



A University of Sussex PhD thesis

Available online via Sussex Research Online:

<http://sro.sussex.ac.uk/>

This thesis is protected by copyright which belongs to the author.

This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the Author

The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the Author

When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given

Please visit Sussex Research Online for more information and further details

WHAT FACTORS – EXTERNAL AND INTERNAL – INFLUENCE A FIRM'S CHOICE OF VOLUNTARY GREENHOUSE GAS MITIGATION ACTIVITIES?

Andrea Claire Harte Smith

A thesis submitted in April 2019 in partial fulfilment of the
requirements for the degree of Doctor of Philosophy

SPRU - Science Policy Research Unit - University of Sussex

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another
University for the award of any other degree.

Signature:.....

HIGH-LEVEL TABLE OF CONTENTS

1	Introduction	22
2	Literature review.....	26
3	Conceptual framework	55
4	Research case	64
5	Research design	85
6	The bank case studies	115
7	The business-to-business (B2B) financial institutions case studies	204
8	The supermarket case studies	237
9	The integrated telecommunication services case studies	297
10	Discussion of research question 1	350
11	Discussion of research question 2	405
12	Conclusions.....	430
13	Bibliography	446
14	Appendices	465

TABLE OF CONTENTS

High-level table of contents.....	2
Table of contents	3
List of figures	13
List of tables.....	15
Abbreviations and conventions	17
Abstract	19
Acknowledgements.....	20
Links with organisations referenced within the thesis	21
1 Introduction	22
2 Literature review.....	26
2.1 Overview	26
2.2 Corporate Social Responsibility (CSR)	27
2.3 Shareholder and stakeholder theories	28
2.4 Principal-agent theory and behavioural theory of the firm	29
2.5 Institutional theory	29
2.6 Corporate Social Responsibility construct and dimensions.....	33
2.7 Terms used within the thesis.....	35
2.8 Factors affecting firms' environmental CSR response/environmental management.....	36
2.8.1 Individuals within firms.....	36
2.8.2 Firm size	38
2.8.3 Firm's available financial resources.....	41
2.8.4 Firm's availability of other (non-financial) resources and capabilities	42
2.8.5 Firm's international experience.....	43
2.8.6 Firm's sector	43
2.8.7 Firm's corporate governance and ownership	44
2.8.8 Investors.....	45

2.8.9	Stakeholders - employees	46
2.8.10	Stakeholders - customers and other stakeholders	47
2.8.11	Other firms.....	48
2.8.12	Regulatory and policy context	49
2.8.13	Polity characteristics.....	52
3	Conceptual framework	55
3.1	Overview of research questions	55
3.2	Conceptual framework	56
3.2.1	Overview	56
3.2.2	Corporate Social Responsibility.....	57
3.2.3	Institutional theory	57
3.2.4	Cyert and March's behavioural theory of the firm	58
3.2.5	Factors associated with firms' environmental CSR/ environmental management.....	58
4	Research case	64
4.1	Introduction	64
4.2	Renewable and low-carbon electricity contractual instruments.....	65
4.2.1	The Guarantee of Origin (GO).....	68
4.3	Impact of renewable electricity contractual instrument purchase on renewable electricity generation capacity.....	71
4.4	GHG accounting issues	73
4.5	The German context	77
4.6	The UK context	78
4.7	Summary.....	80
5	Research design	85
5.1	Philosophical approach	85
5.2	Choice of methodology	86
5.3	Unit of analysis.....	87
5.4	Reflection of conceptual framework in research design.....	88

5.5	Identifying case study firms	91
5.5.1	Sector	92
5.5.2	Available financial resources	92
5.5.3	Firm size	93
5.5.4	Summary of creation of groups of cases	93
5.5.5	Cases in their groups.....	94
5.6	Data gathering.....	95
5.6.1	Data gathering sequence	95
5.6.2	CDP	95
5.6.3	Corporate publications.....	97
5.6.4	Selection strategy for CDP data and corporate publications	97
5.6.5	Interviews	97
5.6.6	Reflexivity	102
5.7	Data analysis.....	102
5.7.1	Qualitative data	103
5.7.2	Quantitative data	103
5.7.3	Reliability and validity	111
5.8	Presentation of the case studies	113
6	The bank case studies	115
6.1	Gamete	115
6.1.1	Data sources	115
6.1.2	Case description.....	115
6.1.3	Overview of data relevant to RQ1	116
6.1.4	Emissions overview.....	118
6.1.5	Activities related to emissions mitigation	121
6.1.6	Factors influencing a firm's GHG mitigation choices (RQ1)	123
6.1.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	131

6.2	Grange	141
6.2.1	Data sources	141
6.2.2	Case description.....	141
6.2.3	Overview of data relevant to RQ1	141
6.2.4	Emissions overview.....	143
6.2.5	Activities related to GHG mitigation.....	146
6.2.6	Factors influencing a firm's GHG mitigation choices (RQ1)	147
6.2.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	156
6.3	Urban	161
6.3.1	Data sources	161
6.3.2	Case description.....	161
6.3.3	Overview of data relevant to RQ1	161
6.3.4	Emissions overview.....	164
6.3.5	Activities related to GHG mitigation.....	166
6.3.6	Factors influencing a firm's GHG mitigation choices (RQ1)	167
6.3.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	177
6.4	Umbrella.....	180
6.4.1	Data sources	180
6.4.2	Case description.....	180
6.4.3	Overview of data relevant to RQ1	180
6.4.4	Emissions overview.....	183
6.4.5	Activities related to GHG mitigation.....	186
6.4.6	Factors influencing a firm's GHG mitigation choices (RQ1)	187
6.4.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	197
7	The business-to-business (B2B) financial institutions case studies	204
7.1	Ursa	205
7.1.1	Data sources	205

7.1.2	Case description.....	205
7.1.3	Overview of data relevant to RQ1	205
7.1.4	Emissions overview.....	207
7.1.5	Activities related to emissions mitigation	209
7.1.6	Factors influencing a firm's GHG mitigation choices (RQ1)	210
7.1.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	218
7.2	Geode	220
7.2.1	Data sources	220
7.2.2	Case description.....	220
7.2.3	Overview of data relevant to RQ1	220
7.2.4	Emissions overview.....	222
7.2.5	Activities related to emissions mitigation	224
7.2.6	Factors influencing a firm's GHG mitigation choices (RQ1)	224
7.2.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	231
8	The supermarket case studies	237
8.1	Goshawk	238
8.1.1	Data sources	238
8.1.2	Case description.....	238
8.1.3	Overview of data relevant to RQ1	238
8.1.4	Emissions overview.....	240
8.1.5	Activities related to emissions mitigation	243
8.1.6	Factors influencing a firm's GHG mitigation choices (RQ1)	244
8.1.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	251
8.2	Upsilon	255
8.2.1	Data sources	255
8.2.2	Case description.....	255
8.2.3	Overview of data relevant to RQ1	255

8.2.4	Emissions overview	259
8.2.5	Activities related to emissions mitigation	262
8.2.6	Factors influencing a firm's GHG mitigation choices (RQ1)	264
8.2.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	273
8.3	Umbra	278
8.3.1	Data sources	278
8.3.2	Case description.....	278
8.3.3	Overview of data relevant to RQ1	278
8.3.4	Emissions overview	281
8.3.5	Activities related to emissions mitigation	284
8.3.6	Factors influencing a firm's GHG mitigation choices (RQ1)	285
8.3.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	293
9	The integrated telecommunication services case studies	297
9.1	Gravadlax.....	297
9.1.1	Data sources	297
9.1.2	Case description.....	297
9.1.3	Overview of data relevant to RQ1	297
9.1.4	Emissions overview.....	300
9.1.5	Activities related to climate change mitigation.....	302
9.1.6	Factors influencing a firm's GHG mitigation choices	305
9.1.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	314
9.2	Upwind	320
9.2.1	Data sources	320
9.2.2	Case description.....	320
9.2.3	Overview of data relevant to RQ1	320
9.2.4	Emissions overview.....	323
9.2.5	Actions related to climate change mitigation	326

9.2.6	Factors influencing a firm's GHG mitigation choices	330
9.2.7	Effect of RECI/LCECI on other GHG mitigation activities (RQ2)	343
10	Discussion of research question 1	350
10.1	Individuals in the firm	350
10.2	International experience.....	351
10.3	Business sector.....	352
10.4	Available finances and cost-savings	354
10.5	Non-financial resources and capabilities and technical issues	356
10.6	Stakeholders	359
10.6.1	Declining stakeholder interest in environmental management	360
10.6.2	Investors.....	361
10.6.3	NGOs – other than NGO CSR rating agencies	361
10.6.4	Employees.....	363
10.6.5	Customers.....	364
10.7	CSR rating agencies	365
10.8	Other firms	370
10.9	Organisational values.....	372
10.10	Regulatory and policy context.....	375
10.10.1	Approach of regulators and policy-makers to RECI/LCECI	375
10.10.2	Other regulation and policies.....	385
10.10.3	Global policy context	386
10.11	Nature of the country of incorporation.....	388
10.12	Reputation and legitimacy.....	389
10.12.1	Reputation, legitimacy and license-to-operate	389
10.12.2	Legitimacy and climate change approach	390
10.12.3	Global financial crisis.....	392
10.12.4	Consistency of approach between internal operations and products	395

10.13	Summary of chapter	395
11	Discussion of research question 2	405
11.1	General comments on the nature of my methods	405
11.2	Findings.....	405
11.2.1	Financial opportunity cost of RECI use	406
11.2.2	Impact on GHG mitigation choices	412
11.2.3	Methods of avoiding displacement	424
11.2.4	Offsets	425
11.3	Summary.....	429
12	Conclusions.....	430
12.1	Distinguishing features of this research	430
12.1.1	Contributions to knowledge from research question 1.....	431
12.1.2	Contributions to knowledge from research question 2.....	433
12.2	Research limitations.....	435
12.3	Implications of research for standard-setters, regulators, policy-makers and firms	438
12.3.1	Implications for standard-setters, regulators and policy-makers	439
12.3.2	Guidance for firms on RECI/LCECI procurement to stimulate extra generation capacity 439	
12.4	Implications of research for practitioners.....	442
12.5	Future research.....	442
13	Bibliography	446
14	Appendices	465
14.1	Detail on use of CDP data sets	465
14.1.1	CDP1 (2003)	465
14.1.2	CDP2 (2004)	466
14.1.3	CDP3 (2005)	466
14.1.4	CDP4 (2006)	466
14.1.5	CDP5 (2007)	466

14.1.6	CDP6 (2008)	467
14.1.7	CDP7 (2009)	467
14.1.8	CDP2010.....	468
14.1.9	CDP2011.....	469
14.1.10	CDP2012.....	469
14.1.11	CDP2013.....	470
14.1.12	CDP2014.....	470
14.1.13	CDP2015.....	471
14.1.14	CDP2016.....	471
14.1.15	CDP2017.....	471
14.1.16	Creating groups of firms	471
14.2	Use of quantitative data for each case	472
14.2.1	Absolute emissions data.....	473
14.2.2	Cost and benefits of mitigating GHG emissions	473
14.2.3	Gamete's quantitative data.....	474
14.2.4	Grange's quantitative data.....	475
14.2.5	Urban's quantitative data.....	475
14.2.6	Umbrella's quantitative data	476
14.2.7	Ursa's quantitative data.....	476
14.2.8	Geode's quantitative data.....	477
14.2.9	Goshawk's quantitative data.....	477
14.2.10	Upsilon's quantitative data.....	478
14.2.11	Umbra's quantitative data.....	478
14.2.12	Gravadlax's quantitative data	478
14.2.13	Upwind's quantitative data.....	479
14.2.14	Banks' electricity/energy intensities.....	480
14.3	Assessment of financial opportunity cost of RECI use.....	492

14.4	Feedback on questions from CSR professionals	493
14.5	Consent form.....	494
14.6	Information sheet	496

LIST OF FIGURES

Figure 1 Diagram of conceptual framework.....	63
Figure 2 Market development for Guarantees of Origin (2009-2016)	70
Figure 3 Case study groups and theoretical and literal replication based on Yin (2014).....	90
Figure 4 Example absolute emissions graph.....	106
Figure 5 Gamete's scope 1, scope 2 and reported scope 3 emissions	120
Figure 6 Gamete's electricity consumption	122
Figure 7 Gamete's available finance	125
Figure 8 Gamete's emissions and electricity/energy consumption intensities and % of consumed electricity covered by RECI	132
Figure 9 Comparison of banks' electricity consumption/FTE employee	134
Figure 10 Comparison of banks' energy consumption/FTE employee	135
Figure 11 Gamete's estimated lifetime tCO ₂ e savings of mitigation measures versus cost savings minus investment cost.....	139
Figure 12 Grange's scope 1, scope 2 and selected S3 emissions	145
Figure 13 Grange's available finance	148
Figure 14 Grange's emissions and electricity consumption intensities and % consumed electricity covered by RECI	157
Figure 15 Grange's energy consumption intensity and % consumed energy covered by RECI.....	158
Figure 16 Urban's scope 1 and scope 2 emissions	165
Figure 17 Urban's available finances.....	168
Figure 18 Urban's emissions and electricity/energy consumption intensities and % electricity covered by RECI/LCECI	178
Figure 19 Umbrella's scope 1 and scope 2 emissions.....	185
Figure 20 Umbrella's available finances	188
Figure 21 Umbrella's emissions intensity and % consumed electricity covered by RECI.....	198
Figure 22 Umbrella's electricity consumption intensity and % consumed electricity covered by RECI.....	200
Figure 23 Umbrella's energy consumption intensity and % consumed energy covered by RECI	202

Figure 24 Ursa's scope 1, scope 2 and reported scope 3 emissions.....	208
Figure 25 Ursa's available finance.....	211
Figure 26 Geode's scope 1 and scope 2 emissions	223
Figure 27 Geode's available finance	225
Figure 28 Geode's emissions and electricity/energy intensities and % consumed electricity covered by RECI.....	233
Figure 29 Geode and Ursa's electricity consumption intensities	234
Figure 30 Goshawk's scope 1, scope 2 and reported scope 3 emissions	242
Figure 31 Goshawk's available finance	245
Figure 32 Goshawk's emissions intensity and % consumed electricity covered by low-carbon energy contractual instruments.....	252
Figure 33 Goshawk's energy consumption intensity and % consumed electricity covered by low-carbon energy contractual instruments.....	253
Figure 34 Upsilon's scope 1, scope 2 and reported scope 3 emissions	261
Figure 35 Upsilon's available finance	266
Figure 36 Upsilon's emissions intensity.....	275
Figure 37 Umbra's scope 1 and scope 2 emissions	283
Figure 38 Umbra's available finance	287
Figure 39 Umbra's scope 1 and scope 2 emissions intensity	295
Figure 40 Scatterplot and trendline of Umbra's emission intensity figures from 1999-2009.....	296
Figure 41 Gravadlax's scope 1, scope 2 and selected scope 3 emissions.....	301
Figure 42 Gravadlax's electricity consumption	303
Figure 43 Gravadlax's available finance.....	307
Figure 44 Gravadlax's emissions intensity and % consumed electricity covered by RECI.....	315
Figure 45 Gravadlax's electricity/energy consumption intensity and % consumed electricity covered by RECI.....	317
Figure 46 Upwind's scope 1, scope 2 and selected scope 3 emissions	325
Figure 47 Upwind's electricity consumption.....	329

Figure 48 Upwind's available finances	331
Figure 49 Upwind's emissions intensity and % purchased electricity covered by RECI/LCECI.....	344
Figure 50 Upwind's electricity consumption intensity and % consumed electricity covered by RECI/LCECI	344
Figure 51 Upwind – lifetime tCO ₂ e savings and estimated lifetime cost savings minus investment	348

LIST OF TABLES

Table 1. Factors included in the conceptual framework.....	62
Table 2 Electricity contractual arrangements and self-generation of electricity	66
Table 3. Timeline of regulatory, policy and methodological changes relevant to accounting for scope 2 emissions from electricity (1997-2018)	81
Table 4 Case study firms in their groups	94
Table 5 Generic questionnaire.....	99
Table 6 Overview of case study interviews.....	101
Table 7 Potential methodological sources of incomparability	110
Table 8 Summary of factors affecting Gamete's GHG mitigating activities – presented by mitigating activity	117
Table 9 Summary of factors affecting Gamete's GHG mitigating activities – presented by factor	130
Table 10 Summary of factors affecting Grange's GHG mitigating activities – presented by mitigating activity.....	143
Table 11 Summary of factors affecting Grange's GHG mitigating activities – presented by factor.....	155
Table 12 Summary of factors affecting Urban's GHG mitigating activities – presented by mitigating activity	163
Table 13 Summary of factors affecting Urban's GHG mitigating activities – presented by factor	176
Table 14 Summary of factors affecting Umbrella's GHG mitigating activities – presented by mitigating activity.....	182
Table 15 Summary of factors affecting Umbrella's GHG mitigating activities – by factor	196
Table 16 Summary of factors affecting Ursa's GHG mitigating activities – presented by mitigating activity	206
Table 17 Summary of factors affecting Ursa's GHG mitigating activities – by factor	217

Table 18 Summary of factors affecting Geode's GHG mitigating activities – presented by mitigating activity	221
Table 19 Summary of factors affecting Geode's GHG mitigating activities – presented by factor	230
Table 20 Summary of factors affecting Goshawk's GHG mitigating activities – presented by mitigating activity.....	239
Table 21 Summary of factors affecting Goshawk's GHG mitigating activities – presented by factor	251
Table 22 Summary of factors affecting Upsilon's GHG mitigating activities – presented by mitigating activity.....	257
Table 23 Summary of factors affecting Upsilon's GHG mitigating activities – presented by factor	273
Table 24 Summary of factors affecting Umbra's GHG mitigating activities – presented by mitigating activity	280
Table 25 Summary of factors affecting Umbra's GHG mitigating activities – presented by factor	293
Table 26 Summary of factors affecting Gravadlax's GHG mitigating activities – presented by mitigating activity.....	299
Table 27 Summary of factors affecting Gravadlax's GHG mitigating activities – presented by factor	313
Table 28 Summary of factors affecting Upwind's GHG mitigating activities – presented by mitigating activity.....	322
Table 29 Summary of factors affecting Upwind's GHG mitigating activities – presented by factor	342
Table 30 Actions of case study firms in relation to regulatory, policy and methodological changes relevant to Scope 2 accounting of electricity emissions	377
Table 31 Modern polity models according to Jepperson (2000, figure 1)	384
Table 32 Summary of factors investigated to answer RQ1, findings and relationship to literature	401
Table 33 Assessment of financial opportunity cost of RECI use	408
Table 34 Summary of data and findings for research question 2 for individual firms.....	413
Table 35 Banks' organisational boundary and excluded sources– CDP data	481
Table 36 Summary of data sources for electricity consumption (MWh) /employee	487
Table 37 Summary of data sources of energy consumption (MWh) /employee	490
Table 38 Feedback on questions from CSR professionals.....	493

ABBREVIATIONS AND CONVENTIONS

B2B – Business-to-business

CDP – CDP was formerly known as the Carbon Disclosure Project

CEO – Chief Executive Officer

CHP – Combined Heat and Power

COP – Conference of the Parties

EHSC – Electricity, heat, steam and cooling

Energy efficiency/saving - Energy efficiency and/or saving. I have used the term “energy” to encompass electricity, heat, steam, cooling and fuel.

Electricity efficiency/saving - Electricity efficiency and/or saving.

ESG – Environmental, social and governance

FTSE – Financial Times Stock Exchange

GHG – greenhouse gas

GO – Guarantee(s) of Origin

KPI – Key Performance Indicator

LCECI - Low-carbon electricity contractual instrument

MNE – Multi-national Enterprises

n.d. – Not dated. A reference for which the date of publication has not been given. Where an author has more than one undated reference, the references have been distinguished by a letter i.e. n.d.a.

NGO – Non-Governmental Organisation

PV - photovoltaic

RE – renewable electricity

REC – Renewable Energy Certificate

RECI – renewable electricity contractual instruments

RECI/LCECI – RECI and/or LCECI

ROI – Return On Investment

RS - Re-stated

RQ – Research Question

S1/2/3 – scope 1/2/3

S1+S2 – Scope 1 added to Scope 2

SDGs – Sustainable Development Goals

SMEs – Small- and Medium-sized Enterprises

UN – United Nations

UNFCCC – United Nations Framework Convention on Climate Change

Y/e – year-end

.... – Indicates superfluous text that has been excised.

[...] - Square brackets indicate that identifying text has been deleted and replaced with words of a similar meaning.

References to CDP datasets - These give the year in which the data was collected e.g. CDP2012 refers to the dataset collected in 2012. This is usually followed by the question number, although “Further Information” sections are sometimes referenced. I have used the CDP data-set extensively. Instead of repeatedly saying that the firm “...provided information in answer to question X in CDP dataset Y”, I have omitted saying “provided information in answer to question” and said instead “CDP Y X said”. If I reference two datasets and the question number is the same in both, I have only written the question number once.

References – Where the reference is given before the full stop in a sentence, the reference relates to the sentence only. Where the reference is given after the full stop, the reference relates to the preceding sentences.

In-text citations – These give the author, date of publication and – where appropriate – the page number. This is not usually prefaced by the “p.” to indicate page number. However, if I assessed it may be unclear what the number refers to, I have used the abbreviation “p.”. Where the author and the date of publication is not sufficient to differentiate which reference is being cited, I have added a letter after the date.

ABSTRACT

This research provides the first empirical evidence on an aspect of a topical debate about firms' claims over their use of renewable electricity. Increasingly firms – many among them the biggest globally – say they use renewable electricity (RE). Unless they generate their own electricity, they often make this claim based on the use of green tariffs or certificates that document the production of a quantity of RE. However, several studies indicate that such contractual instruments have done little to increase RE generation capacity in Europe. Furthermore, it has been argued this activity could impede other actions by firms that reduce carbon emissions. As firms frequently attribute zero emissions to their electricity consumption covered by these renewable electricity contractual instruments, their reported emissions can plummet. This could reduce the motivation for activities such as improving energy efficiency – a possibility which has not been investigated before empirically.

Focusing on 11 of the largest firms in Europe, I ask what factors influence their voluntary greenhouse gas mitigation choices regarding renewable and low-carbon electricity contractual instruments. Secondly, I ask what effect their use has had on their other greenhouse gas mitigation activities. Taking an institutional theory and Corporate Social Responsibility (CSR) perspective, I integrate documentary evidence on firms' carbon emissions and mitigation activities – in some cases employing more than a decade of data - with interviews with managers and senior staff. I conduct multiple case studies, selecting firms to facilitate analytical generalisation (Yin 2014).

A key insight into the influences on firms was the power of CSR ratings agencies. I found instances of firms making or considering changes to operational practice – such as renewable electricity contractual instrument use - due to rating agencies. Displacement and potential displacement of firms' focus on other mitigating activities was found in limited circumstances. For energy efficiency/savings, this depended on three circumstances which I characterize. I assess the possible outcomes if expenditure on contractual instruments had been spent instead on internal mitigating activities e.g. energy efficiency or on offsets. Based on my findings, I recommend specific changes to carbon reporting practices that are relevant to firms, policy-makers and standard-setters.

ACKNOWLEDGEMENTS

Researching and writing a thesis is a solitary journey, but there have been several welcome companions on the way who deserve my thanks. Firstly, I want to thank my supervisors, Professor Gordon MacKerron and Dr Karoline Rogge, for their wisdom, encouragement and inspiration, also my initial supervisor Professor Steven Sorrell and the Economic and Social Research Council who together gave me the chance to begin this journey. My former employer CDP gave me access to the datasets that I used so exhaustively in my research as an extension of the staunch belief of the founder, Paul Dickinson, in the power of knowledge. The people that I interviewed gave very generously of their time and were essential to this research. My friends, Dr Sally Brooks, Dr Nicolette Fox, Clare Hillman, my parents Gerald and Susan Smith, have given vital support along the way, but above all I must thank my partner Nolly Bradshaw for her unswerving support in everything.

LINKS WITH ORGANISATIONS REFERENCED WITHIN THE THESIS

I worked for the environmental NGO CDP, formerly known as the Carbon Disclosure Project, as a technical manager between 2007-2013. I maintain an informal link with them. They allowed me to access their databases, which would normally have to be paid for¹, and use a CDP email address on condition that I use the title *CDP research associate* in conjunction with the email address and share my findings with them. No money was exchanged. In my final year at CDP, I was seconded to work on GHG accounting issues at the Department of Food, Environment and Rural Affairs, working on some of the documents referenced in chapter 4 on the research case. I was also a member of the technical working group contributing to the “*GHG Protocol Scope 2 Guidance, an amendment to the GHG Protocol Corporate Standard*” (Sotos 2015a).

¹ A certain level of access is free, but the level of access that I had would normally have to have been paid for (CDP n.d.b).

1 INTRODUCTION

Interest among industrial and commercial consumers in renewable electricity appears to be growing. RE100, a membership organisation that encourages firms to commit to using 100% renewable electricity, reported that its members' collective demand had increased by 49% between 2017 and 2018 (RE100 2018). In its first report on corporate sourcing of renewable electricity, the International Renewable Energy Agency (2018) found 465 TWh of renewable electricity was deliberately procured or produced for own consumption by firms in 2017. This figure - based on 2,400 firms globally - was close to the total electricity consumption of France and represented about 3.5% of total electricity demand in the commercial and industrial sector globally.

Although the International Renewable Energy Agency report says that the renewable electricity was procured by firms, one cannot choose the method of generation of individual units of electricity consumed from the grid (Raadal 2012). Instead firms expressed their demand for renewable electricity from the grid by using contractual arrangements, such as green tariffs. These contractual arrangements - or contractual instruments as they are known (Sotos 2015a) - accounted for 60% of the 465 TWh figure.

On the face of it, firms' use of renewable electricity contractual instruments could be a useful driver to curbing emissions from electricity generation which, together with heat production, accounted for 25% of global greenhouse gas (GHG) emissions in 2010 (IPCC 2014, Figure SPM.2). However, Brander, Gillenwater and Ascui (2018) argue that use of renewable electricity contractual instruments does not increase the amount of renewable electricity generated, except in specific circumstances that are rarely encountered. Instead increases in renewable capacity are due to the economic viability of the renewables or public subsidy where they are not viable.

This argument has been supported by empirical research in Europe, the area of focus of this research (Wüstenhagen and Bilharz 2006, Markard and Truffer 2006, Raadal et al. 2012, Hast et al. 2015, Hufen 2016, and Mulder and Zomer 2016). These studies have mainly focussed on demand from households with Hufen (2016) and Mulder and Zomer (2016) including demand from small firms. However, it can still offer insight into the effect of demand from firms. In fact, Markard and Truffer (2006) and Raadal et al. (2012) do not distinguish between demand from the domestic and non-domestic sectors. This is valid as the contractual instrument researched by Raadal et al. (2012), Hast et al. (2015), Hufen (2016), and Mulder and Zomer (2016) - that is the Guarantee of Origin - is common to both domestic and non-domestic markets. Therefore, estimates about its prices apply to both (Jansen 2017). Furthermore, the Guarantee of Origin often underpins the eco-labels and tariffs researched by Wüstenhagen and Bilharz (2006) and Markard and Truffer (2006) (see section 4.2). Therefore, the assessment that renewable electricity contractual instruments have done little to produce extra renewable generation capacity due to the small - if any - premium attached to their use also applies to business use.

However, not only is there concern that use of these contractual instruments is producing few benefits in terms of extra capacity, there is also concern that they can lead to a detrimental effect on other GHG mitigating activities that firms may undertake. Brander et al. (2013) and Brander et al. (2015) argue that the reflection of contractual instruments in firms' GHG emission inventories may disincentivise other GHG mitigating activities. This is because firms may dramatically reduce electricity-related emissions in their inventories by attributing zero emissions to grid electricity covered by renewable electricity contractual instruments (RECI).

This leads to my research questions. The first aims to understand why firms in Europe use RECI. I have widened the question to include low-carbon electricity contractual instruments (LCECI) as - in my experience - they have formed important components of some firms' portfolio of GHG mitigating actions. I take a broad look at the question, considering RECI/LCECI use within the context of firms' portfolio of GHG mitigating activities to understand the role they play. In the second research question, I look at the impact RECI/LCECI use has had on other GHG mitigating activities.

The two research questions (RQ) are:

RQ1. What factors influence a firm's voluntary GHG mitigation choices with regard to renewable and low-carbon electricity contractual instrument use?

RQ2. For those firms that have used renewable and low-carbon electricity contractual instruments, what effect has this had on other GHG mitigation activities?

Regarding RQ1, research has been conducted on the motivation for North American firms to use RECI (Wiser, Fowlie, and Holt 2001, Berkhout and Rowlands 2007, Gliedt et al. 2010, Gliedt and Parker 2010) and there is a paper on German Small- and Medium-sized Enterprises (Rahbauer et al. 2018). Therefore, there is a lack of research relating to large European firms which I will address. RQ2 has not yet been investigated in any context despite the proposition by Brander et al. (2013) and Brander et al. (2015) that RECI use could reduce firms' focus on other GHG mitigating activities. This dissertation will therefore be the first to provide empirical evidence into this proposition.

Beside the green tariffs mentioned earlier, the term *contractual instrument* includes contracts directly with electricity generators and certificates verifying the production of so many MWh of renewable electricity or low-carbon electricity such as Combined Heat and Power-generated electricity. To be clear, these certificates - known as energy attribute certificates - are not the certificates used in renewable electricity quota schemes. (Sotos 2015a) I chose Germany and the UK as the contexts for my research as these countries have different policy approaches to the Guarantee of Origin, which is a commonly-used energy attribute certificate within the European Union and Iceland, Norway and Switzerland (Kuronen and Lehtovaara 2017, Marty 2017).

A case study approach was employed to answer the research questions, using a selection strategy suggested by Yin (2014) to facilitate analytical generalisation. My unit of analysis was the firm or group of firms incorporated in Germany or the UK, although I just refer to firms for ease. From each country, I had two firms from the banking sector, one business-to-business financial institution, and one telecoms firm. In addition, I had one supermarket chain from Germany and two supermarket chains from the UK. All 11 are major, well-known firms. For each of these, I integrated data from corporate publications and data from an environmental NGO CDP (formerly known as the Carbon Disclosure Project). Using this, I mapped GHG emissions and mitigation activities over several years. This data was complemented with interviews with managers or senior staff from all but one of the firms.

I took a Corporate Social Responsibility (CSR) perspective on the use of RECI/LCECI as the data that I used frequently appears in corporate publications entitled CSR report. Lockett, Moon, and Visser (2006) and van Oosterhout and Heugens (2009) concluded that CSR research should be regarded as a cluster of investigations with multiple concepts and theoretical approaches. I decided therefore that I would use a description of the common features of CSR theory and practice given by Crane, Matten and Spence (2013) as a reference point in discussing with firms the influence of notions of CSR on their use of RECI/LCECI. Crane, Matten and Spence's review found the common features were: voluntary actions, going beyond philanthropy, recognising parties other than shareholders as stakeholders, managing external side-effects of business activities e.g. pollution, and attempting to align social and economic responsibilities. Another common feature of CSR theory and practice was that CSR was considered as entailing holding certain values.

A further theoretical component was institutional theory which provided a further lens through which I viewed my research data. Institutional theory considers the construction and effect of institutions, such as laws and social norms (Suchman 1995, Hall and Taylor 1996, Scott 2014).

The next chapter – the literature review – considers both institutional theory and the field of CSR research in more depth. I focussed on CSR literature related to environment issues, as opposed to CSR research that covered social issues or employee relations, for example. However, I also included research on environmental management which does not take a CSR perspective as my intention was to take a broad look at firms' GHG mitigating activities, some of which may not be CSR-motivated. Based on these literatures, I identified factors which I intended to consider in my research for RQ1.

In chapter 3 I explain the concepts that have influenced my thinking on the RQs and how I have used the literature review to develop a conceptual framework. Chapter 4 sets out the context for my investigation. It begins with a review of different types of electricity contractual instruments. This is followed by a summary of research on the impact of their use on renewable generation capacity in Europe. I then describe the GHG accounting practices that led to the arguments of Brander et al. (2013) and Brander et al. (2015)

about the impact of RECI/LCECI use on firms' other GHG mitigating activities. As my cases are incorporated in either Germany or the UK, I lay out relevant regulations and policies for both countries.

Chapter 5 covers my research design and method – case studies. This chapter explains how I selected my cases and how I gathered and analysed data, particularly my use of the database on corporate climate change activity assembled by CDP, my former employer. As I have a personal connection to CDP, I include reflections on this link for my research. I conclude the chapter by explaining how I present the data that I have gathered in the case study chapters.

Most of the thesis is devoted to the case studies of firms (chapters 6-9). The case studies are grouped by business sector. Each case study begins with a description of my data sources and of the firm itself. I follow with an overview of data relevant to RQ1. This is also presented as a table, organised by GHG mitigating activity. After this, I delve into the detail for each case, presenting an overview of their absolute emissions, detail on their mitigating activities, and data relevant to factors included in the conceptual framework, along with other factors raised by the firms. This is summarised in a table that describes the influence of each factor on GHG mitigating activities. This provides an alternative perspective to the initial table, which is organised by GHG mitigating activity. The case study then moves onto RQ2, presenting relevant graphical and qualitative data.

Data for RQ1 and RQ2 is predominantly evaluated in discussion chapters 10 and 11 respectively. Chapter 10 is organised by the factors I selected for the conceptual framework and additional factors raised by the firms. It concludes with a focus on key findings. In addition, all the findings and their relationship to existing literature is set out in a table. Chapter 11 begins with a discussion on the nature of my methods, moves to findings on the financial opportunity cost of RECI/LCECI before discussing their impact on other GHG mitigation activities. The final chapter, chapter 12, is the conclusion in which I describe the contributions to knowledge made by my thesis and its implications for policy-makers and standard-setters.

Finally, the appendices detail my process for selecting cases, pinpoint sources of data and provide other background information on my methods of investigation.

2 LITERATURE REVIEW

2.1 OVERVIEW

The purpose of this thesis is to understand the factors that affect firms' use of renewable electricity contractual instruments (RECI) and low-carbon electricity contractual instruments (LCECI) and what impact they have on other GHG mitigating activities. Firms' portfolios of mitigating activities may be assembled with a variety of considerations in mind. Energy efficiency/saving may lead to cost-savings (Sorrell et al. 2004). There have also been legal requirements in relation to use of refrigerants with high Global Warming Potentials², e.g. EU directive EC 517/2014 (European Commission 2016), and energy efficiency, e.g. the UK's CRC Energy Efficiency scheme (Department of Energy and Climate Change 2014). These examples entail motivations of profit maximisation and compliance with regulatory institutions. However, RECI and LCECI use is not compulsory for firms in Germany and the UK and may entail extra costs (see chapter 4). Therefore, a different motivation for their use was assumed.

The data that I used on RECI/LCECI use and GHG emissions frequently appears in corporate publications entitled corporate social responsibility (CSR) report or corporate responsibility or sustainability reports. The latter two often contained similar material to CSR reports. I therefore decided to begin the literature review with an overview of CSR research as this was how – *prima facie* - firms were framing these activities. However, I proceeded with the expectation that other GHG mitigation activities may have different drivers.

My unit of analysis is the firm or group of firms. So, after the overview of CSR research, my next step is to consider conceptualisations of the firm and in whose interests it is run. Given the centrality of stakeholders to common conceptions of CSR, I will cover stakeholder theories and the juxtaposition of stakeholders to shareholders before considering behavioural studies of the firm, i.e. principal-agent theory (A. Smith 1776) and Cyert and March's Behavioural Theory of the Firm (1963).

Institutional theory has influenced my perspective and is frequently cited in research on CSR and corporate environmental management. Institutional theory has a long history and crosses three disciplines. Therefore, I delineate the variants and explain the approach I have chosen.

Finally, I turn to research on influences on firms' environmental CSR response. I make the case for focussing on the relationship between these factors and specific aspects of CSR, rather than the construct of CSR as a whole. However, as my intention is to take a broad look at firms' GHG mitigating activities to

²The global warming effects of GHGs other than carbon dioxide are benchmarked against the effect of carbon dioxide. These ratios are known as Global Warming Potentials. They vary with the period over which the warming is assessed and the source document (GHG Protocol 2016).

understand the context within which RECI/LCECI use sits, I have included papers on environmental management that do not take a CSR perspective. I have excluded literature on firms' disclosure or reporting of their environmental management to focus on the factors associated with practices and outcomes which are more relevant to my research questions. I explain how I used prior research to guide my investigation is explained in chapter 3 on the conceptual framework.

2.2 CORPORATE SOCIAL RESPONSIBILITY (CSR)

Crane, Matten and Spence's (2013) description of common characteristics of CSR practice and theory is a useful place from which to begin a discussion of CSR. It encompassed values as well as practices. It entailed voluntary actions, going beyond philanthropy, recognising parties other than shareholders as stakeholders, managing external side-effects of business activities, e.g. pollution, and attempting to align social and economic responsibilities. It is a good starting point because this field of research lacks a dominant theoretical framework. Lockett, Moon and Visser (2006) and van Oosterhout and Heugens (2009) evaluated CSR research as a loose group of investigations with several concepts and theoretical approaches. As Brown and Forster (2013) summarise, theories may be normative, such as Brown and Forster's own theory and Scherer and Palazzo's (2007) Habermasian perspective, or instrumental, such as Wartick and Cochran (1985). Normative theories argue for CSR response from a moral or philosophical standpoint while instrumental theories argue that it is in firms' interests to be socially responsible. For example, McWilliams and Siegel (2001) presented a cost-benefit approach to determining the optimal level of CSR response bearing mind that it may confer advantages such as differentiating products or enhancing reputation. Russo and Fouts (1997) used the resource-based view of the firm to show a link between environmental CSR and economic performance.

It should be noted that Crane, Matten and Spence (2013) acknowledge that the elements they identified are not found in all views of CSR e.g. its voluntary nature. This is contested. Some researchers have created a new term "*implicit CSR*" for activities that are required by regulation and custom (Matten and Moon 2008).

"By "implicit CSR," we refer to corporations' role within the wider formal and informal institutions for society's interests and concerns. Implicit CSR normally consists of values, norms, and rules that result in (mandatory and customary) requirements for corporations to address stakeholder issues and that define proper obligations of corporate actors in collective rather than individual terms." (Matten and Moon 2008, 409)

Implicit CSR is juxtaposed with explicit CSR which is defined as "...corporate policies that assume and articulate responsibility for some societal interests" (Matten and Moon 2008, 409). Furthermore, the question of "Who is a stakeholder?", which is discussed in the next section, gives more opportunities for

debate. Nevertheless, Crane, Matten and Spence's description (2013) was a useful benchmark to use in discussions with interviewees.

2.3 SHAREHOLDER AND STAKEHOLDER THEORIES

As stakeholders are key to commonly-held conceptions of CSR, I turn to different conceptions of stakeholders and stakeholder theories. To begin with though, I situate the concept of a stakeholder in relation to that of a shareholder and the debate on in whose interests a firm should be run.

Freeman (1999) reminds readers that “*stakeholder*” is a deliberate juxtaposition to “*shareholder*” to make the point that it is not only people with money invested in a firm that have a stake in its actions³. However, to what extent should those interests be taken into account by a firm's managers? M. Friedman (1970) argued that a firm should be run in accordance with the wishes of its owners, which will generally be to maximise profit. To use his famous quote from an article in New York Times Magazine, “*There is one and only one social responsibility of business - to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say that it engages in open and free competition without deception or fraud.*” (p.6). M. Friedman accepted that cases might exist where the firm owners have a different purpose, such as the establishment of a hospital, but the principle remained; a firm should be run for its owners.

The contrasting position to shareholder primacy is the concept of responsibility to a wider group of stakeholders. Freeman's seminal 1984 book defines stakeholders as “*...individuals and organizations that affect or are affected by an organization's purpose*” (Kindle edition, sec.1316). However, there are many definitions of stakeholders; A.L. Friedman and Miles (2006) found 55. Starik's (1995) definition of stakeholders includes non-human entities. A. L. Friedman and Miles (2006) also found and categorised 33 stakeholder theories according to a typology from Donaldson and Preston (1995) of normative, instrumental and descriptive.

In an influential theory, Hart (1995) described instrumental reasons for consideration of stakeholders. Hart extended the Resource-Based View of the firm (Barney 1991) to focus on sources of competitive advantage in a firm's relationship with the natural environment - the Natural Resource-Based View (NRBV). Distinctively Hart gave a role to external parties in gaining competitive advantage through the participation of stakeholders in product development. He also regarded the integration of stakeholder

³ Shareholders clearly have an interest in a firm and so are also stakeholders. However, for brevity in the rest of this thesis the term “*stakeholder*” denotes non-shareholder stakeholders.

views as helping to confer social legitimacy, citing the institutional theory research of DiMaggio and Powell (1983) and Meyer and Rowan (1977). This research has been an important component of this thesis and is discussed in section 2.5.

2.4 PRINCIPAL-AGENT THEORY AND BEHAVIOURAL THEORY OF THE FIRM

An alternative option to firms being run in the interests of shareholders or stakeholders is that managers pursue their own interests. The following two theories both recognise the influence of managers' self-interest.

Agency theory argues that agents, in this instance managers, will advance their own goals as opposed to their principals, in this case shareholders (A. Smith 1776). In Cyert and March's behavioural theory of the firm (1963), organisations are coalitions of individuals and groups (e.g. shareholders, employees, suppliers, firm leaders) with competing interests. Parties will remain in the coalition if they are satisfied with its progress on five business goals related to production, inventory, market share, sales and profits. These goals may frequently conflict and have to be prioritised because of limited ability to deal with all goals simultaneously. In these circumstances, the losing parties may be satisfied with payments (may be monetary or in kind). These payments exceed what is necessary for the efficient operation of the firm and are inducements for the individual/group concerned to remain in the coalition. The difference between the money that is needed for efficient running of the firm and the resources available to the firm is called organisational slack by Cyert and March. They argue that firms are driven by the individuals and groups competing over the allocation of slack, for example, dividend payments, wages, pet projects. There is much more to Cyert and March's theory of the firm. However, these points cover the aspects expected to be most relevant to this research project: slack which is a variable frequently used in environmental management research and the conceptualisation of firms as places of constant negotiations over priorities.

There are other conceptualisations of firms, some of which are outlined in Cyert and March's seminal work (1963). However, given the conceptualisations of firms used in research described later in this chapter, this overview seems sufficient.

2.5 INSTITUTIONAL THEORY

Institutional theories explain the interactions between institutions and individuals and organisations. It is commonly given as a theoretical framework in research on corporate environmental management. Montiel and Delgado-Ceballos (2014) in their review of studies on corporate sustainability – which encompassed environmental management research including CSR responses – found that institutional theory was the most commonly used theory. This section aims to summarise the vast field of institutional theory so that

this research may be situated within it in the conceptual framework chapter. It also introduces definitions of terms used within institutional theory and draws on the seminal work of Scott (2014) on why there may be divergent responses within similar institutional contexts.

As Scott (2014) sets out, institutionalism⁴ has its roots in the early 19th Century. It extends across three disciplines (economics, sociology and political science). Definitions of institutions vary. March and Olsen (1989) describe institutions as rules, procedures, organisational standards, and governance structures. Powell and DiMaggio (1991) additionally include conventions and customs. While Scott (2014, 56) suggests “*an omnibus conception*” of “*Institutions comprise regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life.*” Legitimacy is conveyed by acting in a manner that is legally sanctioned in the case of regulative institutions, morally approved in the case of normative institutions, and understood or recognised in the case of cultural-cognitive institutions (Scott 2014).

Koelble (1995) and Hall and Taylor (1996) described three “*new*” institutional theory approaches or schools of thought - rational choice, sociological, and historical. As it is the “*new*” approaches that I have encountered within my literature review on corporate environmental management, I focus on these. While the schools agree that institutions influence people’s actions, they differ considerably in the relative weight that should be given to the individual, organisational structures and culture in explaining decision-making, and indeed whether structures and culture can be differentiated (Hall and Taylor 1996). Unless stated otherwise, the following summary of salient features of the three perspectives is based on Koelble (1995) and Hall and Taylor (1996).

Rational choice institutionalism has utility-maximising individuals creating and inhabiting institutions to their benefit. These institutions provide degrees of certainty about the actions of other individuals e.g. by penalising contract-breaking. The origin of individual preferences is an open question.

In sociological institutionalism, individuals act as satisficers, rather than utility-maximisers. Institutions provide individuals with interpretation of events, preferences, and moral or cognitive templates for actions. Organisations may adopt practices, not because of effectiveness or efficiency, but to attain social legitimacy. Legitimacy is conferred by conforming to institutions. This does not mean that individuals nor organisations are acting irrationally, but their motivation is to behave in a socially-approved manner rather than maximising utility. For example, Windolph, Harms and Schaltegger’s (2014) study of 109 German companies found that public relations teams were the functional units most frequently involved in

⁴ I use institutionalism and institutional theory synonymously.

implementing CSR initiatives, leading the authors to conclude that the motivation was the search for legitimacy.

There are concerns that a firm's published position on environmental issues may not match its actions e.g. Bowen and Aragon-Correa (2014), Vasiljeviene (2014), Ramus and Montiel (2005), Greer and Bruno (1996), Bortz (2007). Meyer and Rowan (1977) argue organizations may make significant changes to their aspects of their work that are visible to the outside world to achieve legitimacy in the eyes of society, but without altering the core of what they do. An example would be a firm buying in the services of prestigious consultants, but not altering its work procedures as a result of the consultants' recommendations.

Leading sociological institutionalism authors DiMaggio and Powell (1983) proposed three institutional processes to which an organisation conforms to achieve legitimacy. Coercive pressures are exerted by entities on which an organisation depends and may be in the form of regulation or societal pressure. Mimetic processes occur in situations characterised by uncertainty. Organisations respond to a lack of clarity about what to do by copying each other's response. Normative pressures result from the spread of professional codes of conduct, formal and informal, that permeate across organisations. These institutional processes are within a firm's organisational field, which is defined as (p.148) *"...those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products"*.

It is worth noting because of future references to the work of Scott that he placed these three mechanisms in the following categories of institutions: regulative (coercive), normative (normative) and cultural-cognitive (mimetic) (Scott 2014, Table 3.1, p.60). He explains that an organisation may be part of a number of fields (Scott 2014, chap. 8) and that *"...both individual and collective actors serve as the creator and carrier of institutional elements, including logics as well as ways of thinking and working"* Scott (2014, 229). Scott's typology draws out one of the distinguishing features of "new" sociological institutionalism: its emphasis on cognitive frames that affect how individuals understand the situations they encounter.

Historical institutionalism has its roots in political economy and is particularly concerned with the distribution of power among groups trying to affect a political outcome (Koelble 1995). Research from this school has used both rational choice and sociological perspectives to explain decisions e.g. the sociological perspective may explain the menu of options from which an actor chooses the one that best serves his interests, similar to a rational choice perspective. Koelble (1995) and Hall and Taylor (1996) highlight the usefulness of synthesis.

Within institutional theory, the concept of legitimacy has a central role. Suchman (1995) traces the development of legitimacy. Although his review dates from 1995, his definition of legitimacy was still used by Scott in his revisions of his seminal work on institutional theory (Scott 2014). Suchman gave an

encompassing definition (1995, 574); *“Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions.”*

Turning to critiques of institutional theory, Delmas and Toffel (2012) argue that institutional theory does not explain divergent responses of organisations subject to the same institutions. They reviewed empirical evidence indicating that organisational characteristics moderate the influence of institutional pressures, leading to differing responses and said (p.241) *“This novel research stream contributes to institutional theory by exploring how institutional pressures interact with organizational characteristics in influencing managerial decisions in general and environmental strategies in particular.”*

This point is discussed at some length in Scott (2014). Based on reviewed research, he sought to explain divergent responses, not only through varying organisational characteristics, referred to as attributes, but also through differences in the way institutions are experienced by individuals and organisations and through agency on the part of the individual or organisation. As regards differences in the way institutions are experienced, Scott (2014) discusses the role of carriers. These are the means through which institutions are relayed e.g. artefacts, governance systems, symbols, activities (Jepperson 1991, Scott 2014). Scott (2014) found in the literature that the mode of transmission could alter the experience of the institution. Given the diversity of these carriers, one can appreciate that they may nuance the message they convey, opening the door for divergent responses.

Another example of a source of divergence given by Scott is *“...varying relational connections that affect knowledge of or response to institutional pressure”* (2014, 216). In my opinion, a study by Pulver (2011, 581-593) is illustrative of the effect of different relationships. She found oil firms were connected to different networks, even within their organisational field. These networks led to different estimates on the profitability of alternatives to conventional oil and gas, the development of the carbon market and the importance of CSR and hence to different business strategies.

Scott (2014) identifies two more sources of divergence in strategic responses by individuals, organisations and their networks, e.g. an association, to institutions. These sources of divergence refer to instrumental responses by organisations designed to advance their own interests. They lead to a tension in Scott's (2014) approach; if individuals and organisations have latitude in how they respond to institutions, do institutions lose their distinctiveness and is legitimacy reduced to a resource to be acquired? Some institutionalists do view legitimacy as a resource, as Suchman describes in his 1995 overview. In this perspective, organisations purposefully try to attain legitimacy, maybe competing against their peers, to

receive a desired level of support of some kind⁵. However, Scott (2014) – while accepting that organisations may act strategically or instrumentally – maintained the special nature of institutions that means that organisations' response to them may at times be an automatic reaction, the pros and cons of which have not been evaluated. The following quote illustrates the special nature of institutions for Scott and like-minded institutionalists; *"Like some other invisible properties such as oxygen, the importance of legitimacy becomes immediately and painfully apparent only if lost, suggesting that it is not a specific resource, but a fundamental condition of social existence."* (Scott 2014, 72). For me, this view is akin to the second perspective described by Suchman (1995) in which organisations co-construct the institutions with the audiences of their actions with access to resources a by-product of fitting in, rather than an end in itself. I have taken this perspective in this research.

2.6 CORPORATE SOCIAL RESPONSIBILITY CONSTRUCT AND DIMENSIONS

In this section, I make the case that social and environmental responses to CSR should be considered separately and explain how this influenced my literature review.

In their meta-analysis of the relationship between corporate environmental performance and corporate financial performance, Endrikat, Guenther and Hoppe (2014) make a strong case for not confounding findings about constructs that include firm's performance on social and environmental issues with findings about corporate environmental performance alone. Based on their literature review, they argue it is methodological invalid and that empirical findings that show that assessments of constructs that include both social and environmental dimensions do not necessarily correspond to assessments of environmental performance. This argument is supported by the following research.

Bansal, Gao and Qureshi (2014) found that corporate social commitment and corporate environmental commitment should be considered separately because their implementation by firms is very different. Their research using institutional theory found that US firms adopted at least a moderate level of corporate social commitment but tended to polarise on the degree to which environmental practices are implemented.

Miras-Rodríguez, Carrasco-Gallego and Escobar-Pérez's study (2014) of multi-national electric utilities from across the world led them to conclude that environmental management had different motivations to

⁵ This is close to the description given of license-to-operate by Porter and Kramer (2006). They described a business seeking to please its stakeholders, particularly those stakeholders that it wants to tolerate its activities e.g. neighbours of smelly factories or stakeholders whose consent is needed for its business activities to take place e.g. governments giving permission for mining.

other aspects of CSR e.g. community, diversity, corporate governance, product responsibility. Borghesi, Houston and Naranjo (2014) looked at associations between firm characteristics across arrange of sectors and performance on different dimensions of CSR (e.g. community, environment) and an overall CSR construct as part of a study on CEO motivations. They found that while the construct and its different dimensions shared the same direction of change, there were non-trivial differences in magnitude of change across the different dimensions. Ortas et al. (2015) found that firms incorporated in different countries (France, Japan and Spain) were assessed to have different levels of response to different dimensions of CSR, which the authors attributed to institutional factors, specific to the countries.

Further research found that there can be variation in association between firm characteristics and different activities within a single dimension of CSR. Sharma and Henriques (2005) looked at different aspects of environmental management and its association with firm size in the Canadian forestry industry. Some aspects were positively correlated with firm size; others were not. Bowen (2000) also found that organisational slack – or available resources – had different relationships with different types of environmental management.

This issue of assuming that a factor that affects one dimension of CSR affects all dimensions may seem to apply particularly to statistical research that aggregates different aspects of CSR into a single number. However, it also applies to qualitative research where firms have made comments about stakeholder influences on a particular aspect to CSR response, but these are taken to apply to the construct as a whole e.g. Table 2 in Bondy, Matten, and Moon (2008).

There are other difficulties associated with treating CSR responses at too high a level of abstraction. CSR is a very broad concept. Deciding what constitutes good practice, operationalising this and then weighting the different components to create an overarching score on CSR response requires many decisions to be taken – some of which will be highly subjective. This is shown by the lack of commensurability of six of the best-known CSR ratings (Asset4, FTSE4Good⁶, KLD Research and Analytics, Dow Jones Sustainability Index (DJSI), Calvert and Innovest) found by Chatterji et al. (2016). Adjusting the ratings to account for different theorizations of what fell within the scope of CSR did not systematically improve commensurability, showing that even when the ratings were assessing the same aspect of CSR e.g. employee safety or board independence, they were doing so in different ways. Porter and Kramer (2006) drew similar conclusions.

Therefore, to reduce the pitfalls of assuming that variables that influence a composite indicator of CSR response apply equally to my research case, I have restricted my literature review to the environmental

⁶ FTSE – Financial Times Stock Exchange.

dimension of CSR (and environmental management for reasons explained in section 2.1). However, I have not gone as far as the findings of Sharma and Henriques (2005) might suggest in terms of considering only the factors found to have influenced RECI/LCECI use as this would severely restrict the research available to me and my purpose in the literature review was to identify potential factors.

2.7 TERMS USED WITHIN THE THESIS

This research is about the factors that influence a firm's GHG mitigation strategy and its outcomes. As discussed in section 2.1, frequently mitigating actions are described in documents that are labelled as CSR or corporate responsibility reports. As this research considers the outcomes of firms' actions, would it be appropriate to use the term *Corporate Social Performance* (CSP) for these outcomes? Gond and Crane (2010) find that CSP is generally seen either as an umbrella concept, encompassing principles, processes and outcomes, or as the actions and outcomes taken by a firm CSR providing the principles. This latter approach would seem appropriate. However, Gond and Crane (2010) find that CSP research has been plagued by ambiguities and is theoretically undeveloped with weak empirical support.

Because of the ambiguity over its meaning, which could be layered over the ambiguity of the meaning of CSR, I have used the term *environmental CSR response* to include policies, pledges and practices related to environmental CSR. These are instigated by the firm in response to a perception that it has - or is perceived to have - a responsibility for the environment. When the outcomes of these practices are being discussed, I have used the term *environmental CSR outcomes*. I have not used *CSR performance* to avoid conflation with the contested term of CSP.

If a paper in the literature review concerns environmental management without the CSR framing, I have used *environmental management* for relevant policies, pledges and practices. Where the result of these activities is discussed, I have used the term *environmental management outcomes*. I also use the term *GHG mitigating activities*.

Stakeholder is used to indicate a non-shareholder stakeholder to make the text less cumbersome.

As already described in chapter one, the research case concerns renewable electricity and low-carbon electricity contractual instruments. In brief, contractual instruments are "*Any type of contract between two parties for the sale and purchase of energy bundled with attributes about the energy generation, or for unbundled attribute claims*" (Sotos 2015a, 101). Low-carbon electricity contractual instruments includes contractual instruments applying to electricity from high-efficiency Combined Heat and Power plants (CHP).

2.8 FACTORS AFFECTING FIRMS' ENVIRONMENTAL CSR RESPONSE/ENVIRONMENTAL MANAGEMENT

This section looks at research that has investigated characteristics of firms and their association with an environmental CSR or environmental management response. Research in the latter category does not take the view that the environmental management was motivated by CSR. To avoid cumbersome phrasing, I have referred to papers of both types as environmental management literature. However, I make clear any perspectives on motivations in the descriptions of the research papers.

The following sections cover variables where a trend has emerged on a simple vote count method of noting how many papers found a positive/negative/no association between a factor and environmental management. Papers where the methodology led me to conclude that the findings were not robust were excluded from the following review. I have also excluded variables only studied by one paper. Variables where no trend emerged were also excluded with the exception of research on the characteristics of the polity in which the firm operates. Although no clear trend emerged, the nature of the polity in which a firm operates is such a wide-ranging issue that I have included the research, so the reader can see why I reached this conclusion. The reason for these exclusions was to make the literature review less lengthy.

I begin with looking at research on the role of the individual within firms before moving to firm characteristics, then the organisational field within which they operate, a term from institutional theory (section 2.5).

2.8.1 INDIVIDUALS WITHIN FIRMS

There is a considerable amount of environmental management literature looking at the role of individuals within a firm. In considering this literature, I begin with the firm's leadership and then move down the hierarchy, focussing throughout on associations with environmental management. First, I place this literature on firm leadership into a wider context.

There has been a debate in management literature on whether top executives are powerful influences on their firms. Cannella, Finkelstein and Hambrick (2009, chap. 2) describe the debate and the studies that found negligible leadership effect on the outcomes of firms. However, they critique some of this evidence and argue that there are many that do support the existence of managerial influence. They build on Hambrick and Finkelstein's concept of managerial discretion to argue that managerial discretion to act varies according to numerous factors from firm characteristics to the environment in which it operates and a manager's own characteristics (Hambrick and Finkelstein 1987). Subsequent research found a national dimension to managerial discretion; Crossland (2007) found that leadership in Anglo-American countries had greater scope to act than northern European and East Asian countries.

Looking specifically at evidence on environmental management responses, Russo and Minto (2012) and Howard-Grenville and Bertels (2012) conclude that their overviews of research demonstrate links between firm leadership views and environmental management of firms. Using data from a survey of Canadian industrial firms and facilities, Boiral, Henri and Talbot (2012) found that internal motivations were positively associated with GHG reduction commitments. The items included under the category of internal motivations were mixed in nature, so not too much weight is attached to this finding, but one was “*Top managers’ social responsibility and ethical concerns*”.

Gliedt and Parker (2010) found an association with firm leadership and the decision to purchase “*green electricity*”, which I infer from the paper means renewable electricity. They conducted a survey of North American organisations (firms, SMEs, NGOs and government agencies) buying RECI. Much of the research concerns differences in approach between these types of organisations. However, in the results for large firms only, environmental champion was chosen by 68% of firms as the most important or very important factor that influenced the RECI purchase decision. In 62% of cases, this person was the owner/CEO/executive director. They found that the person who decided to buy RECI was the owner/CEO/executive director in 50% of cases. This is a very senior level of management to be involved in such a decision. However, the firms in the large category were still quite small (more than 20 employees). Gliedt et al. (2010) in a case study investigation of the factors that influence “*green electricity*” purchase by firms in Alberta, Canada, found that the presence of an environmental champion advocating RECI use was the dominant driver.

Taken together, there is a basis for considering the influence of firm leadership on environmental management. In the rest of this section, I shall review evidence for the influence of employees further down firms’ hierarchies on their GHG mitigating activities.

Pulver (2007) found that managers were instrumental in a major Mexican oil firm adopting a policy to mitigate the effect of its activities on climate change. Looking at the large firm category in Gliedt and Parker (2010), in 29% of cases it was a manager and the decision to buy RECI was taken in 44% of cases by a manager. Using a framework of institutional theory and the resource-based view, López-Gamero, Claver-Cortés and Molina-Azorín (2011) found that managers’ perception of a competitive advantage in pursuing sustainability influenced the environment management response in the Spanish hotel industry.

Viewed overall, the implication for this research is that a firm’s leadership and managers can be a potential positive influence on the environmental management of firms, depending on their views. The influence of individuals within a firm should be considered in this investigation of factors affecting firms’ GHG mitigating activities.

2.8.2 FIRM SIZE

This section begins with a review of the evidence of association between firm size and environmental management (see section 2.8.2.1). Firm size is a widely-used variable in investigating factors associated with environmental management. However, it is variously operationalised which is discussed in section 2.8.2.2. In addition, it may have different implications for environmental management e.g. by affecting firm visibility, available resources and the pool of employee capabilities. Yet its multi-faceted nature is rarely discussed. (Bowen 2000) Section 2.8.2.3 will discuss its different facets, drawing on the work of Bowen (2000) who tried to identify what aspects of firm size may be associated with environmental management. Bowen concluded that much of the variation in environmental management attributed to firm size may be accounted for by firm visibility and organisational slack, a concept derived from the work of Cyert and March (1963). I continue the discussion on firm visibility within section 2.8.2.3 and consider different aspects of organisational slack - available financial resources and the availability of other, non-financial resources - in sections 2.8.3 and 2.8.4.

2.8.2.1 Research on firm size and environmental management

I begin by summarising relevant research before concluding that most studies discern a positive association between firm size and environmental management. In the following section, I consider the operationalisation of firm size used in this research.

Looking firstly at firms based in Europe before moving further afield, Chapple et al. (2001) found firm size was positively related to environmental investment to meet voluntary standards in UK manufacturing firms. Elsayed (2006) found the size of UK firms was positively associated with firms' possession of an environmental policy. Among firms headquartered in Western Europe, Jackson and Apostolakou (2010) found a positive association between firm size and environmental CSR response in an investigation on the effect of the political economy of the country in which firms were headquartered.

Turning to North America, de Villiers, Naiker and van Staden (2011) found a positive association between firm size and environmental management in an investigation to explain the connection between environmental management and corporate governance in US publicly-traded firms. M.-D. P. Lee and Lounsbury (2011) found larger US firms were more responsive to shareholder activism on pollution management. Kock, Santaló and Diestre (2012) found a negative association between firm size and waste production by US firms, which is in keeping with direction of the relationship found by other research.

Taking a stakeholder perspective on the environmental management of Canadian forestry firms, Sharma and Henriques (2005) found associations between firm size and environmental management were dependent on the environmental management response under consideration. Pollution control, resources

efficiency and recycling measures were positively correlated, but eco-design and re-orientating the business to sustainable business models were not.

Turning to Asia, S.-Y. Lee (2012) found larger Korean firms undertook a broader range of carbon mitigating activities than smaller ones.

However, the pattern is not wholly consistent. Boiral, Henri and Talbot (2012) did not find a relationship between the size of Canadian manufacturing firms and both a commitment to reduce GHG emissions and the actual outcome. Borghesi, Houston and Naranjo (2014) whose research is described in the section 2.6 found that larger firms were less likely to invest in environmental CSR responses.

Despite the findings of Boiral, Henri and Talbot (2012) and Borghesi, Houston and Naranjo (2014), I concluded that the overall picture suggested a positive association between firm size and environmental management.

2.8.2.2 Operationalisation of firm size

This section looks at different operationalisations of firm size. Firm size has been variously operationalised as, for example, turnover (M.-D. P. Lee and Lounsbury 2011), employee numbers (Arora and Dharwadkar 2011, Boiral, Henri and Talbot 2012, S.-Y. Lee 2012, Sharma and Henriques 2005) and total assets (Borghesi, Houston and Naranjo 2014, de Villiers, Naiker and van Staden 2011).

However, these different operationalisations did not appear to be significant. Elsayed (2006) found whether firm size was operationalised as employee numbers, assets or turnover, it was positively associated with possession of environmental policy. Chapple et al. (2001) found different operationalisations of firm size (e.g. turnover, assets) yielded similar results in terms of level of investment in environmental management. Bowen (2000) found a significant degree of correlation between employee numbers, turnover, and total assets in her investigation of the environmental management by UK firms. However, the mechanism by which firm size is associated with environmental management is still not clear and it is to this that I now turn.

2.8.2.3 How is firm size linked to environmental management?

Bowen (2000) investigated whether two mechanisms connecting firm size with environmental management might be visibility and organisational slack. Organisational slack is related to Cyert and March's (1963) view of the firm as a coalition of individuals and groups, often with competing agendas that have to be prioritised. Losing parties may be compensated in monetary or non-monetary ways, so that they remain in the coalition. This is elaborated in section 2.4.

Cyert and March often abbreviate the term *organisational slack* to *slack*. They describe (p.42) organisational slack as *"This difference between total resources and total necessary payments...Slack*

consists in payments to members of the coalition in excess of what is required to maintain the organization." These payments can be excessive dividends to shareholders or expansion of teams within firms without much concern for how much additional revenue they may generate. Bowen investigated organisational slack through looking at financial resources that were available over a range of time-scales and the availability of staff time.

Bowen operationalised visibility using a typology (Bowen 2000, figure 6.2) that captured the prominence of the firm and the prominence of environmental issues associated with it. She found that visibility and organisational slack accounted for much - though not all - of the variation attributed to firm size in the UK firms that she studied. The availability of financial resources is considered further in section 2.8.3 while the availability of non-financial resources - which could include staff time - is discussed in section 2.8.4. In the remainder of this section, I turn to other evidence that supports Bowen's finding on visibility.

The following research supports the importance of visibility. Using an institutional theory perspective, King and Lenox (2000) found that US chemical firms with better known names and brands were more likely to engage in an environmental management programme. Delmas and Montiel (2009) found automotive suppliers were more likely to adopt the voluntary environmental standard ISO 14001 if they reported to the US Environmental Protection Agency's Toxic Release Inventory, which it is argued increased their visibility. G. Jones and Lubinski (2014) found that pressure for environmental action from people neighbouring factories was amplified by the high public profile of the firms to which they belonged. Delmas and Montes-Sancho (2010) looked at US utilities entering into a voluntary agreement with regulators to reduce carbon dioxide emissions per unit of electricity generated. They found early entrants had higher public visibility⁷ (among other characteristics) than late joiners and made more substantive changes to their operations than later joiners. However, evidence is mixed. Borghesi, Houston and Naranjo (2014), whose research is described in the section 2.6, found the relationships between investment in environmental CSR responses and advertising and media exposure were not significant. De Villiers, Naiker and van Staden (2011), whose research was described earlier in this section, did not find a relationship between advertising levels and environmental management.

2.8.2.4 Summary

My conclusion from the literature is that firm size is positively associated with environmental management. Visibility is also positively associated with environmental management. There is limited but persuasive

⁷ Operationalised as being among the top four largest sellers in their state.

evidence that suggests that firm size may be a proxy for firm visibility. Firm size should be considered in this investigation of factors affecting firms' GHG mitigating activities.

2.8.3 FIRM'S AVAILABLE FINANCIAL RESOURCES

As discussed in section 2.8.2.3, available resources – financial and non-financial – are related to organisational slack, a concept from Cyert and March (1963). In the literature review and conceptual framework, I use *available financial resources* and *available nonfinancial resources* in preference to *slack* as this phrasing is more descriptive and *slack* may seem pejorative to practitioners, even though this is not the intention of the academic usage. This section reviews the evidence on the association between available financial resources and environmental management and the operationalisation of available financial resources. To note, although I use the term *available financial resources*, when I describe papers I use the terms employed by the authors.

Bowen (2000) concluded that organisational slack – together with visibility – accounted for much of the association with environmental management that had been attributed to firm size. Financial slack was a component of organisational slack. She investigated financial slack over different time scales from finances that were currently available to those that might be available in the future. I focus here on her metric of *available slack* at firm-level, which is currently available financial resources (2000, figure 7.1, p.184) and its association with environmental management (2000). This is closest to the approach taken by the other researchers in this section. Her findings led her to argue that available financial resources could be used to implement environmental management or shield the firm from external demands for environmental management.

Eesley and Lenox (2006) found a positive relationship between *slack* - defined as income after interest and taxes plus depreciation and amortization - with environmental management in a paper on the circumstances in which firms responded to US stakeholder requests for firm environmental management. Sharma (2000) found the perception of managers in Canadian oil and gas firms of the slack resources – including financial resources - at their discretion was among the factors that influenced whether they perceived environmental issues as threats or opportunities which in turn influenced their choice of environmental management strategy. Borghesi, Houston and Naranjo (2014), whose research is described in section 2.6, found slack proxied by a cash flow variable was negatively associated with environmental CSR responses. Kock, Santaló and Diestre (2012) found that slack (proxied by cash and short-term investments divided by long-term debt) was negatively related with waste production by US firms. De Villiers, Naiker and van Staden (2011) found slack (cash and cash equivalents divided by total assets) was positively associated with environmental management in US publicly-traded firms.

Gliedt et al. (2010) in a case study investigation of the factors that influence “*green electricity*” purchase by firms in Alberta, Canada, found that three of the eight firms studied rejected green electricity use, which I

infer from the paper to be RECI use, on the grounds of cost while a fourth prioritised spending on a social project. The size of the firms varied greatly from an annual revenue of less than CAN\$ 1 million to more than CAN\$ 1 billion.

Sorrell et al. (2004) report that access to capital was one of two main constraints to cost-effective investment in energy efficiency found in the German, Irish and UK firms⁸ studied. The second main constraint was “*hidden costs*” i.e. costs not normally taken into account in financial and engineering evaluations. The most important element of hidden costs was the cost of employing skilled energy managers. Zhuang and Synodinos (1997) found high costs impediments to meeting legislative requirements among chemical firms in the EU. In contrast, Elsayed (2006) did not find a significant correlation between available resources (operationalised as return on assets) and possession of an environmental policy in UK firms.

Overall, the evidence strongly points to a positive association between available financial resources and environmental management. Available financial resources should be considered in this investigation of factors affecting firms’ GHG mitigating activities.

2.8.4 FIRM’S AVAILABILITY OF OTHER (NON-FINANCIAL) RESOURCES AND CAPABILITIES

Taking a resource-based view, López-Gamero, Claver-Cortés, and Molina-Azorín (2008) found a positive correlation between complementary resources and capabilities⁹ and proactivity of environmental management for Spanish firms in the hotel sector and firms covered by Integrated Pollution Prevention and Control regulations. Delmas, Hoffmann, and Kuss (2011) found that absorptive capacity¹⁰ aids the development of proactive environmental strategies that result in competitive advantage (based on a composite construct representing cost advantages, reputation and innovation) in German chemical firms. Pulver (2007) found that a Mexican oil firm’s existing competencies facilitated adoption of an emission reduction target and enabled it to differentiate itself from other firms.

⁸ The organisations studied were the German and UK higher education institutions, UK brewers, Irish mechanical engineering firms and UK constructions firms.

⁹ They use a definition of resources and capabilities needed to derive benefits from a strategy, technology or innovation (Christmann 2000).

¹⁰ Defined as the “*ability to recognize the value of new information, assimilate it and apply it to commercial end*” (Cohen and Levinthal 1990, 128).

The trend emerging from this evidence indicates that availability of resources and capabilities is linked to environmental management and should be considered in this investigation of factors affecting firms' GHG mitigating activities.

2.8.5 FIRM'S INTERNATIONAL EXPERIENCE

There is a high degree of agreement on the influence of firm's international experience. Taking a CSR perspective, Chapple et al. (2001) found industry export intensity (the firm's exports as a proportion of turnover) was positively related to environmental investment in UK manufacturing firms. Borghesi, Houston, and Naranjo (2014) whose research is described in section 2.6 found that firms with a wider geographical spread of sales were more likely to invest in environmental CSR responses. In a survey of Belgium firms, Buysse and Verbeke (2003) found MNEs had more sophisticated environmental strategies than domestic firms. These papers suggest that there is a positive relationship between a firm's international experience and its environmental CSR response. Bansal (2005) suggested that firms with international experience gain insights that they transfer across their operations.

Taken together, the research suggests that firms' international experience is positively linked to environmental management and should be considered in this investigation of factors affecting firms' GHG mitigating activities.

2.8.6 FIRM'S SECTOR

A firm's sector may indicate its environmental impact (Jackson and Apostolakou 2010), its consumer proximity, the organisational field of which it is a part and therefore the institutional forces which it experiences (see section 2.5), such as its regulatory and policy context (see 2.8.12). In this section, I review research on the influence of sector per se, environmental impact and consumer proximity on environmental management.

Turning first to associations between sector and environmental management, the carbon management strategy of Korean firms was found to vary depending on their sector with those in the energy sector focussed more on emission reductions while those in the general service/manufacturing sectors focussed more on reduced environmental impact of products (S.-Y. Lee 2012). Henriques and Sadorsky (1996), who took a stakeholder approach to investigate Canadian firms, found firms in the service sector were less likely to have environmental plans than those in manufacturing and natural resources sectors. Taking an institutional theory perspective, Dögl and Behnam (2015) studied firms in China, Germany, India and the USA. They found that in developed markets, i.e. Germany and the USA, manufacturing firms were more engaged in voluntary environmental management than service firms.

Two studies looked at firms' environmental impact and their environmental management. Jackson and Apostolakou (2010) segregated Western European firms by the environmental impact of their sector, finding that firms in high-impact sectors – which in this study included oil, chemicals, food and beverage and retail - engaged in more environmental CSR responses than the other categories. In the second study, Rahbauer et al. (2018) found the energy intensity of a firm was not a significant factor in the procurement of RECI by German small- to medium-sized enterprises.

Turning to those studies that looked at consumer proximity, Khanna and Anton (2002) found that US stock market-listed firms with toxic emissions were more likely to have better environmental management systems if they were selling final rather than intermediate goods. Anton, Deltas, and Khanna (2004) found US stock market-listed firms selling directly to consumers were more likely to introduce comprehensive environmental management systems. Using 13 years of data, M.-D. P. Lee and Lounsbury (2011) found firms closer to the consumer were more likely to respond to shareholder activism on environmental issues in a study on US publicly-traded firms that emit benzene.

Overall, there is limited, but consistent evidence on a positive association between consumer proximity and environmental management. I cannot see a pattern in either the research that considered sector as a variable nor the research that looked at environmental impact. Nevertheless, a firm's sector will influence both the nature and relative importance of its emission sources, the mitigation options open to it and regulations and policies that apply to it. Therefore, I included sector as a factor to be considered in this investigation.

2.8.7 FIRM'S CORPORATE GOVERNANCE AND OWNERSHIP

By "corporate governance" I am referring to the "... *set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined*" (Organisation for Economic Co-operation and Development 2004, 11). De Graaf and Stoelhorst (2013, 306) argued "*If CSR is about ways to develop a constructive relationship between business and society, then governance structures and systems present themselves as a natural focal point for CSR research.*"

There is considerable research on links between characteristics of corporate governance, the ownership of the firm and CSR responses. A systematic literature review by Jain and Jamali (2016) covered the influence of ownership characteristics (e.g. family, state, block, managerial), board characteristics (e.g. size, diversity, independence), and CEO characteristics. Firms' environmental management was considered separately from other CSR dimensions in some research papers, although these were in the minority. I also limited my consideration of factors to those that had been investigated by more than one

research paper and where an association between the factor and environmental management had been found.

Based on these criteria, the findings on ownership characteristics in Jain and Jamali's (2016) systematic review are mixed if one takes a vote count approach. This applies to block ownership and ownership by different types of actor (family, state, institutional investor, outside director). The strongest picture emerges with managerial ownership where three papers found no effect on environmental management and one paper found a negative effect.

Turning to corporate governance variables other than ownership, the independence of the board (independent directors are not employed by the firm apart from receiving their directorship fees), board interlocks (other directorships held by a director), and board gender diversity emerged as factors that may have an association with environmental CSR response. Board gender representation has a national dimension to it e.g. Germany was considering regulation in relation to this and there are good practice guidelines in the UK (Isidro and Sobral 2015).

In addition to Jain and Jamali's comprehensive review (2016), the following papers were found. Ortiz-de-Mandojana, Aguilera-Caracuel, and Morales-Raya (2016) investigated the effect of institutional forces in different countries and their interaction with corporate governance characteristics by studying firms from North America and Europe. They found a positive relationship between independent directors and environmentally-beneficial product development, but this was weakened in circumstances of exacting regulations, whereas high societal value on environmental protection had the opposite effect.

In summary, prior research suggests that board gender diversity, the proportion of independent directors and prevalence of board interlocks is positively associated with environmental management. However, I did not consider them in this investigation of factors affecting firms' GHG mitigating activities for practical considerations, covered in section 3.2.5.

2.8.8 INVESTORS

Considering investors¹¹ and their association with environmental performance, Delmas and Toffel (2012) found consistent evidence of the effect of shareholder resolutions on environmental issues on improved environmental management even if they did not get passed or even go to a vote. One paper - Reid and Toffel (2009) - even found an impact on other firms that were not the actual subject of shareholder

¹¹ "An investor is any person or other entity (such as a firm or mutual fund) who commits capital with the expectation of receiving financial returns. Investors utilize investments in order to grow their money and/or provide an income during retirement, such as with an annuity" (Chen 2019).

resolutions. M.-D. P. Lee and Lounsbury (2011) found firms' pollution management improved following environmental shareholder resolutions. So, these papers show that if shareholders prioritise environmental management, this is linked with increased environmental management by firms, but to what extent do shareholders prioritise this issue?

Investors – which would encompass shareholders and potential shareholders - are not a homogenous group. There is considerable research – although not specifically about environmental management - showing differences in the association between the composition of ownership (types and proportions of investors) and various CSR constructs e.g. Arora and Dharwadkar (2011), Johnson and Greening (1999), Dam and Scholtens (2012). To add to the complexity, two research papers found association with institutional investors¹² depended on the aspect of CSR under consideration (Aggarwal and Dow 2012, Coffey and Fryxell 1991).

Henriques and Sadorsky (1996) gives a more general picture of shareholder interest in environmental management. They found that shareholders were ranked mid-table by Canadian firms in terms of sources of pressure on environmental issues. Research looking at UK stock-market listed firms found that market value was positively associated with proxies for environmental management (Al-Najjar and Anfiniadou 2012), indicating that investors generally value this activity.

Evidence suggests that investors can be a positive driver of environmental management, although the heterogeneity of investors needs to be recognised. The role of investors should be considered in this investigation of factors affecting firms' GHG mitigating activities.

2.8.9 STAKEHOLDERS - EMPLOYEES

Section 2.8.1 looked at the influence of individuals within firms in shaping environmental management. This section in contrast looks at employees as a group within the firm. Taking a stakeholder approach, Henriques and Sadorsky (1996) found that employees in Canadian firms were the third most important source of pressure to consider environmental issues, ranking equally with efficiency gains. They were ranked after government regulations - current and potential - and the cost of the environmental management. Henriques and Sadorsky (1996) argued that the pressure employees exerted was via accidents due to a lack of training and whistle-blowing, although the nature of employee pressure was not specified in their survey. Wiser, Fowlie, and Holt (2001) found that improving employee morale was the

¹² “An institutional investor is a nonbank person or organization that trades securities in large enough share quantities or dollar amounts that it qualifies for preferential treatment and lower commissions.” Examples are: endowment funds, commercial banks, mutual funds, hedge funds, pension funds and insurance companies. (Investopedia 2003)

most important motivation for business, not-for-profit and public sector consumers to buy RECI in the USA, aside from altruism. Kassinis (2012) in an overview of literature found staff satisfaction could be improved by a positive reputation on environmental issues.

So, there are three articles: one finds employees to be a source of pressure; the second finds that improving employee morale was a motivation for environmental management; the third – a literature overview – finds that there were beneficial staff outcomes from a reputation for environmental management. So, these papers were on closely-related but different themes.

Nevertheless, the thrust of the research is that employee pressure or management's consideration of employees can be a positive influence on environmental management and should be considered in this investigation of factors affecting firms' GHG mitigating activities.

2.8.10 STAKEHOLDERS - CUSTOMERS AND OTHER STAKEHOLDERS

The evidence reviewed in section 2.8.6 broadly indicated that proximity to consumers is positively related to environmental management. This suggests that firms perceive this group as potent stakeholders, broadly in favour of action on environmental issues. In those studies, sectors were categorised according to their assumed proximity to consumers. In contrast, in the following research, firms were asked about pressure from stakeholders including customers to manage environmental impacts. I begin with studies focussed on RECI use.

Gliedt and Parker (2010) found external stakeholder pressure (given as customers and the community) was the most or very important motivation for large firms (more than 20 employees) to buy RECI. The commonest reason given to increase the size of the RECI purchase was the marketing benefit, followed by organisational culture and CSR. Percentages do not accompany these factors. In a case study investigation, Gliedt et al. (2010)¹³ found that some firms' perceived customer support for RECI use while two other firms were concerned there may be an adverse reaction from customers.¹⁴

Turning to environmental issues more widely, Henriques and Sadosky (1996) asked Canadian firms to rank pressure from different sources to consider environmental issues. Pressure from customers came fifth after government regulations, the cost of the environmental management, efficiency gains and pressure from employees. Customers were followed by neighbourhood/community, shareholders, environmental organisations, suppliers and finally other lobby groups.

¹³ See section 2.8.3 for a description of this research.

¹⁴ See section 2.8.1 for a description of this research.

In a survey of Belgium firms, Buysse and Verbeke (2003) found environmental management that went beyond regulatory compliance were associated with more comprehensive stakeholder engagement, although this was not of major importance. Dögl and Behnam (2015) surveyed firms in China, Germany, India and USA to investigate external pressures to adopt environmentally beneficial practices. Although the focus was on differences between developed (Germany and USA) and emerging (China and India) markets, the study did find a positive association between firstly customers considered in aggregate with competitors and suppliers and secondly NGOs, media, labour unions, trade associations – considered in aggregate - and environmental CSR in the developed markets.

Using data from a survey of Canadian industrial firms and facilities, Boiral, Henri, and Talbot (2012) found that increased pressure from stakeholders was positively associated with GHG reduction commitment, which in turn was positively associated with GHG emission reductions. Commitment and reduction performance were self-assessed by survey respondents in relation to peers. Stakeholder pressure was not associated with increased GHG emission reductions. However, stakeholders were considered as a homogenous group and I would argue that this may miss differences in priorities in environmental management or even opposing agendas between stakeholder groups. Differences within stakeholder groups is exemplified by Gliedt et al. (2010). One of the firms they studied was concerned that using RECI would prompt a backlash from specifically its oil industry customers while another was concerned that customers generally would not like the increased costs associated with RECI use.

Overall, the research suggests that customers have encouraged environmental management and this pressure has been positively associated with environmental management activities. As the above descriptions show, research has tended to aggregate other external stakeholders in various groups, making it difficult to assess the link of a specific class of external stakeholder with environmental management. However, external stakeholders should be investigated as possible influences on GHG mitigating strategies.

2.8.11 OTHER FIRMS

The research outlined below shows firms may be affected by other firms as they seek to differentiate themselves in terms of environmental management, looking for a competitive advantage. Conversely, when faced with uncertainty, firms may mimic the response of their peers, conforming to cultural-cognitive institutions (Scott 2014)¹⁵. I shall look at both motivations in turn.

¹⁵ See section 2.5 for more on cultural-cognitive institutions.

Gliedt and Parker (2010) found that competition from other firms was given by 24% of large US and Canadian firms as either a very or the most important factor in the decision to buy RECI. In an overview of research, Delmas and Toffel (2012) found examples of competition leading to enhanced environmental management. However, de Villiers, Naiker and van Staden (2011) did not find a relationship among US publicly-traded firms. Therefore, the findings of research on competition are not wholly consistent.

Next, I turn to motivations not related to competitive advantage. Dögl and Behnam (2015) found a positive association between competitors and suppliers and firms' environmental CSR response in developed markets. As described in the previous section, a weakness of this paper is that competitors, suppliers and customers were grouped together. The influence of suppliers and competitors was not explained by Dögl and Behnam (2015) beyond "*mimetic*" as described by DiMaggio and Powell (1983) and the authors omitted to specify the uncertainties to which this is a response. In contrast, suppliers were not mentioned by firms in Walker, Di Sisto and McBain's (2008) research on environmental supply chain management in seven UK public and private organisations. Gaining a competitive advantage was mentioned by one firm.

Delmas and Toffel (2012) concluded that a reason for firms engaging in self-regulation within their sector was as a defensive measure to avoid the imposition of regulation. They found strong evidence of firms agreeing to implement similar environmental practices, particularly via industry associations. Looking at multi-national chemical firms operating in the USA, Christmann (2004) found a positive relationship between management's perception of support from industry associations for standardisation of environmental policies and this occurring throughout the firm, which she attributed to mimetic isomorphism. Delmas and Montes-Sancho (2010) looked at US utilities entering into voluntary agreements with regulators to reduce carbon dioxide emissions per unit of electricity generated. They found early entrants were better connected to trade associations, among other characteristics, which exerted peer pressure.

In summary, the evidence suggests other firms should be considered in addressing the question of what factors influence firms' choice of GHG mitigating activities.

2.8.12 REGULATORY AND POLICY CONTEXT

This section considers the influence of regulation, both in terms of regulation directly affecting a firm and indirectly in terms of the context that regulations create, and government policies. CSR responses are typically seen as going beyond regulatory compliance (Crane, Matten, and Spence 2013). However, what is required by law may indirectly affect the voluntary activities that firms undertake. This is one of the factors that have been looked at by researchers investigating national differences in CSR response e.g. Midttun, Gautesen and Gjølberg (2006) and Matten and Moon (2008). Firms may set voluntary GHG emission reduction targets that encompass sources covered by emission reduction regulations and those that are not. Emission reductions required by regulation may lead to a reduction in voluntary mitigation.

This section will also consider corporate governance regulation to the extent that it may influence other factors that have been found to have a bearing on firms' environmental management.

Regulation can take many forms but was infrequently specified within the literature reviewed and this is reflected in the descriptions below. In addition, some papers investigated the influence of regulators as opposed to regulation. Regulators could, I would argue, be considered part of the regulatory context.

Most but not all papers found that regulations/regulators were significant drivers of environmental management. Government regulations (potential and actual) were given as the most important source of pressure to formulate an environmental management plan¹⁶ in a survey of Canadian firms conducted by Henriques and Sadorsky (1996). The regulations were not specified but the literature review suggests they were likely to require compliance rather than create incentives for environmental management that firms could choose to undertake. Dögl and Behnam (2015) surveyed firms in China, India, Germany and the USA to investigate the influence of different stakeholders including national and local government. They found a positive association between a higher ranking by firms in Germany and the USA of the importance of regulators with regard to their firm's environmental issues and their environmental CSR response. Christmann (2004) found managers' expectations of international standardisation of environmental regulations with which they would have to comply was a major factor in higher global environmental performance standards being set by multi-national chemical firms operating in the USA. In an overview of the literature, Delmas and Toffel (2012) decided the thrust of evidence was that more rigorous regulatory contexts were associated with higher levels of environmental management.

Short and Toffel (2010) investigated a precise set of circumstances. They found that US industrial facilities subject to air pollutant limits set via the Clean Air Act were more likely to act on their pledges to reduce their environmental impact when they are closely monitored by regulatory agencies and when the threat of sanctions – while present – was not emphasised by regulatory authorities.

However, Grekova et al. (2014) did not find an association between the environmental regulatory context (as opposed to the direct impact of regulation) and environmental management of the supply chain in the Dutch food and beverage industry. In the same vein, Buysse and Verbeke (2003) looked at the environmental management of Belgium firms that were significant polluters. They found that firms with environmental leadership strategies were not driven by environmental regulation. López-Gamero, Claver-Cortés and Molina-Azorín, (2011) found that in the Spanish hotel industry managers' perception of environmental issues as a source of competitive advantage was more positively influenced by norms that existed within the organisational field, such as voluntary environmental management programmes, than by

¹⁶ They deliberately left the nature of the plan unspecified.

direct regulation. Managers' positive perception was in turn linked with enhanced environment management response. This suggests that enhanced higher levels of environmental management were not driven by regulation.

There is a cluster of research on policy initiatives i.e. voluntary environmental management programmes run by regulators. In their literature review, Delmas and Toffel (2012) found that there was a moderately consistent body of evidence that regulatory pressure was a significant factor in firms participating in government voluntary programmes in many countries. Delmas and Montes-Sancho (2010) found that one factor in US electric utilities entering into a voluntary emission mitigation agreement with regulators was the level of pressure they felt from regulators. Although early joiners cut their GHG emissions more than firms outside the programme, when late joiners were factored in, there was no significant difference. Grekova et al. (2014) found that voluntary agreements between industry groups and government were positively linked with environmental management of the supply chain.

Turning now to corporate governance regulations that may influence firms' environmental management. This may be direct; for example Section 172 of the UK *Companies Act 2006* (Companies Act 2006) says that a company director must act to promote the success of the company for the benefit of its members but "*have regard*" to, among other matters, "*the impact of the company's operations on the community and the environment*". (CORE Coalition 2014). Potentially it could be indirect through its prioritisation of shareholders and stakeholders who may or may not want to see more environmental management. For example, Solomon (2013) found the German system had more in common with a stakeholder than a solely shareholder approach. Vitols (2001, 338) drew a similar conclusion; "*In the corporate governance literature Germany is one of the foremost examples of the stakeholder model, since the different firm constituencies enjoy a strong formal 'voice' in decision-making through representation on company board.*" However, "*different constituencies*" appear to be limited to employees and different departments within the firm (see pp. 343-345). Therefore, there is not a formal role for stakeholders that have a definite interest in environmental matters. Gliedt et al. (2010) in a case study investigation of the factors that influenced RECI purchase by firms in Alberta, Canada, found that a participative decision-making culture characterised those firms that did not purchase RECI. They found that hierarchical decision-making structures characterised RECI users and cautioned that more collective decision-making should not be seen as automatically encouraging CSR. In contrast to Germany, Vitols (2001) describes the situation in the UK as one in which employees have no ascribed role in decision-making and power is concentrated in the CEO.

In summary, the picture around environmental regulation is complicated. It may be that the existence and/or expectation of more stringent regulation does increase environmental management, but leading behaviour is motivated by other considerations, such as competitive advantage. There is limited evidence of a positive association between environmental management and policy initiatives. Given that my cases

could be drawn from a variety of sectors, potentially covered by different regulations and policies, I decided that I must consider the regulatory and policy environment in which they operate. The corporate governance arrangements of the country in which a firm is incorporated and its choices on GHG mitigating activities seemed rather removed from one another. Therefore, I excluded this from my conceptual framework, although it was useful background material of which I should be mindful in data-gathering.

2.8.13 POLITY CHARACTERISTICS

As I explained in section 2.8, I have only presented those factors where I have assessed a trend has emerged on their association with environmental management with the exception of the nature of polity in which the firm operates. As this is a factor with potentially such wide-ranging implications, one might expect this to be included within the list of factors forming the conceptual framework. Therefore, I have taken the step of explaining why I did not do this in the following paragraphs.

There is a fascinating line of research looking at the association between the country in which firms are headquartered/incorporated/operating and their CSR response. However, this research has not tended to consider the different dimensions of CSR separately. Exceptions are described below.

Using a comparative political economy approach, Jackson and Apostolakou (2010) investigated how the capitalism of the country in which a firm is headquartered influences its CSR response, which they disaggregated into different dimensions. They categorised countries using Hall and Soskice's (2001) "Varieties of Capitalism" (VoC) typology. This uses a new institutionalism in economics approach in which utility-maximising individuals create and use institutions that provide degrees of certainty about the actions of other individuals e.g. by penalising contract-breaking. Hall and Taylor (1996) treat new institutionalism in economics as the same as rational choice institutionalism for the purposes of their overview of institutional theory as described in section 2.5 "Institutional theory". However, one difference between the two is VoC's recognition that institutions influence the preferences of actors whereas in rational choice institutionalism preferences are exogenous to the model (Fioretos 2001).

Hall and Soskice argue that characteristics of an economy interact to provide a competitive advantage to firms with particular strategies, such as incremental product development versus innovative/radical changes. VoC categorises economies into co-ordinated market economies (CME) and liberalised market economies (LME) of which Germany and the UK are given as respective examples. In a CME firms tend to co-ordinate their activities to achieve strategic goals and contracts may be less complete, relying on a more collaborative interaction. In LMEs, the tendency is more for firm activities to be regulated by formal contracts with activities co-ordinated via price signals that lead firms to adjust their supply or demand for goods and services. Jackson and Apostolakou cite an argument of Aguilera and Jackson (2003) that these differences have at their root different corporate governance arrangements that produce different types of

stakeholder involvement and an argument of Campbell (2007) that institutionalised channels of communication with stakeholders will lead enhanced CSR responses.

Jackson and Apostolakou hypothesised that firms headquartered in CMEs, which included Germany, would have more extensive CSR practices than firms headquartered in LMEs, which was represented by firms from the UK and Ireland, the “Anglo” group. However, their research on European firms found LME firms scored higher than CME firms on CSR in aggregate and on environmental and social practices, although not economic CSR. However, if the CME group is disaggregated into Nordic, Latin and Central European (including Germany) firms, no significant differences were found between the groups, including the Anglo group except for the social CSR dimension. Furthermore, the level of market co-ordination in a country had no significant impact on the likelihood of a firm being assessed as in the top 20% for environmental CSR, although it was a factor for the other CSR dimensions. Jackson and Apostolakou concluded that LME firms voluntarily compensated for the absence of institutionalised stakeholder dialogue found in CMEs. Their findings feed into a debate over whether the CSR responses of firms mirror the institutional forces of the polity in which they operate or substitute for them by filling a lacuna in institutional arrangements.

The findings of Mackenzie, Rees, and Rodionova (2013) went in the opposite direction with firms from CMEs more likely to meet more rigorous environmental management requirements for inclusion in the FTSE4Good, a stock market index based on Environmental, Social and Governance criteria applied to the FTSE All-World Developed Index, than firms from LMEs. This would support the mirroring argument.

G. Jones and Lubinski (2014) conducted case studies of two German chemical firms, comparing their environmental CSR responses with US counterparts. They looked for explanations in VoC theory with the USA categorised as an LME but did not find evidence reflecting the VoC characterisation of the German and USA in environmental CSR responses. Favotto, Kollman, and Bernhagen (2016) also used the VoC categorisation but did not find an association with firms’ environmental CSR response, although they did with the social dimension. They argued that firms’ environmental CSR response reflected environmental management norms at a global level.

Other categorisations of polities have been used in CSR research e.g. Midttun, Gautesen, and Gjølborg 2006, Gjølborg (2009), Koos (2012), Crilly (2011) and Kinderman (2009). However, this research has not focussed on specifically the environmental CSR response. Fifka and Reiser (2015) and Vertigans (2015) describe development of CSR in Germany and the UK respectively. However, they do not consider different dimensions of CSR separately.

In summary, research does not suggest that VoC will serve to illuminate the actions of firms on GHG mitigation. Other theoretical approaches point to fundamental differences in the polities of Germany and the UK. However, there is a lack of research disaggregating their association with the different dimensions

of CSR. Therefore, for the purposes of this research, my perspective will be informed by the specific regulatory and policy differences between Germany and the UK, namely their different approaches to RECI which is described further in the research case chapter, while I will remain aware of that there are wider and deeper differences between the nature of the two polities.

3 CONCEPTUAL FRAMEWORK

This chapter will outline the research gaps that this project aims to fill. It will then turn to the theories and journal articles that have influenced the conceptual framework and it will look at the specific factors that emerged during the literature review for which there is a moderately consistent body of evidence as to their association with environmental management and/or the environmental dimension of Corporate Social Responsibility (CSR). These are summarised in Table 1. Finally, I will present a diagram of my conceptual framework (Figure 1).

3.1 OVERVIEW OF RESEARCH QUESTIONS

This project will answer two research questions (RQ).

RQ1. What factors influence a firm's voluntary GHG mitigation choices with regard to renewable and low-carbon electricity contractual instrument use?

RQ2. For those firms that have used renewable and low-carbon electricity contractual instruments, what effect has this had on other GHG mitigation activities?

The role that the use of renewable electricity contractual instruments (RECI) and low-carbon electricity contractual instruments (LCECI) play in firms' GHG mitigation strategies is an under-developed area of research. RQ1 examines the factors that influenced their use. Motivations for firms to buy RECI have been empirically researched in the case of North American firms (Wiser, Fowle and Holt 2001, Gliedt et al. 2010, Gliedt and Parker 2010), but this is an undeveloped area for EU firms with Rahbauer et al.'s work on German SMEs (2018) being an exception. I sought also to understand the drivers behind other GHG mitigating actions to gain insight into the part that RECI/LCECI may play in a portfolio of mitigating measures. This approach may get closer to the decision-making process that firms undertake, considering how GHG mitigating options may compete or complement with one another, as opposed to looking at their use as a stand-alone activity.

I focussed on this interaction in RQ2. I was specifically concerned with whether RECI/LCECI use displaces other GHG mitigating actions. This was based on the argument of Brander et al. (2013) and Brander et al. (2015) that applying emission factors based on RECI/LCECI leads to reduced reported emissions associated with acquired electricity and this could disincentivise electricity efficiency projects and the self-generation of renewable electricity. This argument is covered in depth in chapter 4 where I also explain why I decided to look at the effect on other GHG mitigating activities, such as carbon offset use. RQ2 represents to the best of my knowledge an entirely new area of empirical investigation. This research project aims to start to fill that gap by looking at some of the largest firms in Germany and the UK.

I took a CSR perspective on the use of RECI/LCECI as the data on RECI/LCECI use and GHG emissions frequently appeared in corporate publications entitled CSR report or corporate responsibility or sustainability reports, which include similar material to CSR reports. However, I also included literature on environmental management within the review, even if the papers did not take a CSR perspective, in order to understand the factors that may be associated with other GHG mitigating actions.

Aguinis and Glavas (2012) conducted an extensive literature review as a prelude to the construction of a theoretical framework for investigating CSR. They found diverse theoretical frameworks were used that, in their view, exacerbated a fragmentation of knowledge about CSR. The lack of multi-level analysis of the CSR was identified as another factor detrimental to understanding about CSR. They found that 95% of the articles they examined focused on a single level of analysis; *“...33% of the articles focused on the institutional level, 57% on the organisational level, 4% on the individual level, and 5% addressed two or more levels”* (p.934). This research covered all three levels in parallel, adding to the scant literature on the role of the individual.

3.2 CONCEPTUAL FRAMEWORK

3.2.1 OVERVIEW

CSR responses are investigated by studies with a diversity of theoretical perspectives and also without any theoretical framing. Montiel and Delgado-Ceballos' (2014) review of studies on corporate sustainability – which encompassed CSR and environmental management research - found that scholars used the following in their research: institutional theory (17%), resource-based view of the firm (10%), stakeholder theory (18%), new theories (5%) or did not have a theoretical framework or used other not mentioned existing theories (42%).

As explained I began my research looking at RECI/LCECI use through the lens of CSR (section 3.2.2). Among the diversity of theoretical approaches within CSR literature, I chose institutional theory (section 3.2.3) to provide the perspective from which I viewed both my research questions, together with Cyert and March's Behavioural Theory of the Firm (1963) (section 3.2.4).

Furthermore, for RQ1, I have used previous empirical work on factors associated with environmental CSR and environmental management (section 3.2.5) to guide me on what to look for in my review of documentary evidence and in the formulation of interview questions. These factors are summarised in Table 1. However, I was also alert to factors that were not on this list when I gathered data.

Turning to RQ2, the conceptual framework for RQ2 is drawn from Brander et al. (2013), Brander et al. (2015) and Brander, Gillenwater and Ascui (2018). The first two papers are the source of the proposition

that RECI use may displace electricity efficiency improvements and self-generation of electricity projects with the third paper raising the issue of the opportunity costs of using financial resources to buy RECI, rather than using them for electricity efficiency measures. My conceptual framework expanded on the argument of Brander et al. (2013) and Brander et al. (2015) to consider the effect of LCECI and RECI use on a wider range of GHG mitigating activities that electricity efficiency improvements and self-generation of renewable electricity. The context to the arguments of Brander et al. (2013), Brander et al. (2015) and Brander, Gillenwater and Ascui (2018) is covered in detail in chapter 4, and is not discussed further in this chapter.

The conceptual framework for both research questions is shown in Figure 1.

3.2.2 CORPORATE SOCIAL RESPONSIBILITY

As mentioned already, CSR is populated by multiple concepts and theoretical approaches (van Oosterhout and Heugens 2009). I wanted to ensure that my interviewees and I were broadly talking about the same concept. However, I did not want to choose a definition, peppered with conjunctions or caveats, that was difficult to understand. So, I decided to use a description of commonly-encountered elements of CSR from Crane, Matten, and Spence (2013) based on their experiences of its conceptualisation by academics and practitioners. Its elements encompassed values as well as practices. It entailed voluntary actions, going beyond philanthropy, recognising parties other than shareholders as stakeholders, managing external side-effects of business activities e.g. pollution, and attempting to align social and economic responsibilities.

Turning to the points about values and practices, in my framework, I have assumed that RECI/LCECI use was a CSR response, but I have not taken a view on whether the CSR response was normative or instrumental. To ask firms directly whether their motivation was normative or instrumental seemed to invite a particular answer and would be difficult to determine independently. So, I decided to focus on the practice and the factors that might affect it rather than whether it was motivated by self-interest or morals.

3.2.3 INSTITUTIONAL THEORY

In this section, I explain why I have used institutional theory as a component of my conceptual framework, the position that I have taken on the key institutional theory concept of legitimacy, and which variant of institutional theory I chose to provide me with a lens through which I have viewed the activities of firms.

I have used institutional theory because it has the potential to explain CSR responses that are not motivated by a focus on competitive advantage by employing the concept of legitimacy. As discussed in chapter 2.5, legitimacy is a concept with a spectrum of understandings (Suchman 1995). My position is that it is not a finite resource, such as capital or employees, as Hahn and Pinkse (2014) have regarded it.

This loses the taken-for-granted nature of the authority of institutions described by Scott (2014). Instead I have taken the view that it is a “...*fundamental condition of social existence*.” (Scott 2014, 72).

As discussed in section 2.5, Koelble (1995) and Hall and Taylor (1996) in their reviews of the “new” institutionalisms commented on the usefulness of the historical institutionalism approach that recognises the power of culture in constraining our choices while ascribing agency to individuals and organisations to calculate how self-interest is best served. This synthesises rational choice and sociological perspectives of institutional theory to explain decisions. That is the sociological perspective may explain the menu of options from which an individual or organisation chooses the one that best serves his interests – a rational choice perspective (Hall and Taylor 1996). I was persuaded by this approach which I have used as a lens through which I have viewed the data that I have gathered.

3.2.4 CYERT AND MARCH’S BEHAVIOURAL THEORY OF THE FIRM

Cyert and March’s (1963) behavioural theory of the firm envisages different groups within the firm, seeking to promote their own agendas, which may have conflicting goals. I found this theory attractive because it resonated with my own experience of being an employee. Another reason for including it within my conceptual framework was that Cyert and March (1963) conceptualised the role of slack, a variable that frequently occurs in environmental CSR and environmental management research. Furthermore, as Argote and Greve (2007) observed in a review of this theory 40 years on from its publication, Cyert and March’s theory has continued to have broad impact, influencing institutional theory, e.g. DiMaggio and Powell (1983), through common themes such as bounded rationality and decision-making in ambiguous circumstances. There are more components to Cyert and March’s theory. However, the concepts of competing groups within the firm and organisational slack are the elements that have influenced this research.

3.2.5 FACTORS ASSOCIATED WITH FIRMS’ ENVIRONMENTAL CSR/ ENVIRONMENTAL MANAGEMENT

I outlined the overarching elements of my conceptual framework in sections 3.2.2-3.2.4. However, the literature review also identified specific factors where an association had been found with firms’ environmental management. The aim of this was to identify factors that might be associated with firms’ GHG mitigating activities, as this is an aspect of environmental management. I selected some of those factors to form part of my framework and I assigned them to these categories: individuals within firms, organisational characteristics and components of organisational fields, as defined by DiMaggio and Powell (1983) (see section 2.5 on institutional theory). I shall now review those factors beginning with individual within firms. I also explain why I did not include corporate governance and ownership characteristics within the framework.

The literature review showed that a firm's leadership and managers could be a positive influence on environmental management (section 2.8.1). However, I did not consider that leaders and managers should be perceived as homogenous in terms of their attitude to climate change and I did not assume that leaders and managers would always encourage GHG mitigation activities when considering this factor in my research.

I turn now to organisational characteristics and begin with firm size which was discussed in section 2.8.2 of the literature review. The influence of firm size on environmental management has been attributed in literature to its effect on firm visibility, available resources and the pool of employee capabilities (Bowen 2000). However, Bowen (2000) found in her research that visibility and organisational slack accounted for much of the variation in environment management that has been attributed to firm size, which she operationalised as employee numbers. She found high visibility was linked with firms instigating more challenging strategies while organisational slack could be used to implement environmental management or to provide buffers against external pressure for environmental management. Bowen's research was compelling. However, this is just one paper compared to a considerable amount of work on firm size *per se* as a factor influencing environmental management (section 2.8.2). Therefore, I decided I would use firm size as a variable in my conceptual framework, rather than specifically operationalising her assessment of its active components: visibility and organisational slack.

Available financial resources, which is part of Bowen's conceptualisation of organisational slack, has also been investigated by a considerable number of studies and the evidence strongly points to a positive association with environmental management (section 2.8.3). Sorrel et al. (2004) investigated the costs that are entailed in implementing energy efficiency measures, such as the investment needed for equipment purchases and staff time. Cost-saving was assumed to be the motivation for some environmental management, particularly energy-efficiency/saving actions. (Sorrell et al. 2004). However, even cost-saving actions may need pump-priming investment and entail on-going expenditures. Therefore cost-saving is grouped with available financial resources in the conceptual framework and in the case study chapters.

Related to the availability of financial resources is the availability of non-financial resources and capabilities that may be needed to implement environmental management (section 2.8.4). The literature review suggested that these should be considered in investigating factors affecting GHG mitigating activities. In the case study chapters, I have included information about resources and capabilities under a broader heading that covers other issues of a technical nature that have enabled or hindered firms in implementing GHG mitigating projects: "Non-financial resources and capabilities and technical issues".

Research suggests that firms' experience of operating internationally experience has been positively associated with environmental management. Bansal (2005) suggested that international connections may expose firms to new ideas on environmental management that they then disseminate through the firm

(section 2.8.5). The literature review also identified consumer proximity as a variable positively associated with environmental management (section 2.8.6). This may be due to customer pressure for enhanced environmental management (section 2.8.10). I decided that sector would serve as a proxy for consumer proximity. I also expected a firm's sector to influence its profile of GHG emission sources and the regulations and policies to which it was subject and must be included within the framework for that reason.

The literature review suggests that board gender diversity, the proportion of independent directors and prevalence of board interlocks have been positively associated with environmental management. It would have been possible to track changes in these variables using the director lists in annual reports, although further research may have been needed to categorise the directors according to gender, affiliations and board interlocks (directorships on other firms). However, this would have significantly increased the time required for this project, and so I decided not to carry this out, which is why these variables are excluded from the conceptual framework.

Turning to a firm's organisational field and returning to factors included within the conceptual framework, evidence suggests that investors and employees have been positive drivers of environmental management (sections 2.8.8 and 2.8.9). Other firms may be a positive influence through joint agreements to improve their environmental management (section 2.8.6). Based on the literature review, the regulatory and policy environments in which firms operate may influence their environmental management (section 2.8.12). In a review of the literature, Delmas and Toffel (2012) found papers suggesting firms improved their environmental management to comply with regulations and also did so to stave off further regulation.

I varied the regulatory and policy environment in which my firms operated through my decision to study firms incorporated in Germany and the UK. The reason for this choice was as follows: one of the RECI that I knew I would encounter in my cases was the Guarantee of Origin. This had its genesis in the EU directive 2001/77/EC (European Parliament and European Council 2001). However, this directive was implemented significantly differently in Germany and the UK. In Germany renewable electricity generators that opt to receive public subsidy are not issued with a GO that they may then sell to a supplier or other party (Marty 2017). In the UK, this is permitted (Kuronen and Lehtovaara 2017). I decided that my cases would be drawn from Germany and UK to see the effect of different implementations of the directive on RECI use.

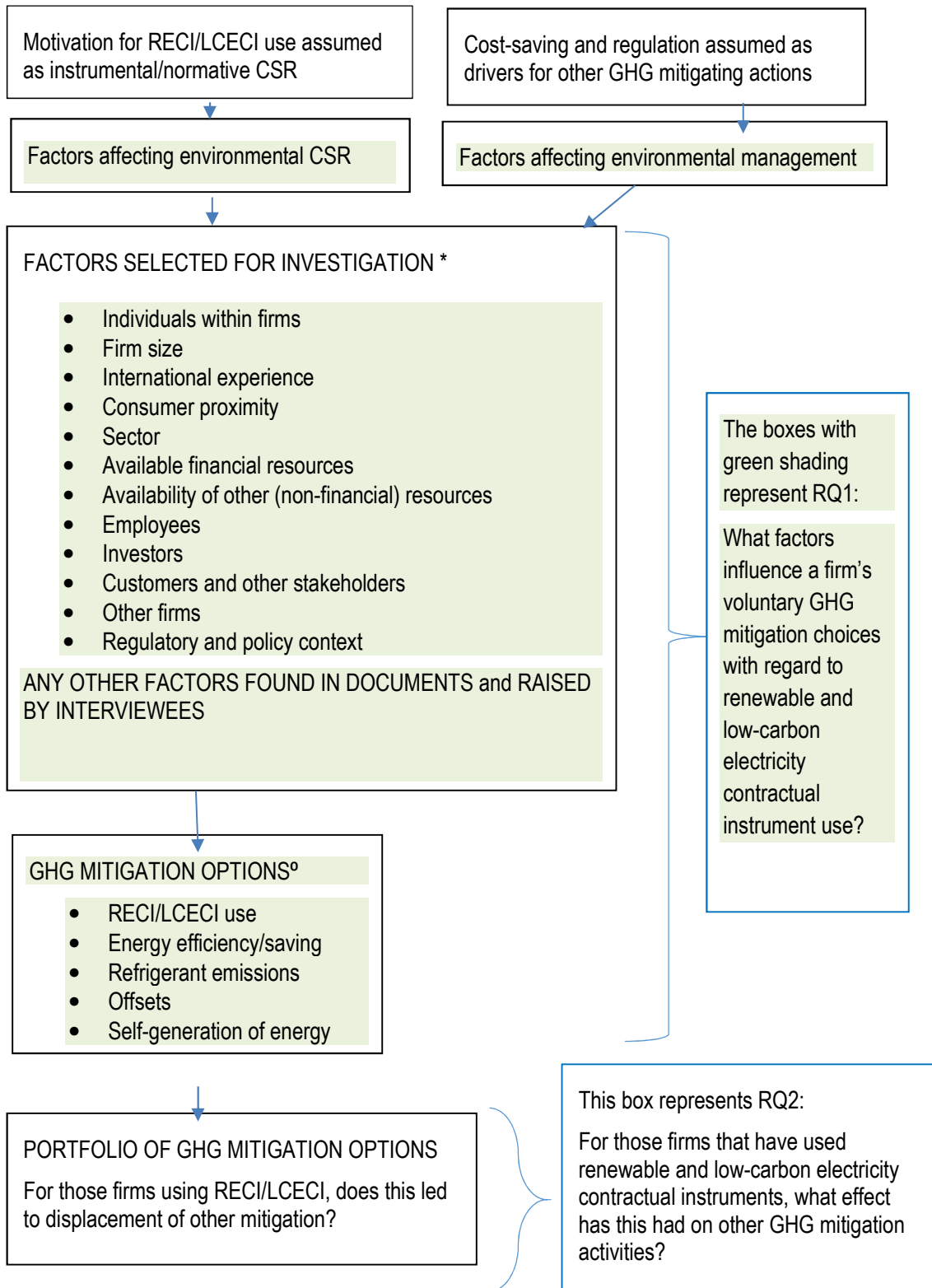
Regarding interaction between factors, organisational characteristics have been identified as interacting with institutions (which are related to a firm's organisational field) to produce divergent responses within the same organisational field. Scott (2014) gives examples from a wide range of situations while Delmas and Toffel (2012) give examples from environmental management research. Delmas and Toffel describe this as a novel area of research to which this thesis contributes.

The factors linked with firms' environmental management and selected for inclusion in the conceptual framework are summarised in Table 1, together with the expected direction of influence on environmental management. I expected that these factors would have a bearing on firms' portfolio of GHG mitigating actions of which RECI/LCECI would be a component. (See section 2.8 for the reasons for the assessment of direction of influence and the underlying references.)

Table 1. Factors included in the conceptual framework

Level	Factors	Direction of influence on environmental management
Individuals within firms	Firm leadership and managers	Individuals may act as environmental champions in which case the influence would be positive.
Organisational characteristics	Firm size	Positive
	International experience	Positive
	Consumer proximity	Positive
	Sector	Expected to influence a firm's GHG emission sources, opportunities for mitigation and regulations/policies to which it is subject.
	Available financial resources	Positive
	Availability of other (non-financial) resources and capabilities	Positive
	Employees	Research shows employees have generally approved of environmental management. So, they are expected to be a positive influence for firms taking their views into account in their environmental management strategies.
Organisational field	Investors	Research shows investors can be positive drivers of environmental management. Although I would not assert that all investors are in favour of improving environmental management, I expect some investors to be positive influences.
	Customers	Research indicates that customers have generally been in favour of improved environmental management. So, they would be a positive influence for firms taking their views on this issue into account.
	Other external stakeholders	Research has tended to consider stakeholder groups in aggregate. The direction of influence may vary with specific stakeholders.
	Other firms	Research on the influence of strength of competition from other firms is mixed. There is a more consistent body of evidence showing firms agreeing to take similar steps to enhance their environmental management. So, influence is expected to be positive.
	Regulatory and policy context	The existence or expectation of more rigorous environmental regulation is expected to be positive, but leading environmental management practices are expected to have another motivation. There was evidence of a positive association between environmental management and policy initiatives.

Figure 1 Diagram of conceptual framework



*Factors are not listed in order of importance. °These will not be given equal weighting in the investigation but will be considered to the extent they seemed important in the context of each firm's portfolio of mitigating actions.

4 RESEARCH CASE

4.1 INTRODUCTION

A significant number of major firms are entering into contracts for renewable electricity or installing their own on-site generation. For example, business association RE100 has a goal of 100% renewable electricity use by its members. Numerous well-known names – e.g. Microsoft, Sky plc, Starbucks, Tata Motors Ltd - have joined the group and its aggregate electricity consumption would make it the 24th largest country in the world for electricity use if collectively they represented a nation (RE100 2018).

Firms have used both approaches - on-site electricity generation and use of contractual instruments based on renewable and low-carbon electricity added to electricity grids – to report a reduced organisational GHG footprint (RE100 2018, Brander, Gillenwater, and Ascui 2018). However, the use of contractual instruments has been controversial. Hufen (2016) describes how in the Netherlands the use of foreign renewable electricity contractual instruments (RECI) in electricity products for the domestic and small business market had led to the label of “*cheat electricity*”. In relation to larger business and emission reduction claims, their use may lead to allegations of greenwashing e.g. Solli (2014) and Schendler (2007).

The reason for this controversy has been because of doubt that the use of RECI will increase renewable electricity capacity in Europe and the USA. However, there is a further argument that their use will undermine the accuracy and relevance of GHG emission inventories. Firms that use RECI frequently report reduced organisational footprints as they assign zero emissions¹⁷ to the electricity that they consume. Capital markets and customers may consider these firms to have better environmental performance than firms that have chosen to invest in electricity efficiency instead. Furthermore, managers of firms that reflect RECI in their emissions figures may have less incentive to allocate resources to electricity efficiency, for example, due to the reductions reported through RECI use. (Brander et al. 2013, Brander et al. 2015, Brander, Gillenwater, and Ascui 2018).

It is this last point that is the subject of research question two of this thesis which will look at whether use of RECI and their counterpart low-carbon electricity contractual Instruments (LCECI) have displaced other GHG mitigating activities in the cases. By “displaced” I mean whether their use has led to a reduction in focus on other GHG mitigating activities or a shift in focus from one GHG mitigating activity to another.

¹⁷ This is zero scope 2 emissions. I explain the scope 2 terminology in section 4.4.

Research question one will set decisions on RECI/LCECI use within the wider context of the factors that affect a firm's decisions on its GHG mitigation portfolio.

This research case chapter will introduce the types of contractual instruments available (section 4.2). Section 4.3 will look at the impact of RECI on extra renewable capacity in Europe¹⁸, where my geographical focus will lie. Section 4.4 will look at the methodologies firms use to estimate their carbon footprints and particularly emissions associated with their grid electricity consumption. Sections 4.5 and 4.6 will focus on the contrasting approaches taken to RECI and LCECI in Germany and the UK, the two countries in which my cases are incorporated. The final section 4.7 will pull together methodological and policy changes relevant for my research for both countries in a table.

4.2 RENEWABLE AND LOW-CARBON ELECTRICITY CONTRACTUAL INSTRUMENTS

The abbreviations, RECI, or renewable electricity contractual instruments, and LCECI, low-carbon electricity contractual instruments, have already been introduced. The term LCECI could in theory encompass to contractual instruments based, for example, on nuclear electricity generation. However, Combined Heat and Power generated electricity, was the only type of LCECI I encountered in my research. Firms may use contractual instruments to make a statement about their electricity use (Sotos 2015a). However, one cannot know the generation method of individual units of the electricity consumed from the grid (Raadal et al. 2012). In Table 2, I introduce types of contractual arrangements and also present data on self-generation of electricity in the final row of the table.

¹⁸ I did not encounter any literature on the impact of LCECI use on extra low-carbon electricity generation capacity.

Table 2 Electricity contractual arrangements and self-generation of electricity

Contractual instrument	Description	Percentage of renewable electricity sourcing	
		RE100 2018	IRENA 2018
Energy attribute certificate (EACs)	Documents that a unit of electricity - usually a MWh - has been produced. It represents characteristics of its method of generation. It can be part of a tracking system that regulates issuance, transfer of ownership and cancellation or retirement, and expiry without use. These may be sold separately from the electricity that they certificate – “unbundled” - and may be sold by a generator to a supplier or directly to a consumer. Examples are Guarantees of Origin and Renewable Energy Certificates.	40	28
Supplier disclosure of supplier-specific emission factors	Suppliers may be required to disclose the generation method of their electricity supply and the GHG emissions/kWh consumed. This may be differentiated into a portfolio of tariffs e.g. green tariffs or green pricing programmes. Products may be offered that are backed by energy attribute certificates.	41	7
Power Purchase Agreement (PPA)	A contract for the supply of electricity from a generator. In the context of this thesis, the counterparty would be the corporate consumer. Typically, agreements are long-term & specify the power to be delivered, price & payment plans. They may or may not convey energy attribute certificates.	13 ¹⁹	25 ²⁰
Eco-labels	Environmental and consumer protection organisations have also created energy attribute certificates sometimes called eco-labels. Typically, additional criteria related to environmental protection or stimulating more renewable electricity capacity need to be met to receive the label. Most EU eco-labels are underpinned by GOs. Examples are TÜV SÜD and OK Power. Some eco-labels commit to allocating part of their cost to a fund to be used to invest in new renewable capacity.	No data	No data

¹⁹ Contracting parties connected via the same electricity grid.

²⁰ This percentage includes a wider range of contracts than the percentage from the RE100 report. It includes contracts between a firm that purchases electricity from an independent generator based on the purchasing firm's site. This is a separate category in the RE100 report i.e. “Direct wire connections with generators”.

Direct wire connections with generators	Electricity purchased from on-site installations owned by a supplier or electricity acquired via a direct connection with an off-site generator (i.e. no grid transfer).	<2	
Production for own consumption from own generators – self-generation		3	35

Sources: International Renewable Energy Agency 2018, Sotos 2015a, RE100 2018, Weber 2014. RE100 2018 percentages based on a table on p. 25 which uses data from 74 RE100 members (firms committed to using 100% renewable electricity). Other, unspecified sourcing strategies account for 1.5%. IRENA 2018 percentages on figure 2.1 on p.39 and further information on p.75. IRENA data from RE100, CDP and from its own survey of 2,400 firms globally. Other, unspecified sourcing strategies account for 5%.

One can see from Table 2 that International Renewable Energy Agency (2018) has significantly different figures to RE100 (2018), notably a much higher percentage of self-generation. Almost half of this is from four material sector firms that do not appear to be on RE100's sample. Therefore, there is a higher degree of alignment between the two reports than might appear at first sight. Both reports found energy attribute certificates to be commonly-used instruments.

As this thesis draws on case studies from Germany and the UK, I will focus on an EU-wide energy attribute certificate, the Guarantee of Origin (GO), which is covered in more depth in the next section. Its intended role is to provide information for the electricity consumer. It has no role in public policies to increase renewable generation through quota schemes, although some energy attribute certificates do have this role (see Directive 2009/28/EC, recital 52, European Parliament and European Council 2009). Therefore, other electricity attribute certificates will be briefly discussed in the next paragraph to differentiate them from GOs.

Quota schemes or renewable portfolio standards are regulatory instruments that require electricity suppliers, e.g. utility companies, to obtain a specified percentage of their electricity from qualifying renewable electricity generators. Suppliers provide evidence that they have met the quota using certificates, often called tradable green certificates, denominated in MWh of generated renewable electricity. Examples are the Renewables Obligation Certificate in the UK, Renewable Energy Certificate (REC) in US states, Certificati Verdi in Italy, and the Elcertifikat in Norway. (Sotos 2015a, Raadal et al. 2012). The US REC may be sold in a voluntary market direct to a consumer that wishes to make an environmental claim instead of being sold to a supplier for compliance with a renewable portfolio standard (Gillenwater 2008b).

In addition to the US REC, there have been Renewable Energy Certificates in Europe, but - unlike the US RECs - these have been for voluntary use only and were not created by regulation but by market players

along with some governmental agencies and environmental organisations. The REC was a forerunner to the GO (Bürger 2007, RECS International 2012).

A further certificate that has been commonly used by firms with operations in the UK is the Levy Exemption Certificate (LEC). In 2001 the UK government imposed the Climate Change Levy (CCL) on fossil fuels and fossil fuel-generated electricity. It was payable by non-domestic consumers via their suppliers but could be reduced using LECs. These were issued to renewable electricity generators and generators of electricity from certain types of Combined Heat and Power Plants, known as “Good Quality CHP”, who could sell them onto suppliers to apply to their customers’ electricity consumption, reducing the CCL payable. (GOV.UK 2017) LECs are discussed more fully in section 4.6 as pre-2008 they also had a disclosure role (Department for Environment, Food and Rural Affairs, UK, 2007).

4.2.1 THE GUARANTEE OF ORIGIN (GO)

In this section, I give an overview of the history, function and procedures related to the Guarantee of Origin (GO), which is the focus of this thesis although not to the exclusion of other contractual instruments.

The GO was created by EU Directive 2001/77/EC (European Parliament and European Council 2001) which was aimed at promoting renewable energy. It had been identified as a component in a proposed pan-European renewable electricity quota scheme, but the proposal failed (Lauber and Schenner 2011, Nilsson, Nilsson and Ericsson 2009). It was left with a disclosure role to enable renewable electricity producers to prove the origin of their electricity.

Directive 2003/54/EC (European Parliament and European Council 2003) concerning the internal market for electricity required suppliers to disclose the generation types and percentages that made up their supply mix to consumers to promote choice. Subsequently Directive 2004/8/EC created a new breed of GO that may be issued for electricity from Combined Heat and Power (CHP) plants (European Parliament and European Council 2004).

The Renewable Energy Directive 2009/28/EC (European Parliament and European Council 2009) repealed Directive 2001/77/EC. It gave greater definition to the GO.

“A guarantee of origin can be transferred, independently of the energy to which it relates, from one holder to another. However, with a view to ensuring that a unit of electricity from renewable energy sources is disclosed to a customer only once, double counting and double disclosure of guarantees of origin should be avoided. Energy from renewable sources in relation to which the accompanying guarantee of origin has been sold separately by the producer should not be disclosed or sold to the final customer as energy from renewable sources. It is important to distinguish between green certificates used for support schemes and guarantees of origin.”
(Recital 52)

Article 15 (7) said suppliers may use GOs for supply mix disclosure as required by Directive 2003/5/EC. It was also stipulated that *“Any use of a guarantee of origin shall take place within 12 months of production of the corresponding energy unit. A guarantee of origin shall be cancelled once it has been used”* (Article 14(3)). Furthermore, GOs were extended to heating and cooling (Article 14(2)).

However, there was diverging implementation of the GO directives which have also been implemented by Iceland, Norway and Switzerland as well as the EU member states (Marcus Klimeschek, telephone call, 10 December 2013, Marty 2017). In Germany publicly-supported renewable electricity generators have not received GOs that they could then sell to electricity suppliers or direct to consumers. Since most renewable electricity generators in Germany have opted to receive public support, there have been relatively few German-originated GOs available to buy. (Marty 2017). Further information on the German approach is given in section 4.5.

Kuronen and Lehtovaara (2017) considered that Croatia, Ireland, Luxembourg, Portugal and Switzerland have followed a similar approach to Germany with a hybrid approach in France while other member states, e.g. the UK, have issued GOs to generators for supported renewable electricity²¹. The UK government called the GOs that were issued in the UK Renewable Energy Guarantees of Origin (REGOs) (Re-Diss 2012a).

As regards the use of GOs, suppliers may differentiate their supply into different tariffs with a renewable electricity tariff backed by GOs. GOs are also sold directly to electricity consumers. (Sotos 2015a). A point to note about GOs is that they do not carry an emission factor for the method of generation that they document. However, it is accepted practice to assign a zero emission factor to renewable electricity GOs (Sotos 2015a).

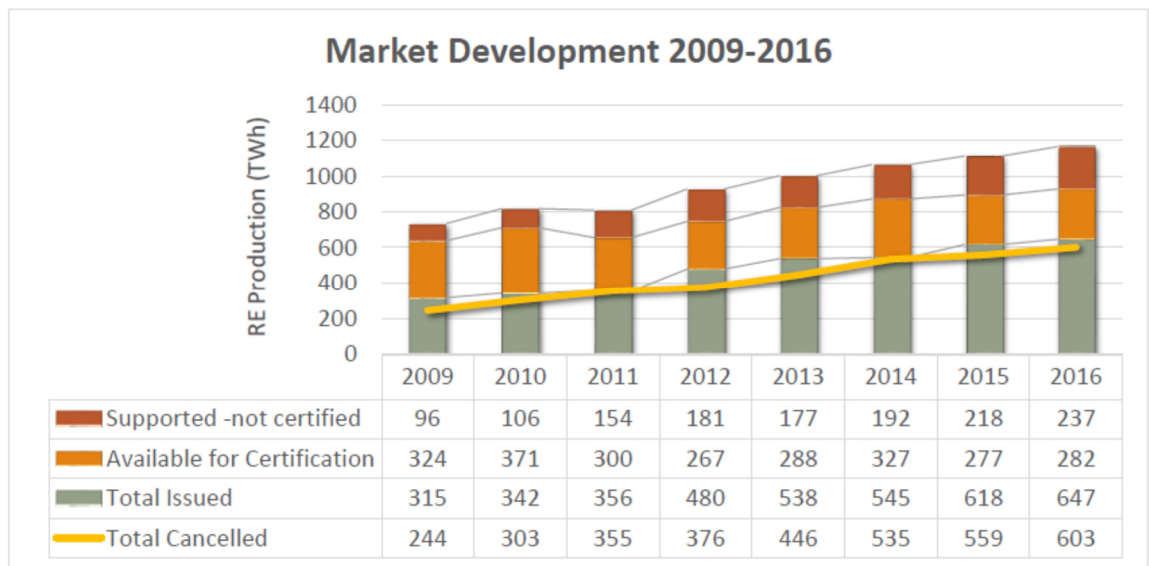
The European Commission has proposed a replacement to the Renewable Energy Directive 2009/28/EC, Renewable Energy Directive II. It was unapproved at time of writing this chapter. A key change was to mandate use of GOs - and only GOs - for disclosure to consumers of the renewable electricity component in their electricity supply from utilities. This had been optional. If approved, this would make the trade in GOs by major GO exporting countries such as Norway more apparent to Norwegian electricity consumers. When they see information about the mix of generation methods that supply them with electricity, the percentage of renewable electricity will be considerably reduced. This is because such a large number of Norwegian GOs have been exported (Kuronen and Lehtovaara 2017). The proposed directive added a commitment to investigate an EU-wide label to promote use of renewable electricity coming from new

²¹ Kuronen and Lehtovaara (2017, 4) interpreted supported electricity *“...as meaning electricity generation from renewable sources receiving production support in the form of feed-in tariff, quota obligation certificate, tax rebate or similar production volume based incentive.”*

installations. Furthermore, member states retained discretion in issuing GOs to electricity from publicly-supported generation facilities. (General Secretariat of the Council 2018).

So far, the overall picture has been of supply of GOs in excess to demand, as shown in Figure 2 taken from Kuronen and Lehtovaara (2017). However, the picture is not static. Kuronen and Lehtovaara (2017) applied a shifted transaction-based approach whereby the volume of GOs cancelled is compared with the volume issued a year earlier. Cancellations exceeded issues by 50TWh or 8% in 2016. However, there has been a large volume of renewable electricity produced in Europe that is eligible for a GO but has not had one issued (shown in Figure 2 as “Available for Certification”). This is distinct from the electricity produced in states that have decided not to issue GOs to electricity from publicly-supported renewable generators, (shown as “Supported – not Issued”). In addition, GOs do expire without being used – 30TWh in 2016. However, Kuronen and Lehtovaara (2017) forecast by 2023 demand expressed as GO cancellations will equal the total volume of electricity eligible for a GO.

Figure 2 Market development for Guarantees of Origin (2009-2016)



Source: Figure 2.1 in Kuronen and Lehtovaara (2017).

4.3 IMPACT OF RENEWABLE ELECTRICITY CONTRACTUAL INSTRUMENT PURCHASE ON RENEWABLE ELECTRICITY GENERATION CAPACITY

In this section, I turn to research into the effect of purchase of renewable electricity contractual instruments (RECI) on renewable electricity capacity. I have included findings from the USA as firms may have purchased US RECI. I have not encountered similar data on the impact of LCECI purchase on extra low-carbon electricity capacity. My impression from working in the field of corporate carbon accounting for five years is that they are much less used than renewable GOs. Next I turn to the reasons for the assessment of the impact of RECI, looking specifically at the price of GO and the dynamics of the GO market.

Looking first at the evidence on the effect of demand from US residential and non-residential consumers, Gillenwater (2013) concluded that the US voluntary Renewable Energy Certificate (RECs) market had not increased investment in grid-connected wind projects. The reason for the failure of consumers' REC purchases to have an impact was due to the low price of RECs and a lack of long-term contracts. Voluntary market RECs were generally sold separately to electricity. Wind turbine investors effectively ignored the income stream from REC sales when deciding on investment in new turbines.

Turning to Germany, Wüstenhagen and Bilharz (2006) said government figures suggested public policy had led to more than 13,000 MW of new capacity from 1990-2000, whereas a survey of renewable electricity suppliers led them to conclude that household demand for RECI was responsible for only 127 MW of additional renewable capacity in 1999-2003 due to eco-labels not appealing to more consumers. Markard and Truffer (2006) assessed the effect of public policy and consumer demand for RECI in five European countries between 1997-2001. They found that demand from consumers – the paper does not distinguish between residential and non-residential consumers - had led to less than 1% of new renewable capacity in Germany, 15% in Netherlands, Sweden, Switzerland and 5% in the UK. The success of the voluntary market depended on the strength of public policy support. Focusing on Sweden, Raadal et al. (2012) concluded that demand from consumers – households and businesses - for GOs had had little or no impact on renewable electricity production compared with a public policy support due to the low price of GOs and the lack of certainty over demand.

I now turn to data on the price premium for RECI, specifically the GO. To set the following figures into context, Jansen (2018) gauged the marginal renewable electricity support for onshore wind generation in the member states with a high demand for GOs (i.e. Germany and The Netherlands) as 20-40 €/MWh. To give a further sense of the value of GO to the electricity generators and suppliers, the mean average price

of wholesale electricity in the UK was 47.50 €/MWh in 2015 and 51.90 €/MWh in 2018²². Data on GO prices is not readily available but what is available shows they are considerably lower. There was a GO market on the European Energy Exchange whose first trade was 5,000 hydropower GOs at just 0.2 €/MWh (European Energy Exchange 2013). However, Jansen (2017) said most trades are bilateral. Based on trader information, Jansen (2018) put GO prices in Germany and The Netherlands at 0.3-5 €/MWh. The range is determined by consumer preferences for particular types of generation. The higher end of the range was for niche markets in locally-produced wind and solar power. (Jansen 2017) Klimscheffskij et al. (2015) estimated prices of 0.05-0.5 €/MWh, with GO from small hydropower plants and new renewable projects costing considerably more. Hufen (2016) costed GOs imported into The Netherlands from Norway, Sweden and Finland in 2015 at about €0.22/MWh.

Marty (2017) said public policy financial support in Germany for renewable electricity production was much higher than the GO price, therefore German generators opted for support and therefore did not receive GOs that could have been sold on. Consequently only 13% of production was certified with a GO in 2015. Nevertheless, those European countries – like Germany - where the government does not allow generators to receive GOs if they choose to receive public support or where demand exceeds domestic supply still have a plentiful supply of cheap GOs from hydropower from Norway and Austria. Klimscheffskij (2013) and Mulder and Zomer (2016) state that the excess of GO supply versus demand has kept GO prices low.

This was supported by research from Hast et al. (2015). Looking across Finland, Germany and the UK, they found that the price premium for “green” electricity products offered to households was typically 0-5% and it could even be cheaper than the standard offer. They concluded that the GOs on which the “green” electricity products were often based were either from existing Nordic hydropower or from renewable generation capacity that had been driven by regulatory obligations.

Hufen (2016) found a similar picture with the Dutch domestic and small business market. Dutch renewable electricity generation met about a quarter of demand with the rest met predominantly by hydropower GOs from Norway, Finland, Sweden and Iceland. The price of imported GOs (about €0.22/MWh for Norway, Sweden and Finland in 2015) was too low to stimulate extra investment in hydropower. Mulder and Zomer (2016) also found that most RECI products for households and small businesses in The Netherlands were based on GOs from Norway with a low price that would do little to incentivise extra renewable generation capacity.

²² These figures are based on my own calculations using data on the N2EX Day Ahead Auction Prices published by Nordpool Group (n.d.).

In 2015 the UK government announced the end of the Levy Exemption Certificates scheme and made some remarks that shed light on RECI supply and value in the UK. It said in the 2020s the supply of renewable electricity was expected to exceed the demand for it from non-domestic consumers obligated to pay the Climate Change Levy. This coupled with the public subsidy available to renewable electricity generators led the government to assess that the financial loss to generators from no longer being able to sell LECs would be negligible (HM Revenue and Customs 2015a). If LEC income to generators was trivial, this implies the cost to consumers may be small too. Furthermore, although Kuronen and Lehtovaara (2017) estimate that demand for GOs will match the production of electricity eligible for GOs in 2023, this UK government assessment shows national variation among the countries that use GOs.

Thus, so far in this chapter, I have introduced different types of electricity certificate, given an overview of GO market dynamics, and reviewed the evidence of the effect of consumer demand for RECI on renewable electricity capacity. The key point from this is that RECI use by consumers has done little to stimulate extra renewable capacity in Europe and this is probably due to the low market value of RECI.

4.4 GHG ACCOUNTING ISSUES

The previous section suggested that RECI use by consumers had had little benefit in terms of additional renewable generation. Brander et al. (2013) and Brander et al. (2015) go further to assert that it could have a detrimental effect by diverting attention from other GHG mitigating activities. To explain this, I need to lay out common GHG accounting practices. This also provides the background to some of the limitations to this research that I cover in the conclusion chapter.

Reporting emissions associated with purchased electricity is a required element of corporate GHG emission accounts under the *GHG Protocol - A Corporate Accounting and Reporting Standard*²³ from the GHG Protocol, a partnership of the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) (GHG Protocol Initiative 2004). This voluntary standard has been highly influential in organisational-level emissions accounting. As Ascui and Lovell (2011) note, the standard, first published in 2001, has been incorporated into dozens of reporting guidelines, including those from governments.

The *Corporate Standard* categorises emissions into scopes. *Scope 1* or *direct emissions* occur within the boundary of the reporting organisation. The boundary is defined three ways within the standard and

²³ Generally referred to as the *GHG Protocol*, but its official short form is *Corporate Standard*.

organisations may choose which to apply. Scope 2 and scope 3 emissions occur outside the chosen boundary of the organisation and are also known as *indirect emissions*. Scope 2 emissions include emissions from electricity, heat, steam and cooling purchased or acquired for own consumption²⁴. In my experience, electricity use is usually the biggest source of an organisation's scope 2 emissions. Scope 3 has 15 categories covering emissions associated with an organisation's supply chain, leased assets, use of products, investments, etc. The data needed to calculate scope 3 emissions is not usually as readily available as the utility bills and contracts needed for scope 2. (GHG Protocol Initiative 2004)

Scope 1 and scope 2 reporting is more established than scope 3. It is optional in the *Corporate Standard* to account for and report scope 3 emissions whereas scopes 1 and 2 must be reported. The *Corporate Standard* was first published in 2001 whereas the document that fleshed out the methodology for calculating and reporting scope 3 was published a decade later (GHG Protocol 2011).

The year before, in 2010, WRI and WBCSD began work to amend the *Corporate Standard* to account for energy contractual instruments (World Resources Institute 2010). The technical working group comprised 157 individuals, with many more contributing out of this group. Many participants were firm representatives e.g. Google and Walmart. Few academics took part. The UK government Department for Environment, Food and Rural Affairs (Defra) and US Environmental Protection Agency (US EPA) were among the funders. (Sotos 2015a). It took five years for the *GHG Protocol Scope 2 Guidance – An Amendment to the GHG Protocol Corporate Standard* to be published. The approach taken proved contentious as exemplified by this blogpost title: “*Scope 2 Corporate Accounting, Enron, and Arthur Andersen – A Cautionary Tale*” (Bain 2015).

The debate has turned around two calculation methods, both found within the scope 2 guidance²⁵.

- The market-based method - “A method to quantify the scope 2 GHG emissions of a reporter based on GHG emissions emitted by the generators from which the reporter contractually purchases electricity bundled with contractual instruments, or contractual instruments on their own.” (Sotos 2015a, 26)
- The location-based method - “A method to quantify scope 2 GHG emissions based on average energy generation emission factors for defined geographic locations, including local, subnational, or national boundaries.” (Sotos 2015a, 26). Typically, international or national authorities

²⁴ “Acquired” was added by an amendment to the *Corporate Standard* on Scope 2 accounting (Sotos 2015a).

²⁵ Note that scope 2 emissions only include emissions from the process of electricity generation. Emissions due to the extraction and processing of fuel or manufacture of a power station or wind turbine would fall within scope 3. (GHG Protocol Initiative 2004).

calculate a grid average emission factor for the electricity network in their area. Use of the grid average has been the “traditional” approach to calculating scope 2 emissions (CDP 2013, 14).²⁶

The GHG Protocol Scope 2 Guidance (Sotos 2015a, table 1.1) requires firms to report scope 2 figures using both methods where the firm is operating in a market where contractual instruments providing product- or supplier-specific data are available. If it is not operating in such a market, only the location-based method needs to be used. The *Corporate Standard* had only required one figure to be reported without the degree of specification over method. For reporting scope 1+ scope 2 emission totals, setting targets including scope 2 emissions and communication about products, a firm may use only one of the scope 2 accounting method, but must say which was used (Sotos 2015a, 60-61).

To report a market-based figure, the contractual instruments must meet “Scope 2 Quality Criteria” (Sotos 2015a, 60). Most of the criteria are concerned with avoiding double-counting of the environmental benefits of renewable electricity. An exception is a criterion that states that contractual instruments are sourced from the same market in which the electricity consumption took place. The text states that a market is not co-terminus with an electricity grid and may have political or regulatory boundaries, but it does finish with the injunction that (p.65) *“In addition, if not already specified by regulation or program, contractual instruments should be sourced from regions reasonably linked to the reporting entity’s electricity consumption.”* It does not explain what “reasonably linked” is. This would be a consideration for Iceland – which has no electrical cable to Europe – but was exporting GOs to energy firms and traders (Hufen 2016).

Arguments have been put for and against the market- and location-based accounting approaches. The arguments against the location method are that it does not reflect that consumers have a choice of electricity suppliers and that there are difficulties in calculating a grid average emission factor (CDP 2013). However, Brander et al. (2013) supports the location-based approach.

“...emission factors based on contractual arrangements or REC purchases do not reflect the emissions actually caused by the reporting business’s activities. For all other reporting under the GHG Protocol, a physical relationship is presumed between a business’s activities and the emissions that result from those activities. This physical relationship is the basis for establishing a ‘true and fair’ account of a business’s GHG emissions. A contractual approach to Scope 2 accounting breaks that fundamental relationship. It allows a business to lower its reported Scope

²⁶ Sotos (2015a, 102) defines an emission factor as “A factor that converts activity data into GHG emissions data (e.g., kg CO₂e emitted per liter of fuel consumed, kg CO₂e emitted per kilometer traveled, etc.)” Activity data is defined as (p.101) “A quantitative measure of a level of activity that results in GHG emissions. Activity data is multiplied by an emissions factor to derive the GHG emissions associated with a process or an operation. Examples of activity data include kilowatt-hours of electricity used, quantity of fuel used, output of a process, hours equipment is operated, distance traveled, and floor area of a building.”

2 emissions without changing how it physically obtains electricity and without altering how electricity is delivered and sold into the grid.” (Brander et al. 2013. This was an internet post, hence no page number.)

As organisations may use just one method for reporting a total scope 1 and scope 2 figure and just one method for setting an emissions reduction target (Sotos 2015a, 60-61), Brander et al. (2013) argue *“If a company purchases RECs and reports zero Scope 2 emissions, for example, the company no longer has an incentive to evaluate more concrete options for reducing Scope 2 emissions, such as energy efficiency improvements²⁷, and stakeholders end up being misled about important aspects of the company’s GHG performance.”*

A point to note is that while the studies described in section 4.3 relate - where specified - to energy attribute certificates, supplier-specific emission factors and eco-labels, the argument of Brander et al. (2013), Brander et al. (2015), and Brander, Gillenwater, and Ascui (2018) applies to the reflection of all types of contractual instruments in scope 2 emission figure. Furthermore, their argument does not appear to pertain solely to renewable electricity contractual instruments as all three papers argue against the use of emission factors reflecting contractual arrangements in scope 2 accounting. *“Scope 2 contractual emissions factors put corporate GHG reporting at risk”* is a heading in Brander et al. (2013, no page number). Therefore, I decided to include contractual arrangements for low-carbon electricity within the compass of my research as - in my experience of GHG emissions mitigation by firms – some firms engaged in contracts for electricity from highly-efficient Combined Heat and Power (CHP) plants.

A further point to note that applies to both the location- and the market-based methods is that they are attributional approaches which contrast with the consequential approach (Nordenstam, Ilic, and Ödlund 2018, Brander and Ascui 2015). This is raised because consequential approaches are found in firms’ GHG emission accounts. Brander and Ascui (2015) describe the difference.

“Attributional methods provide static inventories of emissions allocated or attributed to a defined scope of responsibility, while consequential methods attempt to measure the total system-wide change in emissions that occurs as the result of a decision or action, such as the decision to produce one extra unit of a given product.” (Abstract)

²⁷ Brander et al. (2013) and Brander et al. (2015) call into question the effect of RECI/LCECI and the market-based scope 2 method on actions such as energy efficiency. In addressing this point through RQ2, I have used the phrase “other GHG mitigating actions” to encompass energy efficiency and other mitigating actions. However, section 4.3 shows that whether RECI use is a mitigating activity - as the phrase “other GHG mitigating actions” implies - is debatable. Nevertheless, I have continued to use this phrase for its succinctness and ease of comprehension.

In one of the first assessments of the effect of the market-based approach on decision-making, Nordenstam, Ilic, and Ödlund (2018) have compared the attributional approach of the *Corporate Standard* and the *Scope 2 Guidance* with a consequential approach to decisions around the operation of CHP district heating scheme in Europe from both the perspective of operator and consumer and including use of GOs. They found there were choices that would lead to a reduction in emissions estimated using the *Corporate Standard* approach and an increase in emissions estimated using the consequential approach. However, this was not exclusively a criticism of the market-based scope 2 approach. This also occurred with the location-based scope 2 approach, showing - in my opinion - the limitations of the attributional accounting approach, rather than specifically the market-based scope 2 approach.

4.5 THE GERMAN CONTEXT

A specialist environment research unit, the Öko-Institut, operated the GOs system in Germany initially. Very few GOs were issued in Germany. (Re-Diss 2012d) The German GO system was subsequently operated by part of the German Federal Environmental Agency – Umweltbundesamt (UBA). As already explained, publicly-supported renewable electricity generators in Germany could not receive GOs. Since most renewable electricity generators in Germany had opted to receive public support, there were few German-originated GOs available to buy. In 2011, no GOs were issued to renewable electricity generators in Germany. By 2015, still only 13% (25 TWh) of German renewable electricity production was issued with a GO. (Marty 2017)

The rationale from UBA for the position of successive German governments on GOs was that the plant operator should not receive more support than was necessary to produce the renewable electricity. Another reason given was avoidance of double-counting of attributes already disclosed on all consumers' bills as the proportion of their electricity generated renewably and supported by public subsidy. (Marty 2017) The GHG Protocol's scope 2 guidance puts the reason differently.

“For instance, in Germany if a generation facility receives subsidies, then all generation attributes must be either canceled or retired on behalf of all German consumers under the rationale these consumers have paid for the energy through taxes, and should therefore collectively own the attributes.” (Sotos 2015a, 69)

The German government position has not prohibited electricity suppliers and consumer firms from buying GOs from outside Germany. Kuronen and Lehtovaara (2017) said that due to the German government

position on issuing GOs most demand is met with GOs from overseas. The vast majority (56%) comes from Norway, followed by Austria (15%) (Marty 2017)²⁸.

Regarding corporate carbon accounting methodology, there is an initiative from the Association for Environmental Management and Sustainability in Financial Institutions (Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten e.V. or VfU) which published *Accounting Principles and Guidelines for Operational Environmental Balances of Financial Service Providers with Standard Accounts* (VfU n.d.a) in 1997. This uses emission factors reflecting contractual arrangements.

4.6 THE UK CONTEXT

The regulatory and policy context for UK-incorporated firms seeking to account for and report emissions associated with their electricity consumption is complicated. In summary, the UK Department for the Environment, Food and Rural Affairs (Defra) and latterly in concert with the UK Department for Energy and Climate Change (DECC) assisted organisations in calculating their GHG emissions by publishing emission factors and guidance. This guidance has intersected with UK government regulations that used fiscal measures to incentivise energy-saving and other behaviour related to climate change as well as guidance from the GHG Protocol. I unpick this sequence of events below.

In 2001 the UK government implemented a tax - the Climate Change Levy – on electricity and fossil fuels used by non-domestic consumers, except for the transport sector. Firms in sectors that reached voluntary agreements with the government to reduce their energy use by defined amounts (Climate Change Agreements) could benefit from reduced rates of the levy. Firms that paid their electricity suppliers for RECI certificates known as Levy Exemption Certificate (LECs) were exempt from the main rate of the levy. LECs were also issued for electricity from certain types of Combined Heat and Power Plants, known as “Good Quality CHP”, which could also benefit from an exemption. Generators eligible to be issued with LECs were able to sell them to energy suppliers who could use them to sell a “green tariff” to non-domestic customers. (HM Revenue and Customs 2015a, Ofgem 2016a, GOV.UK 2017)

Pre-2008 Defra guidance stated that the grid average emission factor it published for the UK could be replaced by a zero emission factor for electricity purchased and consumed by a non-domestic customer providing the energy supplier had bought an equivalent number of renewable electricity LECs. Electricity

²⁸ For this reason, the dates of when the GO systems became operational in Austria and Norway are shown in Table 3.

from Good Quality CHP could be accounted for using a lower emission factor than the grid average. (Defra 2007). In 2008 the guidance changed. Organisations were advised to use the grid average emission irrespective of LEC use for the 2008-2009 reporting year. For the 2007-2008 reporting year, it recommended that organisations using LECs continue to zero rate electricity but to add an explanatory note in anticipation of the change.²⁹ (Defra 2008) The guidance (p.6) explained why the change was being made:

“This is a complicated issue. Electricity suppliers already have a legal obligation to produce a certain amount of their electricity from renewable sources through Renewables Obligation Certificates (ROCs) and other Government schemes.

“This means that existing evidence suggests that green tariffs deliver insignificant additional carbon savings from renewable energy. You may wish to speak to your supplier about whether your tariff results in additional renewable energy being generated beyond the legal minimum.”

Subsequently a methodology of GHG accounting was published by Defra and DECC (2009) as guidance for firms. It recommended that organisations only applied a zero emissions factor to green tariffs where a supplier could demonstrate evidence of supply and additionality. For the first test, the guidance from Defra and DECC followed guidelines issued in a letter by Martin Crouch, then a director at the energy regulator Ofgem (Crouch 2009). The Ofgem guidelines considered that the supply test could be met by an electricity supplier applying a LEC and a REGO/GO to each MWh sold under a green tariff. Both certificates were specified to avoid double-counting of the environmental benefits of the underlying electricity. In addition, the guidance from Defra and DECC (2009) specified that a supplier offering a “green tariff” (p. 51) should apply Kyoto Protocol-compliant carbon offsets to at least 50% of the GHG emissions from the electricity supplied under the tariff, as calculated using the grid average emission factor, not an emission factor specific to the tariff. This was to ensure that the purchase resulted in GHG emission savings that were additional to what would have happened otherwise. (Defra and DECC 2009).

This 2009 guidance used a gross/net presentation of emission accounts. The location-based scope 2 approach could be used to report a “gross” figure. RECI/LCECI use would be reflected in a net figure, along with offsets and estimates of emissions avoided due to the sale of self-generated renewable electricity to the grid.

I would argue that this approach mixes two different approaches to GHG accounting - the attributional and the consequential – which are described in the section 4.4 on GHG accounting issues. However, there were less theoretical issues with this approach. Organisations could deduct offset purchases from emission totals and still get the same figure – without LEC and GO purchases. Some argued this deterred

²⁹ The approach for users of CHP LECs is not clear.

firms from purchasing renewable electricity and reduced potential investment in renewable capacity. In 2014 Defra proposed to remove this rule and consulted on how scope 2 figures should be calculated and presented in firm reports, restricting its discussion to the circumstances of the UK. (Defra 2014)

The Defra process coincided with the GHG Protocol's lengthy consultation on scope 2 accounting and there were some similarities between the two approaches. Furthermore, the consultation webpage noted concerns about displacement, the subject of this thesis; *"There are also concerns that allowing companies to report significantly reduced gross emissions by purchasing renewable electricity and giving this equal accounting status in reports will reduce pressure to make energy efficiency improvements which lead to greater overall emission reductions."* (Defra 2014)

However, the Defra consultation did not result in its guidance being updated. Guidance published in 2013 said that the scope 2 accounting approach was under review and in the meantime the accounting approach given in the 2009 document should be applied (Defra 2013). The scope 2 accounting issue was picked up by the UK government consultation on Streamlined Energy and Carbon Reporting (SECR) by organisations. This concluded with regard to certain aspects of reporting – such as mandatory requirements - shortly before submission of this thesis with further elements of guidance due to be addressed at a later date (Department for Business, Energy and Industrial Strategy (Beis) 2019, email from the SECR team at Beis dated 1 April 2019). The SECR consultation occurred after my case studies were conducted, so is not discussed further here, but this is covered in 12.3.1 on the implications of this thesis' findings.

4.7 SUMMARY

Table 3 presents a timeline of regulatory, policy and methodological changes relevant to accounting for scope 2 emissions from electricity for Germany, the UK and internationally. An abbreviated form of this table is used in the discussion chapter for research question one where I use it to situate actions by the cases (see Table 30).

In summary, though, the market for RECI/LCECI is diversifying into increasingly sophisticated contractual instruments such as different types of PPAs (International Renewable Energy Agency 2018) between the generator and the business consumer. Work is needed to understand the impact of these comparatively new arrangements on generation capacity. In contrast, the main energy attribute certificate in Europe – the GO - dates from a directive that came into force in 2001 (European Parliament and European Council 2001). Although the directive gave it a disclosure role, this was a fall-back position to GOs having a role in a pan-European quota scheme (Lauber and Schenner 2011, Nilsson, Nilsson, and Ericsson 2009). Given the lack of a plan for their operation, it is not surprising that the market in them has been slow to develop with supply only expected to catch demand in 2023 (Kuronen and Lehtovaara 2017). I would not anticipate a dramatic change in supply of GOs as a result of Renewable Electricity Directive II (General Secretariat

of the Council 2018), given that member states retain discretion in issuing GOs to electricity from supported generation facilities. However, the legitimisation of the reflection of RECI/LCECI in corporate carbon accounts by the GHG Protocol (Sotos 2015a) and the recently-revised carbon accounting and reporting standard ISO 14064-1:2018 (International Organization for Standardization 2018) will – I expect - increase demand from firms for them.

Table 3. Timeline of regulatory, policy and methodological changes relevant to accounting for scope 2 emissions from electricity (1997-2018)

This table is reproduced in the accompanying A3 portfolio.

Legend:

Regulatory, policy and methodological changes relevant to Scope 2 accounting of electricity emissions are shown in **green font for international changes**, **in purple font for changes specific to Germany** and **in blue font for changes specific to the UK**.

Date	Regulatory, policy & methodological changes relevant to accounting for scope 2 emissions from electricity		Reference
	Short description	More detail	
1997	VfU methodology published.	Publication of the <i>"Accounting Principles and Guidelines for Operational Environmental Balances of Financial Service Providers with Standard Accounts"</i> by Association for Environmental Management and Sustainability in Financial Institutions (VfU). Reflects contractual emission factors in emission figures.	Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten e.V. - VfU (n.d.a)
2001	Guarantee of Origin for renewable electricity created.	Guarantee of Origin created by EU Directive 2001/77/EC	European Parliament and European Council (2001)
2001	Climate Change Levy implemented.	Implementation of Climate Change Levy on electricity and fossil fuels with reduced rates for firms in sectors with agreements to reduce their emissions (Climate Change Agreements) and for firms using Levy Exemption Certificates (LECs) evidencing production of electricity from renewable sources and "Good Quality CHP".	GOV.UK (2017), HM Revenue and Customs (2015a)
2002	Revision of VfU methodology. Development of calculation tool.	Subsequent updates in 2005, 2007, 2010, 2013, 2015	Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten e.V. - VfU (n.d.b)
2002	First CDP questionnaire issued.	International NGO CDP suggested firms follow the GHG Protocol's <i>Corporate Standard</i> methodology with no additional instructions regarding scope 2.	CDP (2002)
2003	Renewable electricity GO system becomes operational in Austria.	Renewable electricity GO system becomes operational in Austria.	Re-Diss (2012b)
October 2003	Renewable electricity GOs introduced in UK.	Implementation of UK transposition of Directive 2001/77/EC (The Electricity (Guarantees of Origin of Electricity Produced from Renewable Energy S.I. 2003/2562) Regulations 2003.)	Re-Diss (2012a)
2004	Guarantee of Origin for electricity from high-efficiency CHP created.	Created by EU directive 2004/8/EC.	Re-Diss (2012a)

2004	Renewable electricity GO system enacted in Germany.	Renewable electricity GO system enacted in Germany.	Draeck (2009)
2006	Renewable electricity GO system becomes operational in Norway	Renewable electricity GO system becomes operational in Norway.	Re-Diss (2012c)
February 2007	CHP GOs created in UK.	Statutory instrument 2007/292 implements CHP GOs in UK, transposing Directive 2004/8/EC.	Re-Diss (2012a)
June 2007	Draft CRC Energy Efficiency scheme published	Publication of draft proposals for the CRC Energy Efficiency scheme (as the Carbon Reduction Commitment scheme became known).	DECC (2014)
May 2008	CDP steers firms towards location-based scope 2 approach, with option of presenting an alternative figure.	CDP introduces its first instructions for reporting emissions from electricity consumption. A location-based approach to be used with space provided for an alternative figure reflecting contractual arrangements. Aim: to allow firms to report a scope 2 figure calculated as they saw fit while giving data-users clarity over the methodology behind the figures. There was no mechanism to stop firms entering a number reflecting RECI use in the field for a location-based scope 2 figure if they wished.	CDP (2008), author of thesis
June 2008	Defra recommendation to use location-based emission factor – even if LECs are used.	Start of change to Defra's scope 2 accounting approach with publication of annual " <i>Guidelines to Defra's Greenhouse Gas Conversion Factors for Company Reporting</i> ". Firms recommended to use grid-average emission factor for grid electricity consumption even if contracts included LECs. Guarantees of Origin not mentioned.	Defra (2008)
January 2009	CHP GO implemented in Germany.	CHP GO implemented in Germany.	Draeck (2009)
September 2009	UK government recommendation to use location-based emission factor – unless electricity contracts come with LECs, GOs and offsets.	Further change to scope 2 accounting approach with publication of " <i>Guidance on how to measure and report your greenhouse gas emissions</i> ". Recommendation to use location-based emission factor – unless electricity contracts come with LECs, GOs and Kyoto Protocol-compliant carbon offsets for at least 50% of the GHG emissions from the tariff.	Defra and DECC (2009)

2010	CRC Energy Efficiency scheme becomes operational.	CRC Energy Efficiency scheme becomes operational. It created financial penalties and reputational incentives for participants through a league table of energy efficiency, though league table was dropped along with other changes.	DECC (2014)
2011	Start of revision of GHG Protocol's Scope 2 guidance.	Start of collaborative process to develop GHG Protocol's new scope 2 guidance.	Sotos (2015b)
2011	End of CCL reduction for Good Quality CHP announced.	UK government announced CHP LECs would cease to be issued in March 2013 and LECs must be used before end of 31 March 2018 for the tax reduction to apply.	Bellingham (2013)
Dec 2013	CDP steers firms towards market-based scope 2 approach.	CDP's instructions change on scope 2 accounting, so firms could use a market-based scope 2 figure throughout their CDP response.	CDP (2013)
2014	Defra consultation on Scope 2 guidance.	Defra public consultation on scope 2 accounting. This did not reach a conclusion, so 2009 guidance remained operational.	Defra (2014)
2014	CDP announces alignment with GHG Protocol Scope 2 Guidance.	CDP announced it would align with forthcoming scope 2 guidance amending <i>Corporate Standard</i> .	CDP (2016c)
Jan 2015	GHG Protocol Scope 2 Guidance published.	Publication of "GHG Protocol Scope 2 Guidance - An Amendment to the GHG Protocol Corporate Standard"	Sotos (2015a)
July 2015	End of CCL reduction for renewably generated electricity announced.	UK government announces end to CCL reduction for renewably-generated electricity. LECs cease to be issued on 1 August 2015 and must be used before end of 31 March 2018 for the tax reduction to apply.	HM Revenue and Customs (2015a and 2015b)
March 2016	End of CRC Energy Efficiency scheme announced.	UK government announces CRC Energy Efficiency scheme will cease in 2018-2019 compliance year. CCL rates will increase to compensate for revenue loss.	Pratt (2016)
Feb 2016	CDP operationally fully aligned with GHG Protocol scope 2 guidance.	CDP questionnaire and instructions are fully aligned with GHG Protocol's scope 2 guidance.	CDP (2016c)
March 2018	CHP and RE LECs must be redeemed (used) by this date.		Bellingham (2013), HM Revenue and Customs (2015a and 2015b)

5 RESEARCH DESIGN

This chapter describes my philosophical approach in section 5.1 before explaining my choice of methodology (case studies) to answer the research questions (section 5.2). The unit of analysis is covered in section 5.3. Section 5.4 explains the influence of the conceptual framework on the selection of case study firms and how this was selection was carried out (section 5.5). I then describe my sources of evidence and how they were analysed (sections 5.6 and 5.7), including my position relative to the research questions (section 5.6.6). I finish with how I have addressed issues of validity and reliability (section 5.7.3).

5.1 PHILOSOPHICAL APPROACH

I take a critical realist approach in this thesis which is neatly described as “...an integration of a realist ontology (there is a real world that exists independently of our perceptions, theories and constructions) with a constructivist epistemology (our understanding of this world is inevitably a construction built from our own perspectives and standpoint)” (Creswell and Plano Clark 2018, 40). Bryman and Bell (2003) delineate critical realism from positivism by explaining that critical realists reject the positivist view that scientists’ view of reality is a direct reflection of reality, arguing that it is an attempt to understand that reality. In addition, critical realists are willing to include in their explanation theoretical terms that are not observable (p.15).

I consider critical realism to be consistent with the view of Scott, whose work on institutionalism I draw on to explain much of the firm behaviour that I describe in the subsequent chapters. Scott (2014, 76) says that he takes a post-positivist view, describing it thus; “It rejects both a radical materialist view that espouses that the only reality is a physical one, and also the idealist (and postmodernist) view that the only reality exists in the human mind.” He further elaborates his view that social reality is a category of reality external to the person whose existence depends on observers who have a common understanding of a situation. He does not specify an epistemological position. However, his description of institutionalism involves the construction of cultural cognitive schema through which we understand the social world. These schema are institutions that affect human activity, which fits with critical realism’s constructivist epistemology as described by Creswell and Plano Clark (2018).

5.2 CHOICE OF METHODOLOGY

This project's research questions (RQ) were:

RQ1. What factors influence a firm's voluntary GHG mitigation choices with regard to renewable and low-carbon electricity contractual instrument use?

RQ2. For those firms that have used renewable and low-carbon electricity contractual instruments, what effect has this had on other GHG mitigation activities?

I chose to investigate both questions using case studies. Answering both questions would involve detailed examination of a large quantity of data from a variety of data-sources. In-depth investigation within a real-world context is characteristic of a case study investigation (Yin 2014).

Regarding RQ1, it may not have been possible to answer this question solely from interviewing representatives of firms or from reading documents. The factors affecting GHG mitigation options could change over time and therefore a longitudinal approach was fitting. However, interviewees may not have been able to remember events a decade earlier precisely (or even have knowledge of those events) and documents may not cover the exact questions I wanted answered. McWilliams and Siegel (2011) made a point about potential firm sensitivity about revealing motivations. I thought that I would be able to get more candid information through an interview than through a survey. Therefore, interview data could augment documentary data.

RQ2 also required a longitudinal approach as any impact of RECI/LCECI on firms' portfolio of GHG mitigating activities may take years to manifest, due to lead-in times for mitigation actions or for electricity contracts to elapse, for example. Extensive and detailed examination of data as is typical in a case study would be required to answer RQ2 based on my experience of working on corporate GHG accounting. This was partly due to issues of data quality which is covered in section 5.7.2.6.

The literature review led to the creation of a conceptual framework that guided data collection. Based on this, I deliberately introduced variation in the regulatory context for the commonly-used energy attribute certificate, the Guarantee of Origin, which differs between Germany and the UK, to see how it affected its use by firms. The careful selection of case studies was designed to allow analytical generalisations as described by Yin (2014). This is discussed more fully in section 5.4.

To an extent, the research was deductive as I had already identified several factors which had been associated with environmental management by other researchers and I intended to ask interviewees about them and to look for them in my reading of documentary evidence. However, the approach that I took to data collection allowed me to incorporate other factors that emerged from these activities into explanations of behaviour. Creswell and Plano Clark (2018, 43) call this an "*inductive interpretive approach*", based on Creswell (2015), and describe it thus; "*In some qualitative studies, the theory is*

advanced as a preliminary framework but then modified into a new or newly configured theory as data is analysed." I thought this would be a useful approach because research on RECI/LCECI use by firms is limited, especially in Europe.

Academic literature lent support to the case study approach. Much of the CSR-related literature has taken a quantitative approach. Aguinis and Glavas (2012) in their review of 690 journal articles, books and book chapters found only 11% of the studies in their analysis used qualitative methodologies and they called for more diversity in methodologies. Case studies may reveal how factors interact inside the black box of the firm, offering a different perspective to statistical correlations between variables. The insight they can offer on the environmental management of firms is exemplified by Prakash (2000), Busch and Schwarzkopf (2013) and G. Jones and Lubinski (2014).

As an alternative to case studies, I considered using Qualitative Comparative Analysis (QCA) - specifically a variant of QCA called fuzzy-set - as my method. Fuzzy-set QCA uses Boolean algebra and set theory qualitative analysis to undertake systematic study of causality. It is considered appropriate for small n studies and allows examination of causal complexity, enabling the researcher to discover factors that are sufficient or necessary for an outcome. (Schneider and Wagemann 2006). Despite these advantages, I decided against it as one must decide the cut-off points that enable categorisation of data. I could not do this to my satisfaction as I could not establish robust reasons for thresholds for all factors.

5.3 UNIT OF ANALYSIS

A key source of data was going to be the information collected by the environmental NGO CDP (formerly known as the Carbon Disclosure Project). CDP sends out an information request on behalf of institutional investors to firms listed on certain stock market indices. My unit of analysis was therefore the stock market-listed entity to which CDP sent its information request³⁰.

Some of the entities that I would be contacting would be groups of firms. According to Tricker (2012) every firm in a group must follow laws of the jurisdiction in which it is incorporated. This has bearing on the firms that I would be using as cases as some would have parts of the group incorporated in different nation

³⁰ Later CDP set up a programme to gather data on behalf of firms that wanted to understand the climate change-related activities of firms in their supply chain. However, I did not use data from the supply chain programme as this requested data from both stock market listed and non-listed companies. My assumptions were that non-listed firms were likely to be smaller than listed firms and that use of RECI/LCECI was a sophisticated climate change response more likely to be used by larger firms.

states. I expected the use of an in-depth case study methodology to help in understanding if this affected the GHG mitigation choices of the group.

This research project is a longitudinal study; therefore the unit of analysis also needs to be bounded in terms of time. The start point for the case studies was the period prior to the earliest date found of RECI/LCECI use. The end-point for each case study was usually set by the reporting year the firm had used for its response to the CDP information request for 2016. Firms set their own reporting period when they respond to CDP. The CDP2016 dataset typically contains data for y/e 2015 or y/e 2016. I also looked at corporate publications for y/e 2016. However, some data was gathered for y/e 2017 in cases where there was an event or decision in y/e 2016 and I wanted to see how it unfolded.

5.4 REFLECTION OF CONCEPTUAL FRAMEWORK IN RESEARCH DESIGN

This section explains how the factors selected for my conceptual framework were used in the design of the research. It explains where variation was deliberately introduced on a key factor and where variation in factors was constrained to reduce complexity and to allow the identification of patterns.

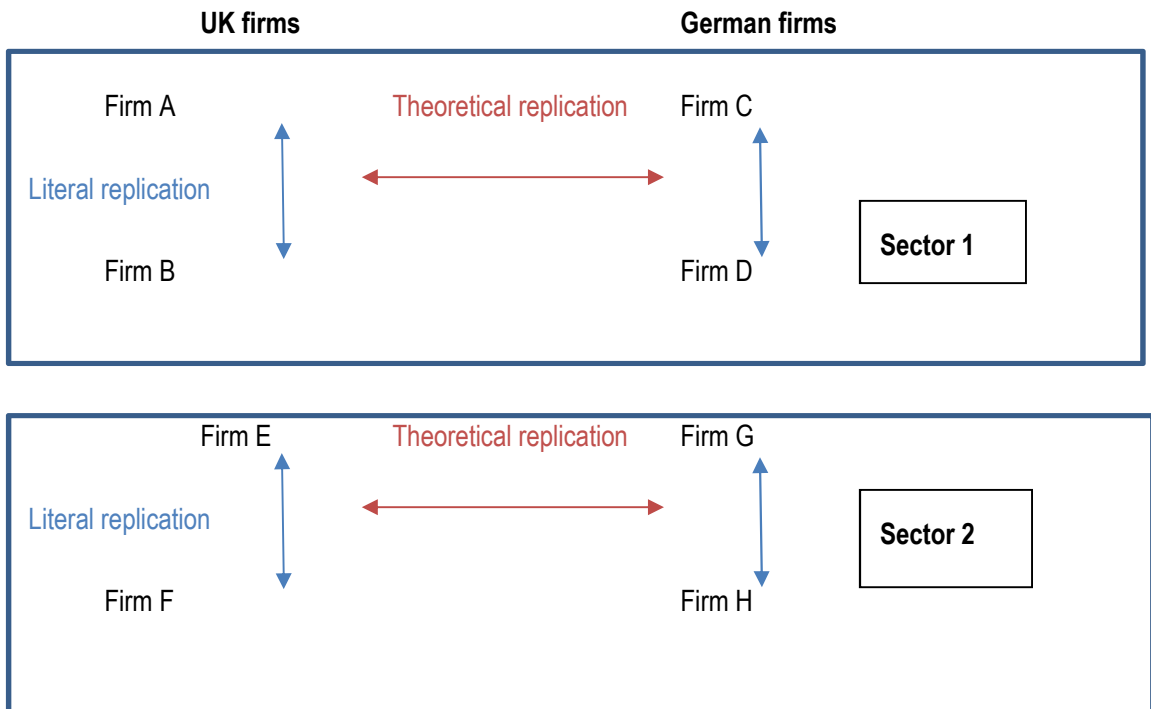
One key factor associated with firms' environmental management and included in my framework was regulatory and policy context. UK and Germany have taken different approaches to the Guarantee of Origin, a common energy attribute certificate created by EU directive 2001/77/EC (European Parliament and European Council 2001). To investigate if this affected firms' use of RECI/LCECI, my cases were incorporated in either Germany or the UK.

I employed a strategy from Yin (2014) where units of analysis are selected because they do or do not share the feature of interest. This could provide instances of what Yin calls literal and theoretical replication. Applied to my research case, if firms based in the same regulatory context as regards GOs chose a similar approach to RECI/LCECI use, this would provide literal replication. If the approach of firms to RECI/LCECI differed between contrasting regulatory regimes for GOs, this would show theoretical replication or "*contrasting results but for anticipatable reasons*" (Yin 2014, 57). Taken together, the research would suggest that the regulatory approach to GOs in the country of incorporation is influencing RECI/LCECI use in particular ways, although this research design does not rule out that other factors associated with country of incorporation are influencing firms' RECI/LCECI practices. However, the GO approach in the country of incorporation would be a strong candidate.

My cases would, of course, differ in other characteristics linked with environmental management. Having identified firms incorporated in Germany and the UK, I dampened the influence of some factors to allow any patterns regarding other factors to become clearer. I did this by reducing the range of variation in some factors. The firms were all stock market listed as explained in section 5.3. Variables that I chose to constrain were firm size, available finance and sector which serves to limit the number of regulatory/policy

contexts within which firms were operating. Sector was a proxy for consumer proximity. Firms were sorted by sector and then I formed sets of firms by grouping together those whose size and available finance fell within a defined band relative to one another. It was not possible to constrain more variables due to the difficulty of finding firms comparable on the aforementioned variables. This process is described in detail in section 5.5. A diagram of the resulting research design is shown in Figure 3.

Figure 3 Case study groups and theoretical and literal replication based on Yin (2014)



Between firms in different sectors, there could be theoretical replication if the sectors differed in terms of their consumer proximity, and/or emissions profile and/or regulations specific to their sector and the firms incorporated in the same country took a contrasting approach to RECI/LCECI use. Alternatively, there may be literal replication if firms incorporated in the same country are similar in terms of their consumer proximity and/or emissions profile and/or regulations specific to their sector and take a common approach to RECI/LCECI use. However, the point of the sector grouping was to try to reduce the diversity of firms that I was studying. As I mentioned, I also tried to hold variation of firm size and available finances within a range, defined by the ratio between the highest and lowest figures within the group. However, the case study approach captures the influence of other factors. Therefore, while the influence of the GO approach in the country of incorporation was at the core of the research design, this research project investigates a wide range of factors for their influence on RECI/LCECI use and its role in a portfolio of GHG mitigating activities.

To summarise, this section has explained that while firms were selected to produce a finding about the influence of country of incorporation's approach to GOs on RECI/LCECI use by firms, this research project is broader, considering a wide range of factors for their influence on RECI/LCECI use within a suite of mitigating activities conducted by firms.

5.5 IDENTIFYING CASE STUDY FIRMS

The following section explains how I identified potential case study firms that were incorporated in Germany and the UK and used RECI/LCECI. It details how I operationalised the variables of sector, firm size, and available financial resource. It goes on to explain how I used these variables to form groups of firms defined by sector and how I decided which groups to take forward to the next phase of the research - approaching the firms to ask them to be case studies in my research.

I used the CDP datasets to identify potential cases. These specified where firms were incorporated and my first stage was to filter the datasets to identify firms incorporated in Germany and the UK.

The next stage was to identify firms that bought RECI/LCECI and the start date of these purchases. I did this by working backwards through the CDP data-sets from its 2015 investor programme. Some firms had long histories of RECI/LCECI use – stretching back to the early 2000s - and in the earlier years it was not always clear what contractual instruments had been used. I included all RECI/LCECI within my search. As the CDP questionnaire and its web-based data entry system evolved over the years, the data-sets had to be searched in different ways. This is explained in the appendix section 14.1. I excluded electric utilities from my search because the focus was on how electricity consumers used RECI/LCECI.

The firms identified by this search were then grouped by sector and were subsequently matched as closely as possible on the characteristics of firm size and available financial resources. This process is explained in detail in sections 5.5.1-5.5.2. These characteristics were assessed for the three years prior to the first year of recorded RECI/LCECI use i.e. if the first recorded use was in y/e 2014, then data for y/e 2011-2013 was used. The selection of a three-year period was based on my assumption that buying energy attribute certificates could be executed within days or weeks while a longer lead-in time might be needed to switch tariffs with an electricity supplier and an even longer period might be required to set up a Power Purchase Agreement with an electricity generator.

I wanted firms to be broadly comparable on the factors of available financial resources and firm size. Therefore, I set criteria to reduce divergence on these variables among firms in each group. In deciding which groups of firms to select for the next stage of this research – asking the firms to participate in my project – I selected the groups of firms that had the least divergences from these criteria.

The operationalisation of the firm characteristics is described in the following sections, along with the criteria that I set with the aim of keeping the firms in each group within a range for available financial resources and firm size.

5.5.1 SECTOR

I followed CDP's listing of the firm's sector. I checked the classification three years prior to the firm's first reported RECI/LCECI use. If this year fell prior to CDP's introduction of industry classification in 2007, then the earliest available classification was used.

5.5.2 AVAILABLE FINANCIAL RESOURCES

From the literature review, it can be seen that a variety of metrics have been used to represent available financial resources. However, there are limitations to these proxies as they are publicly available historical data provided for shareholders, creditors and to meet regulatory requirements while firm insiders would use confidential, forward-looking management accounts in deciding allocations of funding to environmental management. (Mario Abela, email communications 24-29 March 2016³¹)

In the absence of access to this data, I assumed that managers would have used the amount of available finance that they had had at their discretion as guide to its future availability. My aim was to capture the financial resources at managers' discretion after compulsory outlays had been made, but before exceptional events had been taken into account as RECI/LCECI use is frequently not a one-off expenditure. Therefore, I wanted a metric that captured the prevailing financial environment. I operationalised it using the Net Income Before Extraordinary Items (NIBX) variable in the Thomson One database (see section 14.1.16). The mean average of the figures from the three years preceding the first known date of RECI/LCECI was used to smooth some of the volatility in this metric. I tried to ensure the highest mean net income figure in the sector groups was less than ten times bigger than the lowest mean net income in the group. The ten-fold difference was chosen so I was able to create some groups.

The disadvantage of this metric is that incorporates asset valuation changes that may be a cause of volatility. Earnings Before Interest, Tax, Depreciation and Amortisation was considered as an alternative. It excludes some of these changes but is not always reported by companies. Another option considered was *Cash flows from operations* (OTLO). There are expenditures that have to be made from OTLO this before you arrive at the amount of funds available for distribution to shareholders as dividends or for use in the business. (Mario Abela, email communications 24-29 March 2016). These are the funds that I would consider represent available financial resources. Although OTLO does not precisely represent these funds, I decided OTLO would be useful to double-check the selection of the firms made using NIBX. The

³¹ Mario Abela is a professional accountant and visiting professor at IÉSEG School of Management, Paris, France. <https://uk.linkedin.com/in/mario-abela-75a95957>

mean average of the figures from the three years preceding the first known date of RECI/LCECI was used and I checked the number of times the OTLO mean of one firm in the group was ten or more times the mean of another firm in the group.

5.5.3 FIRM SIZE

As discussed in section 2.8.2, firm size could be a proxy for other firm characteristics that could be linked to environmental management e.g. organisational slack and visibility (Bowen 2000). Available financial resources - a component of organisational slack according to Bowen's conception - was being used already in the grouping process, so I rejected using a financial variable that may overlap in its effects with available financial resource. This ruled out turnover and annual sales revenue. I also wanted to use a variable that was accessible prior to approaching firms. This ruled out production output and total capacity. Furthermore, I wanted to operationalise firm size using a variable that would best represent visibility. Bowen (2000) argued that employee numbers would best capture visibility effects. I judged that employee numbers would reflect visibility better than my other option of total assets as I assumed that these could be great even though the firm may not be widely known.

The aim was to keep the number of employees at the larger firm within the sector group to no more than four times the number of employees of the smaller firm, although this was not possible for all cases. The mean of the figures from the three years preceding the first known date of RECI/LCECI use was used for the grouping process. The four-fold difference was set so that I was able to create some groups while ruling out more excessive differences. Data was taken from the Thomson One online database.

5.5.4 SUMMARY OF CREATION OF GROUPS OF CASES

The process of selecting cases was as follows:

- a) Identify firms incorporated in Germany and the UK.
- b) Group firms based on firms' sector.
- c) For each firm, calculate mean average employee number, net income (NIBX) and cash flow from operations (OTLO) figures for the three years prior to the first record of RECI/LCECI in CDP datasets.
- d) Refine groups so that – where possible - the highest mean number of employees in the group was not be more than four times the lowest mean in the group and that the highest mean NIBX figure and the highest mean OTLO figure in the group were less than ten times greater than lowest.
- e) Count how many divergences from these goals there were in each group and convert to a percentage.

- f) Select groups of firms on the basis that they had the lowest percentage of exceedances of the criteria. The degree of exceedance was also taken into account. I rejected groups in which the number of employees in one firm was five or more times bigger than another firm in the group.

5.5.5 CASES IN THEIR GROUPS

The process summarised above resulted in the creation of the case study groups shown in Table 4. All the cases chose to be anonymous except for the German B2B financial institution that decided not to participate in the research. However, I continued with this case study using the firm's CDP responses and its own publications. I have made this case study anonymous too as giving its identity would assist in identifying the UK B2B financial institution. German firms were given a pseudonym beginning with G and the UK firms a pseudonym beginning with U.

Table 4 Case study firms in their groups

Sector and title used in case study chapters	Firms		Notes
	German	UK	
Banks	Gamete	Umbrella	Ratios between firms for employee numbers, NIBX and OTLO all fell within set parameters.
	Grange	Urban	
Diversified financials - referred to as B2B financials	Geode	Ursa	Initially ratios between firms for employee numbers, NIBX and OTLO all fell within set parameters. Start date for Ursa's RECI/LCECI use was later revised and the firms diverged on employee numbers (there was more than a seven-fold difference between the firms). NIBX figures fell within the criterion. OTLO data was no longer available.
Food and drink retailing - referred to as supermarkets	Goshawk	Upsilon	Initially ratios between firms for employee numbers, NIBX and OTLO all fell within set parameters. Start dates for RECI/LCECI use were later revised. Upsilon and Umbra then exceeded the employee number criterion, although difference between them was still less than 5-fold.
		Umbra	
Integrated Telecommunication Services – referred to as telecoms	Gravadlax	Upwind	Ratios between firms for employee numbers, NIBX and OTLO all fell within set parameters.

Once I started on data collection, I found I had to revise the start dates for RECI/LCECI use for some firms, based on my preliminary examination of CDP records, and this caused some of my grouping criteria to be broken. In particular, there was a large difference in employee numbers between Umbra and Upsilon

and between Geode and Ursa at the point at which they started to use RECI/LCECI. Bowen (2000) found variation in environmental management associated with firm size could largely be accounted for by firm visibility and organisational slack. However, from my knowledge of these firms, I was confident that firm visibility in their domestic markets remained comparable within the groups throughout the period of assessments. Regarding available finance, Geode and Ursa diverged on NIBX and OTLO once I had revised the date for when Ursa began purchasing RECI/LCECI. However, as there was no alternative comparable to Ursa, I pressed ahead with Geode.

Given the lack of alternative firms, I was fortunate that only five of the firms that I asked for an interview declined to participate. I would attribute this to my links with CDP, which are covered in section 5.6.6. One of the five that declined to take part was Geode. Two of the five declining firms would have added to existing groups. Another two were attempts to set up groups in the capital goods and household chemicals sectors.

5.6 DATA GATHERING

In this section, I explain the order in which I gathered data (section 5.6.1), describe my data sources – CDP (section 5.6.2) and corporate publications (section 5.6.3) – and give my approach for selecting which publications and CDP responses to read among the large amount of material available (section 5.6.4). I cover my approach to interviews (section 5.6.5) and finish with addressing the issue of reflexivity (section 5.6.6).

5.6.1 DATA GATHERING SEQUENCE

I contacted prospective cases, sending them an information sheet on my research project. The information sheet had passed my university's ethical review process. I asked firms for an interview. If they agreed, I began to read documentary data to answer the research questions. This allowed me to build a picture of the firm in advance of the interview. The two main documentary sources were the CDP datasets and corporate publications, augmented occasionally by media articles. The following sections describe the main sources of data.

5.6.2 CDP

CDP holds an extensive database on firms' climate change activities that extends back to 2002. Corporate publications from 15 years ago are not readily available. For these reasons, CDP data was used extensively in this research. In this section, I describe the database and organisation that compiles it.

CDP³² was founded on the premise that providing investors with information about stock market-listed firms' climate change response would lead to firms taking action on the issue (CDP n.d.a). It sends out an annual request from institutional investors for firms to complete a questionnaire. The first questionnaire was sent out in 2002. The questions were few and were answered in a free-form format. Over the years, the questionnaire has evolved to include their internal governance and management of climate change, their engagement with policy-makers, risks and opportunities, adaptation and mitigation actions, and emission figures and underlying accounting methodologies (CDP 2016d). A comprehensive response from a firm could be 50 pages or more. Firms are not compelled to answer every question and can choose to make their response public or restrict access to the investors that requested the information from them via CDP. Only public responses have been used in this research.

The first three questionnaires were sent to firms in the FT500, the Financial Times' list of the largest firms globally based on market capitalization (Financial Times 2015). Over the years, the number of signatory investors increased and CDP increased the number of stock market-listed firms to which it sent its information request. A blog post on Harvard Business Online described it as *"the most powerful green NGO that you've never heard of"* (Winston 2010).

Notes of caution have been raised about CDP. Andrew and Cortese (2011) said that although it is funded by a variety of donors, its claims of independence from vested interested must be kept under review. Questions have also been raised about the comparability of CDP data when trying to assess firms' performance (Kolk, Levy, and Pinkse 2008, Andrew and Cortese 2011, Sullivan and Gouldson 2012 and Doda et al. 2016). Regarding the second criticism, I addressed this through the case study methodology which allowed me to triangulate data. In the appendix sections 14.1 and 14.2, I explain how I used each of CDP's annual datasets. Over the years CDP has changed how it has asked firms to report their scope 2 emissions. Furthermore, firms can choose whether they comply with CDP's requests on this and other GHG accounting issues. Therefore, I took care to understand the methodology behind emission figures.

One final point on CDP, please note that in subsequent references the CDP year refers to the year in which the firms reported the data, not to the period to which the data pertains. CDP has not required use of a specified reporting period. Reporting period was not even a requested piece of information in the earliest questionnaires. Typically, although not always, firms report data for the year prior to the date of the CDP questionnaire i.e. data for year-end 2013 will be commonly found in the CDP2014 dataset. I have therefore assumed that - unless specified otherwise - the CDP response was for the preceding year-end. I

³² I worked for CDP from 2007-2013 and – where not referenced - this section is based on my personal knowledge. My connection with CDP is covered in section 5.6.6 "Reflexivity".

use the term “year-end” to denote the year in which the end of the reporting period used by the firm falls i.e. firms do not always supply data for the calendar year.

5.6.3 CORPORATE PUBLICATIONS

Corporate reports specifically addressing sustainability, corporate social responsibility or corporate responsibility issues were used to learn more about the firms’ climate change activities and to augment the data available from the CDP database. Annual reports presenting primarily financial data were also read, usually to understand timings of mergers, acquisitions and divestments. Reports were skimmed to find relevant sections.

5.6.4 SELECTION STRATEGY FOR CDP DATA AND CORPORATE PUBLICATIONS

For the GHG emission figures, I used initially used successive CDP datasets to create the graphs that appear in the following chapters on the firms. For some firms, I switched to using the emissions data available in corporate publications where I assessed they offered greater methodological consistency year-on-year.

Given the extensive amount of documentary evidence that I had available, I decided that I would alternate between CDP responses and corporate publications in gathering qualitative data. Some issues disrupted this plan of analysing a CDP response one year and a corporate publication the next. Corporate websites do not generally host corporate publications from the early 2000s and some CDP responses were only authorised for release to the investors that had signed the request for the firm to complete the CDP questionnaire. Therefore, I could not always follow that sequence and had to analyse a corporate publication for two successive years, for example. In other cases, the same information was being repeated year after year and therefore I skipped reading a report or CDP response for a year. In general, I read CDP responses and corporate publications until I was gathering no new insights into the firm’s GHG mitigating activities.

5.6.5 INTERVIEWS

This section describes the process of defining the questions that I intended to cover in interviews, who I interviewed and how I got in contact with interviewees.

I developed an initial set of questions from my conceptual framework. These were refined following trial interviews and written feedback from CSR professionals, all of whom have worked at stock market-listed companies. The aim of this was to ensure the questions were clear and to assess if I had too many questions to cover in an hour to 90 minutes, the length of time I expected I would have for an interview.

Section 14.4 describes these professionals who helped with this. The refined questions shown in Table 5. These were modified further to reflect points arising from my review of the documentary evidence for each case. In most cases, I had a list of requests for clarifications following my analysis of the documentary evidence, particularly the emission figures. Overall, the interviews were used to check and elaborate on the data that I had gained from the documentary evidence, to discuss significant factors and delve deeper into motivations. Furthermore, my intention was also to give interviewees scope to raise topics not covered by the prepared questions.

Table 5 Generic questionnaire

Question number	Question
1	<p>Please would you talk me through how your firm decided between different GHG mitigation options? The following are possible factors. They may not be applicable to your firm, so please just discuss as appropriate.</p> <ul style="list-style-type: none"> • Laws/regulations that introduce requirements and/or incentives for particular GHG mitigation actions or act as barriers to undertaking particular GHG mitigation actions. • Financial: Different options entail different amounts of capital and on-going expenditure, and opportunities for savings. How did financial considerations influence your decision? Were there any internal financial policies that you had to follow e.g. maximum amount of investment? • Technical issues
2	Where did the idea of buying renewable electricity contractual instruments originate?
3	What did you think the effect of the support would be on the renewable electricity market?
4	What has been the effect of supporting renewable electricity on other GHG mitigation actions?
5	What is the firm's experience of business practices overseas e.g. experience gained through exporting, being part of a group with associated companies based overseas, investing overseas, having directors of different nationalities or with experience of business practices overseas?
6	Corporate Social Responsibility is often thought of as voluntary actions that go beyond philanthropy and attempt to align social, economic and environmental responsibilities. It is often thought of practices and values, recognising multiple parties as stakeholders, and managing external impacts. How does that fit with your firm's use of the phrase CSR or does your firm use another term to refer to similar ideas? If so, what is it. Please explain any differences. Would it be appropriate to use the term CSR in place of your firm's term?
7	Does your firm see support of renewable electricity generation as a CSR activity?
8	If your firm considers it has stakeholders, who are they?
9	What drives your firm's position on climate change and GHG mitigation? Again a few prompts that may not be applicable to your firm: particular people within the organization, particular stakeholders, action taken by competitors/other firms in general, laws/regulation in the countries in which your firm operates? What is their effect?

My gateway to interviewees was primarily through CDP's contacts with firms and I was able to use a CDP email address to make contact. CDP asked me to use the title "CDP Research associate" in my approach to firms. Occasionally email addresses from firm publications and websites were used instead of the CDP contact information. As my project involved interviews, I was required by the University of Sussex to

submit my research plans to an ethical review committee for approval to proceed. Parts of my submission were the information sheet and consent form that were sent to all interviewees. The approved documents can be found in sections 14.5 and 14.6. Firms could choose to be anonymous.

Firms that agreed to take part in my research project were sent the modified questions in advance. Interviewees were more candid than I expected them to be. The answers were often more complicated and lengthier than they had been in the trial interviews. It was not always possible to cover all the questions in the allotted time. Interviews were recorded with the permission of the interviewee and were transcribed by me. Job titles were agreed with the interviewees. All interviews are summarised in Table 6. To varying extents, it was possible to ask follow-up questions/seek clarifications after the main interview, usually by email. Impromptu phone calls from interviewees to me were recorded as notes.

Table 6 Overview of case study interviews

Firm	Description of interview	Date of interview	Length
Gamete	Call with two specialist environmental and energy managers	18 September 2016	2 hours 4 mins
Grange	In-person interview with a manager	10 January 2017	1 hour 19 mins
Urban	Call with a senior manager concerned with corporate responsibility	10 August 2016	50 mins
Umbrella	Call with a sustainability manager	1 September 2016	29 mins
Umbrella	Call with a manager with responsibility for the firm's operational environmental footprint	28 October 2016	54 mins
Ursa	In-person interview with sustainability manager	22 March 2017 (follow-up call 24 March 2017)	Interview 48 mins Call 15 mins
Geode	No interview granted	N/A	N/A
Goshawk	In-person interview with an expert in corporate responsibility strategy and reporting and the corporate responsibility director	21 September 2016	1 hour 3 mins
Upsilon	In-person interview with a sustainability manager	10 August 2016 (follow-up calls on 2 September 2016 and 11 November 2016)	Meeting 1 hour 22 mins Calls 20 mins and 30 mins respectively.
Upsilon	Call with Upsilon's former head of energy	12 September 2016	45 mins
Umbra	Call with head of sustainability	2 February 2017	31 mins
Gravadlax	Call with a senior expert in corporate responsibility	24 March 2017	1 hour 30 mins
Upwind	Call with an environmental reporting manager	24 May 2017 (follow up calls on 11 August 2017, 13 October 2017)	Main call 1 hour 38 mins. Follow-up calls 20 min each approx.
Upwind	Call with a former manager	12 September 2016	30 mins

5.6.6 REFLEXIVITY

Creswell and Creswell (2018, 183) make the point that a qualitative researcher is interpreting a situation and therefore the reader should be informed of “...biases, values and personal background...” that may influence that interpretation and connections. To that end, in this section I discuss my connections with the scope 2 accounting debate, so that readers may make their own assessment of bias.

I set out my connections with organisations featured within this thesis in the section “Links with organisations referenced in this thesis” (p.23). To reprise, I worked for CDP from 2007-2013 as a technical manager. I was instrumental in changing CDP’s scope 2 accounting approach in 2008. This involved asking firms to use a location-based approach for scope 2 while giving firms the opportunity to provide an alternative figure reflecting contractual arrangements. However, the location-based scope 2 figure was the main figure in the questionnaire. My aim was to allow firms to give data-users clarity over the methodology behind the figures while allowing firms to report a scope 2 figure calculated as they thought appropriate.

Subsequently I represented CDP on the GHG Protocol’s technical working group to revise the scope 2 approach in the *Corporate Standard*. Finally, I was seconded by CDP to the UK government’s Department of the Environment, Food and Rural Affairs. One of the issues that I worked on there was scope 2 guidance (see Table 3).

Post-employment, CDP helped me in my research, giving me to access to the CDP datasets, which would normally have had to have been purchased, and helping me with contact information. In return, I was asked to share my findings with CDP.

My personal approach to scope 2 differed to that adopted by CDP in CDP2013-2015; firms could use a scope 2 figure that reflected contractual instrument use throughout their CDP response (see Table 3). I thought firms should continue to report a location-based scope 2 figure as well as one that reflected contractual arrangements. However, I conducted the research with an open-mind, wanting to learn from the evidence, rather than using the process to confirm a firmly-rooted opinion. Overall, I did not feel influenced by my relationship with CDP nor did I detect any wish on behalf of the interviewees to modify their answers because of my relationship to CDP.

5.7 DATA ANALYSIS

In the following sections, I explain how I analysed qualitative and quantitative data from CDP datasets, corporate publications and interviews (sections 5.7.1 and 5.7.2). I then explain how I have addressed issues of reliability and validity in both research questions (section 5.7.3).

5.7.1 QUALITATIVE DATA

CDP questionnaires comprehensively cover a firm's climate change activities including aspects such as adaptation to climate change that were not relevant to this research project. (See, for example, CDP 2016 guidance (CDP2016d)). Appendix section 14.1 explains which questions were used as sources of data. The corporate publications were often large documents, sometimes more than 300-pages long. Indexes, word searches and skim-reading were used to find sections on climate change mitigation.

When I began reading CDP data and corporate publications, I cut-and-paste excerpts of data into Word documents whose structure was based on the conceptual framework. I later learnt of NVivo qualitative data analysis programme. I began coding data using NVivo 11. The conceptual framework informed the initial coding structure with additional codes added as required. However, I found adding data from CDP datasets to NVivo was cumbersome. CDP datasets are in Excel format with a workbook for each year. From CDP2009 onwards, they are large files about 50 Mb in size. It was not efficient to add them to NVivo relative to the amount of data a single worksheet may contain. Therefore, for the earlier years, I coded the entire Excel workbook and in the later years I cut-and-pasted sections from the Excel into a Word document and then coded that. For those firms where I already had a collection of data cut-and-pasted into Word, I coded the Word document. Interviews were transcribed by me, writing in Word, and then coded. While I used some of the data visualisation tools in NVivo. I did not draw much insight from them. However, I found it useful when seeking to compare what firms had said about a specific factor e.g. CSR rating agencies.

5.7.2 QUANTITATIVE DATA

I used quantitative data from CDP and corporate publications to create graphs to understand how firms' absolute and relative emissions and use of RECI/LCECI changed over time.

In the case study chapters, I have shown graphs of firms' absolute emissions. The aim of these graphs is to show the magnitude of RECI/LCECI use, particularly relative to other mitigating activities and to emission reduction targets. I also created graphs that compared intensity of emissions/electricity or energy consumption with the extent of RECI/LCECI use by the firm. The purpose of these graphs was to look for potential associations between these variables. Prompted by comments from some firms that they were running out of mitigating projects to implement, I decided to compare firms' intensity metrics. Finally, for some cases I had the necessary data to compare the financial costs and benefits of different mitigating options with their emission reduction benefits. The purpose of these graphs was to see what the effect on reported emissions might have been if the money spent on RECI/LCECI was diverted to other mitigating actions. Details on how these graphs were constructed is given below. Then I consider the issues of data quality and comparability of data.

5.7.2.1 Absolute emissions graphs

These graphs show absolute emissions, an example of which is shown in Figure 4. The aggregation of emissions is usually based on emission reduction targets set by the firm. Targets are usually set that apply to scope 1 emissions (direct emissions that occur within the boundary of the reporting organisation e.g. the combustion of fossil fuels) in aggregate with scope 2 emissions from acquired electricity, heat, steam and cooling. Sometimes targets also include another category of indirect emissions known as scope 3 emissions e.g. emissions from use of a firm's products. Scope 3 emissions are shown where they are linked with targets including scope 2 emissions. (GHG Protocol Initiative 2004, Sotos 2015a). As emissions from different sources are typically aggregated together, emission reductions from one emission source may obscure a lack of reduction in emissions from another source, so that reductions in emissions from one source may - I argue - influence efforts to mitigate emissions from another source.

The lines with dots show the emissions total. The location-based scope 2 approach was used to standardise on one accounting approach to allow comparability across years and to show the effect of the use of RECI/LCECI has on total emission figures. However, sometimes only a figure reflecting contractual arrangements was available or the approach used by the firm to calculate scope 2 was unknown or unclear.

The bars represent factors that have caused the emissions to change from the previous year e.g. a merger or change in emission factor. So, if there is a negative bar in the chart, the previous year's emissions have been reduced by the amount represented by the bar. Conversely, if there is a positive bar, the previous year's emissions have increased by the amount represented by the bar. The aggregation of the bars would in theory represent the net change in year-on-year emissions, and the position of the marker for the following year's emissions. However, data on the factors causing emissions to change year-on-year was not always available or may have been incomplete. There are two exceptions to the approach for presenting factors that cause reported emissions totals to change year-on-year. The first is the effect of renewable electricity contractual instruments (RECI) and low-carbon electricity contractual instruments (LCECI). The second is the use of carbon offsets.

To deal with RECI and LCECI use first, as the scope 2 location-based method is used as much as possible, RECI/LCECI use is not reflected in the emission totals, although it is shown as a bar. The bars are labelled "The difference between location-based S2 figure and one reflecting use of renewable-/low-carbon electricity contractual instruments." The data for the bars is typically: (a) the difference (calculated by me) between location- and market-based scope 2 figures, (b) based on statements by firm such as "150,000 tCO₂e saved through the use of renewable electricity". I assumed when I read these statements that firms mean this quantity was saved from their inventory, although they may have meant at an

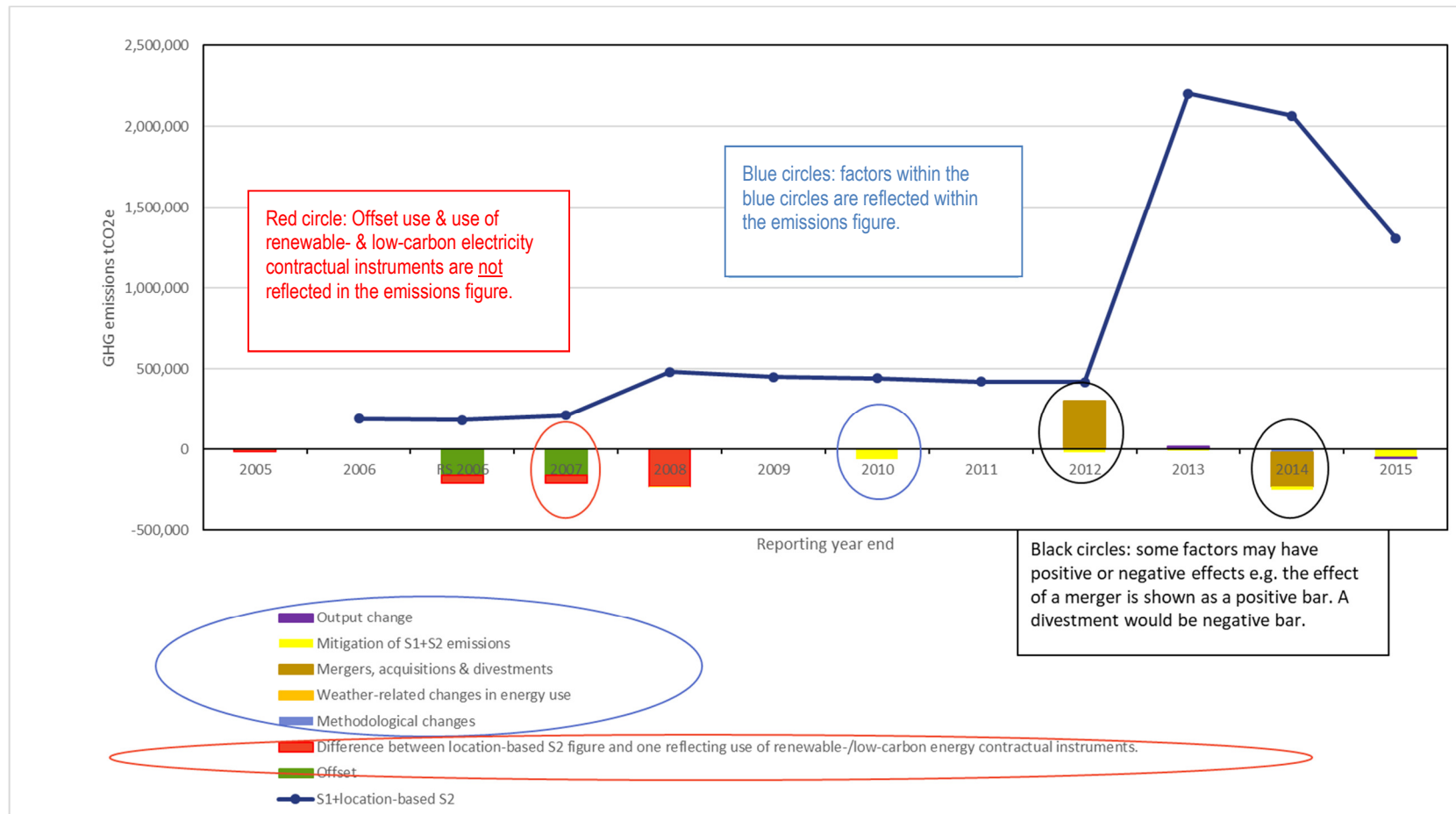
electrical grid systems level through the displacement of marginal electricity generation that such as natural gas-fired generation, but I considered this unlikely³³.

Scope 2 emissions are emissions associated with acquired electricity, heat, steam and cooling (EHSC) (Sotos 2015a). Therefore, for some firms, the bar represents emissions from heat, steam and cooling as well as electricity. This is shown in the accompanying legends.

Offsets are not deducted from the emission figures either in accordance with the GHG Protocol's *Corporate Standard* (GHG Protocol Initiative 2004), but they are shown on the graphs as a bar to indicate the magnitude of the role that they play within the firm's portfolio of GHG mitigation measures.

³³ I am grateful for assistance on this point from Dr Matthew Brander via an email dated 6 September 2018.

Figure 4 Example absolute emissions graph



5.7.2.2 Use of emission/electricity/energy intensity metrics and % of consumed electricity/energy covered by RECI/LCECI

The argument of Brander et al. (2013) and Brander et al. (2015) is that the use of RECI may affect other GHG mitigating activities. To investigate, I compared changes in the emissions normalised using a measure of the firm's activity level with the percentage of consumed electricity/energy³⁴ covered by RECI. Use of normalised emissions takes into account the effects of mergers, acquisitions and divestments and growth/contraction in operations on emissions. If emissions intensity was falling while the RECI percentage was increasing or remaining high, then this indicates that at least some emission mitigation activities were not being displaced, although this cannot address whether emission intensity might fall faster in the absence of RECI use.

However, if the use of RECI was dissuading the firm from other GHG mitigation activities, then the intensity metric would rise, although there may be a time lag before the effect of RECI use is seen. For example, a firm may decide to complete electricity/energy efficiency/saving projects already underway, but not to implement further projects because there will be no benefit in terms of reduced reported emissions figures. Conversely, if the RECI percentage falls and scope 2 emissions increase, prompting attention to other mitigation actions, there will be a time delay while new mitigation projects are initiated. I therefore bore time lag effect in mind in looking for patterns in the data.

The foregoing hypotheses have the RECI/LCECI use percentage as the cause and the intensity metric as the resulting outcome. However, if electricity/energy intensity decreases, due to efficiency/saving actions, then less energy/electricity is consumed, shrinking the denominator of the RECI/LCECI percentage. If a firm has a contract for a fixed number of energy attribute certificates, the RECI percentage will rise. Given the potential for rival explanations, evidence from these graphs needs to be triangulated with other data sources before any conclusions are made.

Turning to the calculation of the variables used, for the numerator of the emissions intensity metric, I used the aggregation of emission scopes that the firm commonly chose for its high-level targets i.e. those that apply across the all firm activities and are not focussed on a specific business activity such as fleet management or fugitive emissions of refrigerants. I did this as action to mitigate emissions in one scope could influence the activities undertaken to mitigate emissions in another scope. This seems more likely if the scopes are linked by a common emission reduction target.

³⁴ I have treated electricity as a subset of energy, with energy encompassing electricity, heat, steam and cooling and fuels.

Use of the electricity and energy consumption as a numerator avoids some of the methodological inconsistencies that may arise with using emissions data e.g. how scope 2 emissions have been calculated and changes in the methodology used to calculate emission factors (see Table 7).

While use of electricity/energy intensity metrics avoids these complications, I need to distinguish between purchased electricity and consumed electricity. Electricity that is both purchased and consumed relates directly to scope 2 emissions. However, sometimes the figures given by firms were labelled consumed electricity and could include self-generated electricity. If amount of purchased and consumed electricity and RECI/LCECI stays the same, but the amount of self-generated electricity increases, then RECI/LCECI percentage will fall, although there will be no impact on scope 2 figures, although scope 1 could increase if fossil fuel is used for electricity generation. The amount of self-generation would then have to be assessed in these cases, although it was not expected to be significant in these cases.

For the denominator, I looked first at the denominator used by the firm in question to express intensity metrics. Often multiple denominators were used. I chose denominators that related to business activity rather than financial metrics that may be influenced by non-core business activities.

5.7.2.3 Inter-firm intensity comparison

During the course of data collection, it emerged that some firms considered that they had few GHG mitigation activities available to implement. To test this statement, I compared the intensity metrics of these firms with others based on the hypothesis that firms that had implemented common mitigation actions would have similar or lower intensities than their peers. Care needs to be taken with this due to many potential sources of incomparability listed in section 5.7.2.5. Analysing data over a period of years reduces the impact of unusual circumstances e.g. unseasonal weather. However, even finding comparable data on a basic metric such as employee numbers was surprisingly difficult. Differences in how to count employees (end-of-year headcount, mean average over the year, full-time employee equivalent) could make a marked difference in findings. Comparability issues relating to specific groups of firms are given in appendix section 14.2.14 that describes how data sets were assembled. A further consideration is that a rival explanation for differing intensities would be different business models and types of operations.

5.7.2.4 Cost and benefits of mitigating GHG emissions

To understand the GHG mitigating actions RECI/LCECI use might be displacing, I looked at data of the costs and savings in monetary terms of individual mitigation measures and the amount of GHG emissions saved. I looked at question 3.3b in CDP2013-2017 for instances of the firms reporting a cost for RECI/LCECI use and other mitigation measures, so I could make graphs of tCO₂e mitigated over the lifetime of the project versus cost savings minus investment costs. I had to assign arbitrary project

lifetimes for energy/emission saving projects, e.g. reducing fleet size or switching off redundant energy-using equipment, that do not have a given or obvious lifetime. Detail on this process is given in appendix section 14.2.2.

I also presented these figures in a different format – a chart – that shows a) what would be the aggregate emission reduction if the money spent on RECI/LCECI was redeployed to a) other internal GHG mitigation projects and b) offsets. For this analysis, I have not used emission savings over the lifetime of the mitigation measure, using instead annual estimates to give an alternative perspective, although many of these projects offer ongoing savings.

5.7.2.5 Data incomparability

While CDP has used the terminology of the globally dominant GHG accounting standard, the GHG Protocol Corporate Standard, CDP has not imposed a prescriptive methodology on firms. A firm may use whatever methodology it chooses. CDP2016 lists 58 standards, protocols and methodologies for calculating scope 1 and 2 emissions figures and businesses may use a methodology not on the list (CDP 2016d).

Within this list, the *Corporate Standard*, ISO 14064-1 (International Organization for Standardization (ISO) 2006) and UK Government's *Environmental Reporting Guidelines: Including mandatory greenhouse gas emissions reporting guidance*³⁵ (Defra 2013) were the three commonest used methodologies cited in CDP 2015's investor programme³⁶ (A. C. H. Smith 2016). ISO 14064-1:2006³⁷ is aligned with the *Corporate Standard* and the Defra guidelines are heavily influenced by it (World Business Council for Sustainable Development and World Resources Institute n.d.). However, even if firms choose one of these emissions accounting methodologies, they may still make legitimate choices within these methodologies that complicates comparison. This is because the *Corporate Standard* is a framework that allows methodological flexibility over organisational boundary, measurement techniques, estimation formulae and GHG emission factors. The table below shows methodological parameters that could affect an organisation's reported emissions change over time.

³⁵ Also known as Defra Voluntary Reporting Guidelines

³⁶ CDP has two programmes collecting climate data from organizations: a request for data from investors sent to stock market-listed companies and a request from customer organizations for data from their suppliers. This remark pertains to the investor programme.

³⁷ This ISO standard was under review at time of writing and a new version was released in December 2018 - ISO14064-1: 2018 (International Organization for Standardization 2018a).

Table 7 Potential methodological sources of incomparability

Area	Description
Organisational boundary	How an organisation defines the entity for which it is providing data. GHG Protocol's <i>Corporate Standard</i> , 14064-1:2006 and the UK Government's <i>Environmental Reporting Guidelines: Including mandatory greenhouse gas emissions reporting guidance</i> have three options within them.
Exclusions	Within the organisational boundary, are some emission sources specific GHGs excluded from the figures?
Global Warming Potential	The global warming effect of GHGs other than carbon dioxide is benchmarked against the effect of carbon dioxide. These ratios are known as Global Warming Potentials. They vary with the period over which the warming is assessed and the source document (GHG Protocol 2016)
Measurement method	If emissions are measured directly, different techniques may be used that could introduce incomparability.
Emission factors	<p>GHG emissions are frequently modelled rather than measured directly. A unit of activity is e.g. distance travelled in a specific mode of transportation is multiplied by an emissions factor from a reference source to give an estimation of the resulting emissions.</p> <p>There are methodological choices to be made in calculating an emission factor that may change over time. For example, the emission factor for combusting a specific fuel in a specific technology may only cover the carbon dioxide emissions or it may include the emissions of methane and nitrous oxide, two other GHGs. If it includes GHGs other than carbon dioxide, one would have to decide which Global Warming Potential to apply to those GHGs.</p>
Scope 2 approach	Whether a location-based or a market-based approach has been used is another source of incomparability.

I dealt with issues of incomparability of data either within a firm year-on-year or between firms through use of the case study method that requires detailed examination of the data used to ensure that comparability is maximised and incomparability clearly noted.

5.7.2.6 Data quality

Researchers have questioned the quality of corporate carbon data in the CDP datasets and firms' own publications. Talbot and Boiral (2013) argue that in public debate and literature on climate change mitigation, the accuracy of corporate GHG emissions data is assumed, but has been largely unexamined, an omission that they address in their investigation of the emission inventories of 10 large emitters using corporate publications and interviews. They find a lack of transparency and reliability in reported figures

and this leads them to question quantitative studies based on secondary data (p.1083). Sullivan and Gouldson (2012) found gaps and inconsistencies in data reported in data reported by nine UK supermarkets to CDP and in corporate publications. This, among other issues, made it extremely difficult for investors to compare firms' performance. Dragomir (2012) in a study of the reported emission of five European oil and gas firms found instances of incomparability between successive annual sustainability reports published by the firms. Dragomir found that his results partly supported an accusation that the reports were symbolic, rather than a substantive attempt to transparently provide data but noted that their quality improved over time. He concludes that the use of data from these reports for quantitative studies depends on the specific data-set under consideration, but they have value in qualitative or critical assessments. Kolk, Levy, and Pinkse (2008) and Andrew and Cortese (2011) have raised concerns about using CDP data to compare the performance of firms.

I addressed data quality through use of the case study approach which involved in-depth examination of the data used, such that anomalous figures could be excluded or changed based on my knowledge of organisational GHG accounting. To safeguard against threats to validity that these steps entail, I have documented the reasons for such adjustments in detail, so that the reader may assess their legitimacy.

5.7.3 RELIABILITY AND VALIDITY

Reliability and validity are concepts commonly used to judge the quality of research design (Yin 2014, Creswell and Creswell 2018). I have used the descriptions in Yin (2014) of reliability and three types of validity to check the robustness of my approach to my research questions. These descriptions are applicable to both the quantitative and qualitative data.

Yin describes reliability as the outcome that a later researcher repeating the same case study as the initial researcher would draw the same conclusions. Confidence that the findings are reliable is enhanced by a clear description of the method followed and by the development of a case study database. I have followed both tactics. I have set out my methodology explicitly. Furthermore, for each case study, all the corporate publications that have been read, even if they have not been referenced in the case study, have been gathered in a folder for each firm, together with interview recordings and transcriptions. All CDP datasets are in a single folder. All the cases are anonymous. Nevertheless, I have carefully labelled all sources of data.

The first of the three types of validity that Yin identifies is construct validity, summarised as "*identifying the correct operational measures for the concepts being studied*" (Yin 2014, 46). Yin recommends these tactics to address this: establishing a chain of evidence that clearly links the research question with the conclusion, using multiple sources of evidence, and review of draft case study reports by interviewees, all of which I have employed within the methodology.

On the first tactic, I have set out the evidence underpinning my findings in the data and discussion chapters. On the second tactic, I had three main sources of data (CDP databases, corporate publications and interviews). This gave considerable opportunities for triangulation³⁸ of the documentary data. Opportunities for corroboration of interview data were largely related to triangulation with documentary data, as I usually interviewed only one person per firm. Where I did interview more than one person, they differed in their roles or the time periods that they knew about differed or I interviewed both interviewees at the same time which may discourage disagreement. On the final tactic, each interviewee was sent a close-to-final draft of the case study chapter for their firm and any outstanding queries. Further information was then received from seven firms, which were then used to further refine the text. However, as I had flagged the text as a close-to-final draft, I felt obligated to restrict the changes that I made subsequently.

The second type of validity is internal validity in which the causal relationship is inferred. Is the connection between cause and effect robust or has a spurious link been made? To deal with this, I exhaustively considered rival explanations for my findings. I have also employed the technique of selecting cases on independent variables (country of incorporation) in order to look for instances of literal and theoretical generalisations in terms of the effect that the regulatory approach to GOs had on firms' use of RECI/LCECI. (Yin 2014)

The third type of validity is external validity which involves defining the extent to which findings can be generalised to other cases. Yin (2014) argues that the selection of cases can lead to literal and theoretical replications of findings and from there to analytical generalisations to other similar cases. I have made analytical generalisations as the evidence allows. However, even if Yin's argument is not accepted e.g. by Creswell and Creswell (2018), my case study firms are so large that it is important to know the approach that they are taking to GHG mitigation irrespective of any insight that may be applicable to other firms. Furthermore, my findings provide a starting point for further investigations.

³⁸ I use "triangulate" as in "Triangulate different data sources by examining evidence from the sources and using it to build a coherent justification for themes. If themes are established based on converging several sources of data or perspectives from participants, then this process can be claimed as adding to the validity of the study." (Creswell and Creswell 2018, 200)

5.8 PRESENTATION OF THE CASE STUDIES

In this section I explain how I present the gathered data in the case study chapters 6-9. I outline the structure of the case studies and the conventions that I have followed in the text.

The contrasting regulatory regimes of Germany and the UK as regards the Guarantee of Origin was the reason for selecting firms incorporated in Germany and the UK for this research. However, as explained in section 5.5, firms were also selected according to sector. Grouping the firms by sector provides sets of firms that are conveniently-sized for the presentation of the case studies. Therefore, the following case study chapters are ordered according to sector. Each chapter begins with details of the grouping process specific to that group of firms. Then, looking at one firm at a time, the firm is described and data relevant to each of the research questions presented.

Order of presentation of data for each case study

Data sources

Case description

A short description of the firm is given without compromising its anonymity.

Overview of data relevant to research question 1

RQ1 is “What factors influence a firm’s voluntary GHG mitigation choices with regard to renewable and low-carbon electricity contractual instrument use?” This section gives a vignette of the factors relevant to RQ1. This text summary is accompanied by a table summarising the factors affecting the firm’s mitigating activities. This table is ordered by mitigating activity e.g. RECI/LCECI use, energy efficiency/saving. This overview section does not contain references to data sources to improve the flow of the text. References are included in subsequent sections of the case study.

Emissions overview

This section gives a profile of the firm’s emission sources and their relative magnitude. It includes a section on emission targets and includes a graph of the firm’s absolute emissions. See section 5.7.2.1 for an explanation of these graphs.

Activities related to emissions mitigation

In this section, I describe the firm’s mitigating activities. In general, I have not covered activities related to scope 3 emissions unless these are linked to activities that mitigate scope 1 and 2 emissions e.g. via a target that encompasses emissions from scopes 1, 2 and 3.

Factors influencing a firm’s GHG mitigation choices (RQ1) – This uses the factors identified in the conceptual framework as a starting point for ordering this section. I add headings for new factors

that emerged from the case study. For the factor “Stakeholder pressure”, data is first presented as to whether the firm considers that it has stakeholders. This is often via a description of its approach to CSR. The firms frequently listed associations working on climate change issues of which they were members. Data on these have only been included where a specific action related to its own operational emissions was given as an outcome e.g. Goshawk and Upsilon supermarkets were members of a group that agreed a voluntary phase-out of coolants with high GWPs.

Summary table of findings for RQ1

Data relevant to RQ1 is summarised in a table organised by factor. The discussion chapter for RQ1, chapter 10, develops the analysis of the factors in order to answer RQ1.

Effect of RECI/LCECI on other GHG mitigating activities (RQ2)

In this section, I present the data that I have gathered to answer RQ2 (“For those firms that have used renewable and low-carbon electricity contractual instruments, what effect has this had on other GHG mitigation activities?”). This frequently includes graphs of GHG emissions/electricity consumption/energy consumption normalised by an appropriate activity metric plotted against the percentage of RECI/LCECI used by the firm relative to its consumption of electricity. Analysis of the data is primarily undertaken in chapter 11.

I conclude this section with explanations about the convention that I have used for referencing data sources. Data sources are given as footnotes except where they are used to indicate the span of dates over which something occurred or where they relate to a source other than the firm. An entry such as “CDP 2012 11.2” means that the data was taken from the answer to question 11.2 in the CDP2012 dataset. In later years, CDP prefixed its question numbers with “CC” for “climate change”. Turning to corporate publications, some corporate publications did not have page numbers. Therefore, I have given the page number in the PDF as a locator. If data is attributed to an interviewee, the information was given in interview unless otherwise stated.

Where a reference is given in the main body of the text, it is usually included within the relevant sentence i.e. “*Energy efficiency improvements were the firm’s primary mitigation measure (CDP2011 3.3a).*” However, if the reference relates to more than one preceding sentence, I have positioned the reference outside of the sentence i.e. “*The firm had encountered technical difficulties with its own wind turbines. Energy efficiency improvements were the firm’s primary mitigation measure. (CDP2011 3.3a).*”

6 THE BANK CASE STUDIES

This group comprises four financial institutions that have a retail or consumer-facing side to their business and run networks of bank branches. Three of the four were listed as banks by CDP in CDP2007, which was the first year CDP categorised firms into sectors. The three were already using RECI/LCECI at this point. The early CDP responses of the fourth, Gamete, were non-public, but the closest CDP public record that I have to its first instance of RECI/LCECI use listed it as a diversified bank. All four were categorised as “Banks, Diverse Financials, Insurance” in CDP2016. I concluded that the four firms were sufficiently comparable in terms of sector.

6.1 GAMETE

6.1.1 DATA SOURCES

This bank's early responses to CDP (CDP2006-2010) were not public. This case study is based on its public responses from CDP2011 onwards and documents that the bank has published. The combination of the two gives a published record of emissions from 2004. In addition, I interviewed two specialist environmental and energy managers (called Interviewee 1 and Interviewee 2 in this thesis) from Gamete in a joint call on 18 September 2016 and this was followed up by emails with Interviewee 1. Dates of these are given in the text.

6.1.2 CASE DESCRIPTION

The interviewees confirmed Gamete was a German-incorporated group that was active internationally. It was consumer-facing and had business-to-business services with climate change-related products, such as funding renewable electricity generation projects.³⁹ However, the data in its corporate responsibility reports relates solely to the parent bank in Germany with the exception of the report for y/e 2016 that includes foreign branches for the first time⁴⁰.

³⁹ 2006 annual report PDF p.3, 2009 annual report PDF p.4, 2012 annual report PDF p.4, 2015 annual report PDF p.3, CDP2011 2.2.

⁴⁰ Email from Interviewee 2 sent 24 July 2017.

6.1.3 OVERVIEW OF DATA RELEVANT TO RQ1

This section summarises the key factors influencing the firm's GHG mitigation choices. Firstly, the power of the sustainability ratings agencies comes across in this case study; they could steer the firm towards specific activities. This was due to the value that the bank placed on having a good reputation. Attempts to restore the bank's reputation following the global financial crisis was shown as a driver in an area of the bank's activities not related to financial crisis i.e. its carbon emissions. Use of RECI was seen as a positive story to tell and would - I assume - have enabled the bank to consider a carbon neutrality target, which may have also been seen as a reputational boost.

Cost-saving was not given as a driver in the interview for GHG mitigation actions, although return-on-investment and financial optimisation calculations were listed as drivers in CDP2011. There has been a dedicated budget for energy efficiency described in CDP2012, but Interviewee 1 gave the impression of the RECI budget being more protected. RECI was useful to the bank because of its perception of a lack of other GHG mitigation options. A noteworthy feature of this case was its repeated referencing of the German *Energiewende* as context for its climate change approach.

Table 8 Summary of factors affecting Gamete's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors			
GHG mitigating actions in general	<u>Stakeholders</u> Stakeholders, specifically CSR ratings and competitors had influenced GHG mitigating actions in general. Competitors' influence seemed to be brought to bear through comparison of CSR ratings agencies' scores.		<u>Reputation and legitimacy</u> These were strong drivers to take GHG mitigation action. At times they took effect through CSR ratings agencies.	<u>Non-financial resources and capabilities and technical issues</u> Perception of limited mitigation options.
LCECI/RECI use	<u>Regulatory and policy context</u> RECI use framed in terms of contributing to <i>Energiewende</i> .	<u>Reputation and legitimacy</u> Bank was offered cut-price deal on RECI a year after the global financial crisis started and bank staff realized increasing its use gave bank a positive story to tell. Through use of RECI, bank's operations were consistent with the renewable energy financing products it offered.	<u>Available finance</u> RECI budget was protected by public pledges to buy 100% renewable electricity to cover Gamete's German electricity consumption.	<u>Individuals in firm</u> A drive from some individuals in the bank for it to remain a leader in terms of RECI use.
Energy efficiency/saving	<u>Regulatory and policy context</u> EU Energy Efficiency Directive (2012/27/EU) was leading firm to monitor its energy consumption in more detail, enabling greater quantification of efficiency/saving options.	<u>Non-financial resources and capabilities and technical issues</u> Gamete perceived that it had few remaining energy efficiency/saving options available to it.	<u>CSR ratings agencies</u> Agencies have steered firms towards specific actions. Environmental management systems were given as an example.	<u>Available finance</u> Capital for energy efficiency/saving investment was in short supply in aftermath of global financial crisis.
Self-generation of electricity	<u>Non-financial resources and capabilities and technical issues</u> Operation of CHP difficult to optimize. Wanted to concentrate on core business.			
Refrigerant emissions	<u>Regulatory and policy context</u> Requires a change in refrigerants used. Expected to be insignificant within firm's inventory.			
Offset use	Carbon neutrality target - Offsets needed to be bought to meet goal.			

6.1.4 EMISSIONS OVERVIEW

The bank's dominant source of reported emissions was its electricity use. If one takes a location-based approach, scope 2 (S2) emissions were as much as almost five times greater than scope 1 (S1) emissions from combustion of heating and transportation fuels in y/e 2011⁴¹. Scope 3 (S3) emissions have been increasingly reported with employee commuting the largest emission source among the categories accounted for so far, but this is still less than scope 1 emissions⁴².

The bank underwent major corporate restructuring in y/e 2009, leading to a sharp increase in emissions. Employee numbers and the number of branches almost doubled. However, the bank said that emissions per employee in 2009 were the same as in 2007 and were expected to decrease in 2010.⁴³ The rapid decline in emissions intensity was due to the bank's use of RECI to reduce its scope 2 emissions. The percentage of electricity consumed by Gamete's German operations and covered by RECI was 100% or thereabouts from y/e 2010 onwards⁴⁴. RECI purchase dwarfed other emission reductions measures⁴⁵.

6.1.4.1 Targets

Data on targets is presented because emission sources are typically aggregated together in target(s). Therefore, emission reductions from one source could compensate for lack of a reduction from another source. My assumption is that this could reduce the drive to act on the more difficult source to reduce.

Gamete has had targets encompassing all three scopes. The bank reported two absolute emission targets covering all three scopes, both with a 2007 base year. One ended in 2011 and the second had a target year of 2020⁴⁶. The targets were part of the bank's drive to become carbon neutral⁴⁷. I first found this commitment in the 2009 corporate responsibility report (p.24) to *"...to gradually compensate for its unavoidable greenhouse gas emissions"*.

Target 1 was to reduce S1+S2+S3 emissions by 30% with reference to a 2007 base year. It was said to include 100% of scope 3, although figures were reported for only some of the scope 3 categories. Target 2

⁴¹ CDP2012 8.2a, 8.3a.

⁴² See data sources in section 14.2.3 for Figure 5.

⁴³ 2010 Corporate Responsibility Report, 15.

⁴⁴ Corporate responsibility reports 2011 p.111, 2012 p.18, CDP2014-2016 11.4.

⁴⁵ CDP2014 CC3.3b, CDP2015 CC3.3b, CDP2016 CC3.3.

⁴⁶ CDP2011-2016 3.1a.

⁴⁷ Webpage accessed 5 August 2017.

was specified to a greater degree. It covers the parent bank in Germany, excluding overseas branches and subsidiaries (CDP2016 3.1a). In CDP2013 3.1a it is said to cover S1, S2 and 100% of scope 3. Subsequently Gamete limited the scope 3 categories covered (CDP2016 3.1a). Target 2 is based on market-based scope 2 (CDP2016 3.1a). However, the lines representing different aggregations of S1+S2+S3 have both been plotted using location-based scope 2, in some cases calculated by me, as much as possible to draw out the role of RECI in meeting the targets. These targets are shown on Figure 5. The key feature of this graph is the scale of RECI use by Gamete.

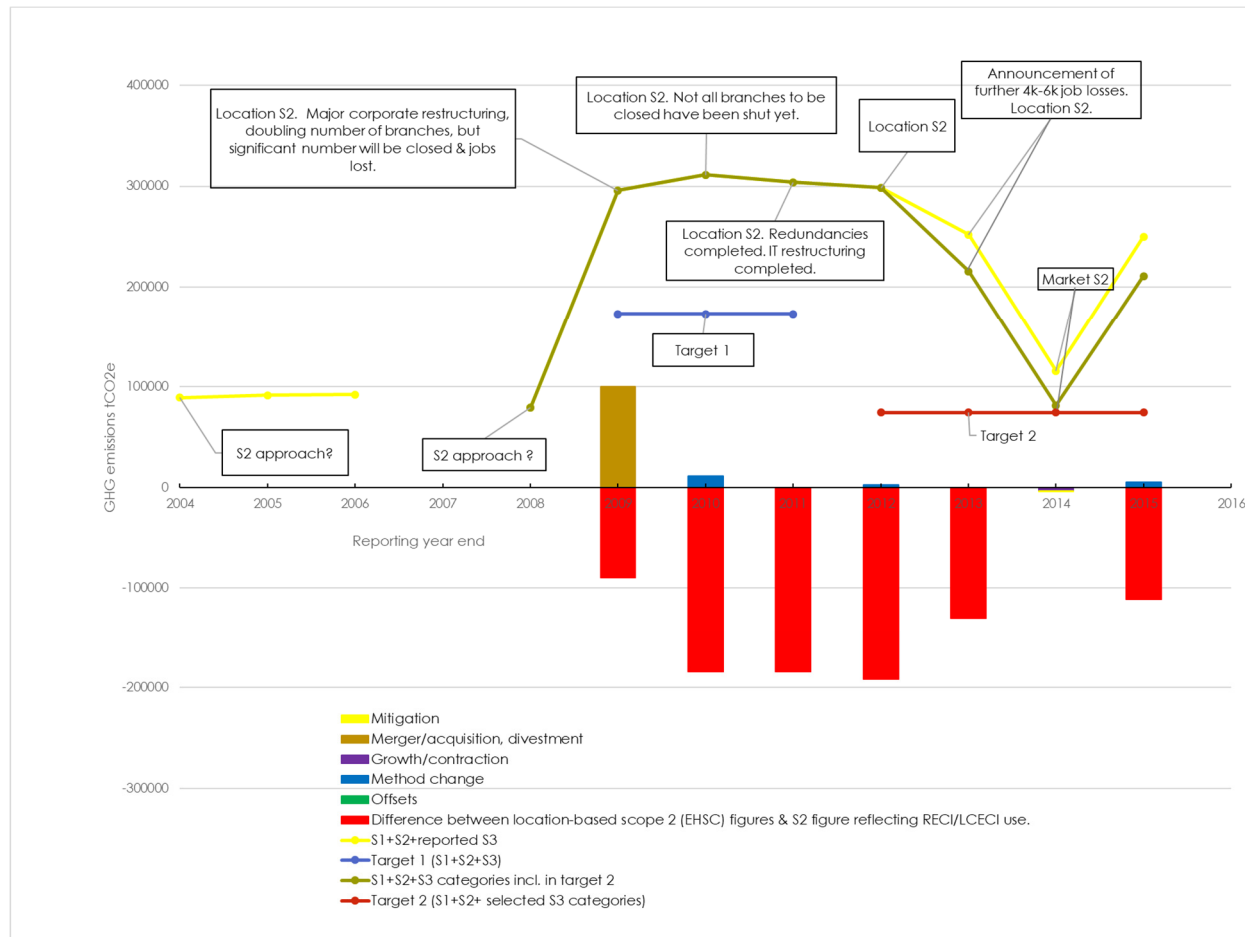
Gamete's carbon neutral goal was first found in the 2009 corporate responsibility report (p.24). It committed to buying RECI for all its German electricity consumption and to work towards carbon neutrality with an unspecified timeline (p.57). Gamete's carbon neutral goal differs from Target 2 in that an additional scope 3 category - employee commuting - is included⁴⁸. The bank has been carbon neutral since 2015. It has maintained a position of covering 100% of its power requirements in Germany through RECI and has committed to extending that percentage to its worldwide operations, which currently cover 95% of their consumption with RECI⁴⁹. Gamete said that it has not set a science-based target due to the lack of a commonly-agreed procedure for estimating scope 3 emissions from projects that it has financed⁵⁰. This is also CDP's position on science-based targets for the financial sector (CDP2017 CC3.1, CDP 2016b).

⁴⁸ Webpage accessed 5 August 2017.

⁴⁹ 2015 corporate publication p.21.

⁵⁰ Guy Rickard, writing on the Carbon Trust website, said "...a carbon emissions target is defined as science-based if it is in line with the scale of reductions required to keep global temperature increase below 2°C above pre-industrial temperatures" (Rickard 2018).

Figure 5 Gamete's scope 1, scope 2 and reported scope 3 emissions



Sources and notes: See section 14.2.3. This figure is reproduced in the accompanying A3 portfolio.

6.1.5 ACTIVITIES RELATED TO EMISSIONS MITIGATION

Interviewee 1 said Gamete began purchasing RECI in 2008. I assume the small amounts of renewable electricity shown before then represent renewable electricity supplied as default (see Figure 6).

Interviewee 1 explained buying RECI was voluntary, but the bank had not sought out RECI. The bank's supplier had a cut-price offer and it decided to take the opportunity. The environment department that had been established the year before realised its potential for reducing the bank's reported carbon footprint and so they decided to pursue it as a strategy. The motivation for this is covered in the section 6.1.6.8.

The firm's leaders were persuaded to increase the percentage bought year-on-year until 2013 when 100% of its electricity consumption in Germany was covered by RECI, a position that it has maintained⁵¹.

(Interviewee 1). The bank has reported purchase of GOs, RECs and supplier-specific emission factors⁵².

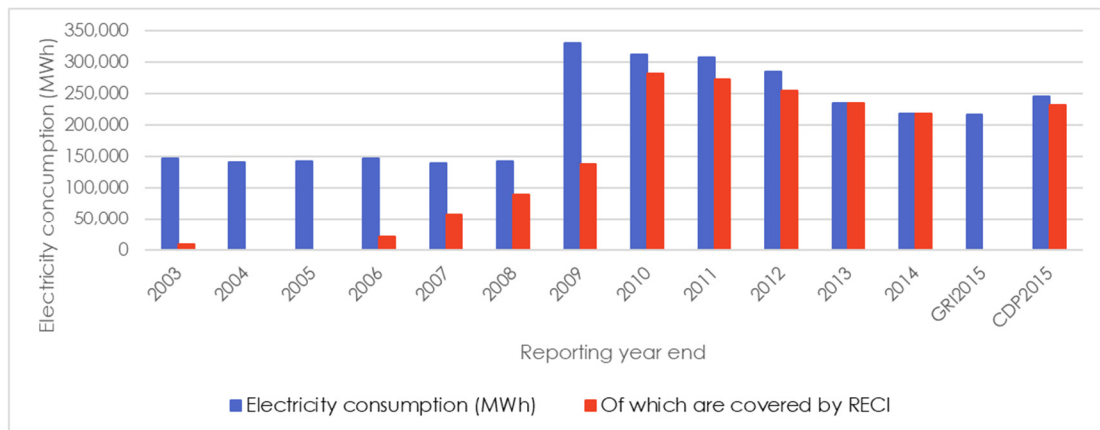
"This is the biggest way to reduce emissions for a financial institution," said Interviewee 1 and it is noticeable in Figure 5 that the scale of emission reductions actions other than RECI use has been small.

LED lighting had been installed in its headquarters. Air conditioning, ventilation and heat pumps were being optimised or replaced. Additional electricity meters were being installed to aid monitoring. Data centre hardware that could tolerate higher temperatures was being installed. The firm had reduced its number of data centres, cabling and number of devices per user⁵³. Interviewee 1 said that it was hard to find new mitigating opportunities, although the firm had committed to implement ISO 50001, which would require them to make continual improvements in their energy management and performance (International Organization for Standardization (ISO) 2018b, Lazarate 2016).

⁵¹ Undated corporate webpage on the environment, accessed 9 June 2016, Interviewee 1.

⁵² CDP2011 11.2, CDP2012 11.2, CDP2013 11.4, CDP2014 CC11.4, CDP2015 CC11.4, CDP2016 CC11.4.

⁵³ 2015 corporate responsibility report p.23, 2015 Global Reporting Initiative-compliant report, indicator EN5, 2013 corporate responsibility report p.17.

Figure 6 Gamete's electricity consumption

Sources: See section 14.2.3.

Gamete specified the characteristics of the RECI it wanted to procure with the aim of stimulating investment into renewable electricity generators and supporting the German *Energiewende*⁵⁴. When it issued a request for tenders in 2012, it wanted electricity from hydroelectricity plants no more than seven years old to incentivise the construction of new generation equipment. This was later reduced to no more than six years old⁵⁵. It has principally bought energy attribute certificates including GOs and RECs⁵⁶. Interviewee 1 said energy attribute certificates have had “a bit of a bad impression” and were viewed by some as a kind of Medieval indulgence⁵⁷. The criterion of coming from recently-commissioned hydropower addressed this criticism. The bank had turned down certificates from re-powered hydropower (Interviewee 1).

Run-of-river hydroelectricity was procured, supplemented with a maximum of 20% wind power, sourced from the EU, Switzerland and Norway (email dated 4 October 2016 from Interviewee 1). The bank specifically wanted run-of-river hydroelectricity because of the lower scope 3 emissions associated with type of hydroelectricity⁵⁸. The bank had planned to purchase from Germany, but energy attribute certificates of this specification were scarce in Germany and the price was too high (Interviewee 1). The

⁵⁴ 2013 corporate responsibility report, p.63.

⁵⁵ Interviewees 1 and 2.

⁵⁶ Interviewee 1, interview and email dates 4 October 2016.

⁵⁷ Roman Catholics acquired indulgences to reduce the time they would spend being punished for their sins in purgatory, a system that became notorious for its abuses (Duggan n.d.).

⁵⁸ Scope 3 emissions include the emissions associated with constructing and manufacturing generation equipment (GHG Protocol 2011).

purchase of these RECI was continued in 2016 (Interviewee 2). A new contract was to start in 2017 with the same profile of supply as the previous contract (email dated 4 October 2016 from Interviewee 1).

The bank was convinced that the demand for RECI does drive additional RE generation. *“...the purchase of renewable energy raises the inquiry and automatically drives the offering. In the end, this leads to more produced regenerative electricity”*. It has not encountered any evidence to the contrary (email dated 16 September 2016 from Interviewee 1).

6.1.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

(RQ1)

6.1.6.1 Individuals in firm

There were indications throughout the interview that staff within the bank wanted to support the transition to a renewable electricity-dominated electricity grid. Interviewee 1 said *“It really helps that Germany has made the decision to stop using nuclear power as it helps within the company that Germany has certain energy goals and we have to take our part.”* Interviewee 1 said some staff flagged to the bank's leadership their earlier public commitment to purchase RECI to cover 100% of the parent bank's electricity use in Germany and were pleased they decided to maintain this commitment, despite the cost. Interviewee 1 listed self-motivation followed by job description, stakeholders, competitors and rating agencies as factors that influenced work on climate change and corporate responsibility, so clearly individuals' values played an important role.

Asked if there were particular people in the firm that advocated RECI use, Interviewee 1 said *“I think nobody really pushes the bank to be a leader on this topic, but in case we publish internally and externally about good things we have done on this subject I think it also motivates afterwards when you read good things about your company. It motivates employees to work for a good company. I think it is more this way.”* I would infer from this that positive news on climate change mitigation has been seen to produce a feel-good factor that motivates further activity.

In summary, there is evidence showing that there was a drive among some individuals in the bank for it to remain a leader in terms of RECI use and to use external events or a public pledge made by the bank to advance this agenda.

6.1.6.2 International experience

The firm has international experience with overseas branches and subsidiaries and considerable experience in financing foreign trade⁵⁹. No references were found or made in the interview and emails to international experience influencing its GHG mitigating activities or environmental management more generally.

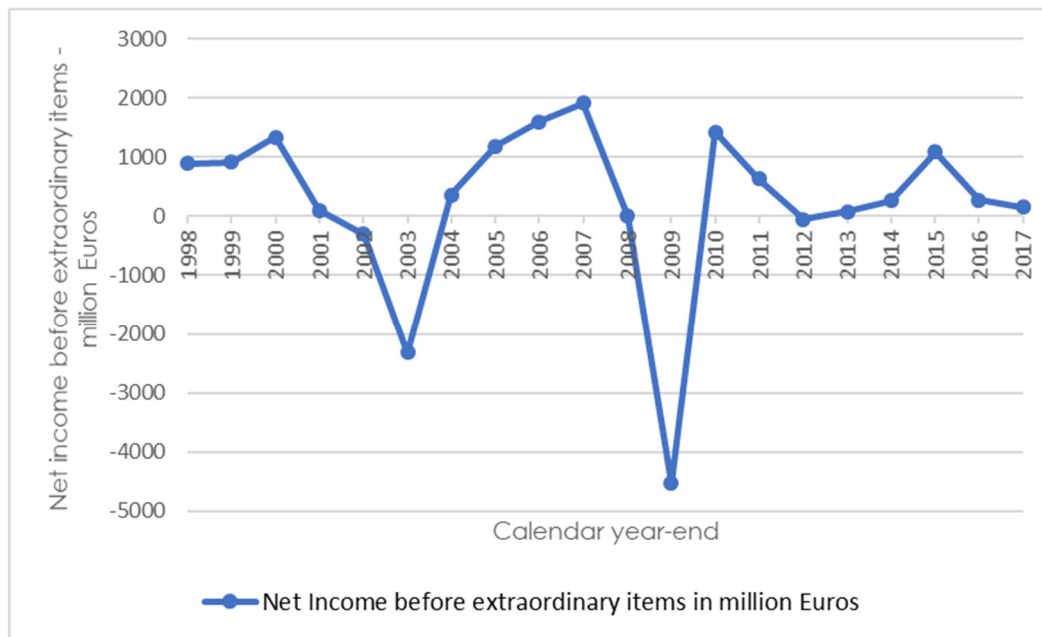
No effect detected.

6.1.6.3 Available finances and cost-saving

The 2007 corporate responsibility report said that due to financial pressure, environmental protection took “a back seat for a few years during a period of a few years”, but the firm moved on to work systematically on the issue (p.37). However, as can be seen from the graph of available finance, represented by net income before extraordinary items, Gamete’s fortunes nosedived after this with the onset of global financial crisis and have been slow to recover.

Overall energy costs were not a major outgoing for the firm. The percentage of its total operational expenditure spent on energy was less than or equal to 5% (CDP2012 12.1, CDP2016 CC11.1). Interviewee 1 said that financial institutions had limited opportunities for reducing their scope 1 and scope 2 emissions compared to a sector such as supermarkets. Interviewee 1 said “*We have look to see where can we save more than 60kW.*” This would explain why cost saving was not given as a major driver for GHG mitigation actions by the interviewees, although return on investment (CDP2011 3.3c) and financial optimisation calculations (CDP2012 3.3c) were listed as methods used to drive investment in emission reduction activities. Payback period was discussed in the interview as a tool in assessing energy efficiency options (Interviewee 2). There has been a dedicated budget for energy efficiency (CDP2011-CDP2013 3.3b), although only the dedicated budget for “*green energy*” was mentioned in CDP2016 CC3.3c. The carbon neutrality target has introduced an internal price on carbon via the need to buy offsets to meet the goal (CDP2016 CC3.3c).

⁵⁹ 2005 corporate responsibility report pp.12-13, 2007 corporate responsibility report p.3, 2015 GRI G4-format report, indicator G4-6, webpage giving overview of Gamete, accessed 3 August 2017.

Figure 7 Gamete's available finance

Source: Thomson One Reuters Fundamentals accessed 13 April 2018

The interviewees were asked how they allocated funds between mitigation options. Interviewee 1 gave the following explanation.

"We divide it into two parts. So, we buy renewable energy. Full stop. Punkt. I don't know how you say it in English. On the other hand, we definitely have to take out more ... even more efforts of these energy efficiency measurements even if the money that we have for that is very limited at the moment because really - and this is not an excuse - but it really is a fact that the financial situation is not the best at the moment so but nevertheless we have this energy management system and definitely we only get the certificate for that when we can show the auditor that we improve every year."

The system that Interviewee 1 is referring to is energy management standard ISO 50001, which is a recognised route to compliance with Article 8 of the EU Energy Efficiency Directive⁶⁰. A claim made on the ISO website is that ISO 50001 can lead to energy efficiency improvements of 10% or more, even in organisations with longstanding energy efficiency programmes (International Organization for Standardization (ISO) 2018b, Lazarate 2016).

⁶⁰ Directive 2012/27/EU (European Parliament and European Council 2012).

The firm spent an additional €603,860 in 2014 (approximately £0.5m) and €700,000 in 2015 on “green” electricity⁶¹. To give a sense of scale, this was comparable with waste disposal costs (€687,000)⁶². Section 2.8 of the 2014 GRI-format report listed consolidated profit attributable to the bank’s shareholders for y/e 2014 as €264 million (approximately £207m). The additional cost of green electricity was 0.23% of this. Interviewee 1 described this as “a lot of money” and said the annual outlay had been discussed internally due to financial stress. However, public commitments had been to buy RECI to cover 100% of the parent bank’s electricity consumption in Germany which ensured that the budget was protected.

“We have to stay with the 100%, not really no matter what it costs, we have to keep the 100%. We have to keep the good quality standard. We have to maybe to reduce the price a little bit, but the quality and the price of renewable energy is maybe not more discussable.” (Interviewee 1)

In summary, cost-saving did not emerge as a significant driver of GHG mitigation. While available finances were reduced following the global financial crisis, the budget for RECI was protected by public pledges to buy 100% renewable electricity to cover German electricity consumption. The energy efficiency budget could be reduced in response to financial stress.

6.1.6.4 Non-financial resources and capabilities and technical issues

Gamete encountered technical difficulties with the operation of a Combined Heat and Power plant because it needed to produce heat as well as electricity to work at optimum efficiency and so Gamete had to find a use for the heat. Interviewee 1 explained further; *“It is very difficult for our employees that take care of the buildings to make this plant work very efficiently. We had a lot of problems with one of the plants and there we realised that we should not do too much with these very difficult, technical plants because we are not specialists in that. ... This was the reason that we said for [Gamete] we should concentrate on our core business. Maybe do some photo-voltaic, or something like that, but not really produce a lot of electricity for ourselves.”*

Interviewee 1 explained that they had a limited range of emission sources which gave the bank fewer opportunities for cutting emissions compared to some other sectors. Interviewee 1 said *“So this is why the renewable energy has such a big influence for us. It is very helpful. It is not that we do not want to take out energy efficiency measures. We do take them out definitely, but it is really harder than for a producing company that has a lot of plants that can be optimised.”*⁶³

⁶¹ Gamete’s 2014 GRI-format report indicator G3-EN30 and 2015 GRI-format report indicator G4-EN31.

⁶² Gamete’s 2014 GRI-format report indicator G3-EN30.

⁶³ When Interviewee 1 says “take out”, I think the intended meaning is “take”.

In summary, technical difficulties were encountered in using CHP. Gamete also perceived that it had few remaining mitigating options available to it.

6.1.6.5 Stakeholders

Interviewee 1 confirmed that Crane et al.'s description of CSR (2013) was close to the firm's understanding of corporate responsibility, the term that it uses, for example, in the 2005 corporate responsibility report (PDF p.5).

Gamete has had a definition of stakeholder that is given repeatedly through its documents: everyone with whom it has a direct or indirect relationship. Its main stakeholders have been its customers, shareholders and employees, but the list also included the public, politicians and legislative bodies, NGOs including consumer protection organisations, suppliers, the media, researchers and the capital market. The 2007 corporate responsibility report (p.13) explained that the capital market included shareholders, rating agencies and analysts. Interviewee 1 said that internal and external stakeholders, competitors and social rating agencies had influenced the bank's climate change and corporate responsibility strategy. The influence of competitors is discussed in section 6.1.6.6.

The 2007 corporate responsibility report (p.14) explained that the assessments of ratings agencies formed part of the basis for inclusion in stock market sustainability indices. Interviewee 1 said that a poor rating from a rating agency would adversely affect its reputation and led to public doubt as to whether it was meeting the "social requirements" that a bank of its size had.

"That is why the social rating agencies especially at the beginning where they had a big influence when every year they had the new questionnaire for rating and we spent first it was 2006,7,8. First they were asking, 'Do you have an environmental management system?' Afterwards they said, 'Is it externally certified?' So, every year there were more questions and, yah, things that were important and had a big influence on things we can do and things we should do."
(Interviewee 1)

Using RECI served to align the firm's internal operations with its money-making activities, so that it could present a consistent picture to its stakeholders. The bank had been a major funder of renewable electricity generators. Buying RECI gave consistency between its products and operations. Interviewee 2 said *"It is important to give a signal to our stakeholders that we ourselves as a company have the goal to be emissions-free, to use renewable energy. We help to finance renewable energy in a big amount and on the other hand it is important to show that we use it ourselves."*

GHG mitigation actions also had a motivational aspect to the employee stakeholder group. Asked about whether there were particular individuals in the firm arguing for a GHG mitigation agenda, Interviewee 1 said: *"I think nobody really pushes the bank to be a leader on this topic, but in case we publish internally and externally about good things we have done on this subject I think it also motivates afterwards when*

you read good things about your company it motivates employees to work for a good company. I think it is more this way.”

To summarise, Gamete considered its stakeholders in its GHG mitigating activities, specifically CSR ratings agencies that steered Gamete towards particular activities. It could be seen that there was also an employee motivational benefit to environmental management.

6.1.6.6 Other firms

Competitors were cited by Interviewee 1 as an influence on Gamete's climate change strategy in the interview. Asked why, Interviewee 1 said *“The work on climate change and corporate responsibility is influenced by many factors, e.g. intrinsic /self motivated, by the job description, by stakeholders, competitors, sustainability rating companies, etc. One reason is that we would like to do a good job, to take over social responsibility and of course it is also our intention to be scored well in the various sustainability ratings”*⁶⁴. I would infer from this that the link with other competitors may relate to relative scores from ratings agencies and their influence on the firm's reputation.

In summary, competitors were an influence on Gamete's climate change strategy, possibly through CSR ratings agencies.

6.1.6.7 Regulatory and policy context

Gamete did not describe regulatory and policy context as greatly influencing the operational emissions of the firm, although there were some regulations that impinged on its operations e.g. laws on coolants (CDP2016 3.3c) and Article 8 of the EU Energy Efficiency Directive (2012/27/EU)⁶⁵ which requires firms above a specified size to have regular energy audits or implement specified energy/environmental management systems. Interviewee 1 explained that this was driving changes in energy data collection that would allow energy efficiency options to be quantified and prioritized. The firm had chosen to implement ISO 50001 which would require them to make continual improvements in their energy management and performance (International Organization for Standardization (ISO) 2018b, Lazarate 2016).

However, it is noticeable the number of times Gamete has framed its activities in terms of the *Energiewende* or the national energy plan in the days before *Energiewende* was adopted as a term by the German government (Evans 2016). In its 2007 corporate responsibility report (p.40) the bank said *“The*

⁶⁴ Email dated 4 October 2016 from Interviewee 1.

⁶⁵ European Parliament and European Council 2012.

German Federal Government has set the goal of reducing German CO₂ emissions by 2010 by 40% compared to 1990. [Gamete] is also required to do its part.” This was described principally in terms of financing the transition to a low-carbon, non-nuclear energy system⁶⁶. The bank said “Engagement in activities supporting the German transition to renewable energies will lead to a better reputation and demonstrate how the company takes on responsibility for the future.” Later it described “...our contribution to making this forward-looking social project a success and helping our customers fulfil the tasks related to the energy transition”⁶⁷.

Even Gamete’s specification of RECI has been framed in terms of the *Energiewende* goal, an act that could for example have been framed as driven by corporate morals; “In order to promote investment in more renewable energy power plants and thereby aid the shift in German energy policy, [Gamete] issued an invitation to tender for the supply of green electricity that is certified as originating from new hydroelectric power plants for the period 2013 to 2015”⁶⁸.

Gamete has used the VfU methodology – a standard originating in Germany and designed for financial institutions - for calculating its carbon emissions since 2007 (2007 corporate responsibility report, p.40, Interviewee 1). The methodology has consistently used emission factors reflecting contractual arrangements.

In summary, Gamete’s operations were little affected by regulation, but from Gamete’s perspective, *Energiewende* led to a norm of contributing to the nation’s success in mitigating climate change, to which Gamete responded.

6.1.6.8 Reputation and legitimacy

Interviewee 1 talked about the need for a firm the size of Gamete to meet “social requirements” which I interpret as seeking to achieve legitimacy (DiMaggio and Powell 1983, Scott 2014). Interviewee 1 said “...we are within the German stock exchange one of the 30 biggest companies. When you are that big you have to be aware that you also have to play a certain role, not to play a role, but to fulfil also ... social requirements because you are an important company with social reliability, so for that reason when there is social responsibility rating agencies for example [Gamete] is listed very low with only a few points, then it is a really bad reputation, so we have also reputation and reliability and liability I think.”

⁶⁶ CDP2011 6.1b, 2015 GRI format report G4-1, G4-2, Description of Management Approach – Product Portfolio, G4-FS8.

⁶⁷ 2015 GRI format report, indicator G4-F28.

⁶⁸ 2013 corporate responsibility report, p.63.

It was noticeable that the global financial crisis had driven Gamete to seek to rebuild trust in ways that were unrelated to financial issues i.e. environmental management. Gamete started to buy RECI in 2008 - a year after the start of the global financial crisis in 2007 - because it was offered a reduced-price deal. Interviewee 1 explained that its newly-established environmental department realised that it could use RECI purchase to reduce the bank's emissions, give the bank something positive to say and boost its reputation, which, I infer, would have been particularly welcome at that point in the time.

Using RECI was also seen as supporting *Energiewende* and in turn enhancing Gamete's reputation; *"Engagement in activities supporting the German transition to renewable energies will lead to a better reputation and demonstrate how the company takes on responsibility for the future"* (CDP2012 6.1e).

Reputation and legitimacy were at times affected by the scores assigned by CSR ratings agencies (see section 6.1.6.5).

In summary, reputation and legitimacy were linked concepts for Gamete. They were strong drivers to take GHG mitigation action and could be affected by CSR rating agency scores.

7.1.6.9 Summary of findings for RQ1

Table 9 Summary of factors affecting Gamete's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	A drive among some individuals in the bank for it to remain a leader in terms of RECI use.
International experience	No effect detected.
Available finances and cost-savings	Cost-saving did not emerge as a significant driver of GHG mitigation. While available finances were reduced following the global financial crisis, the budget for RECI was protected by public pledges to buy 100% renewable electricity to cover German electricity consumption. The energy efficiency budget could be reduced in response to financial stress.
Non-financial resources and capabilities and technical issues	Technical difficulties were encountered in using CHP. Gamete also perceived that it had few remaining mitigating options available to it.
Stakeholders	Stakeholders in general and specifically CSR ratings and competitors had influenced strategy.
Other firms	Other firms were an influence on Gamete's climate change strategy, possibly through CSR ratings agencies.
Regulation and policy context	Operations were little affected by regulation, but from Gamete's perspective, <i>Energiewende</i> created a norm of contributing to the nation's success in mitigating climate change, to which Gamete responded to maintain legitimacy.
Reputation and legitimacy	Reputation and legitimacy were strong drivers to take GHG mitigation action. At times they were affected by CSR ratings.

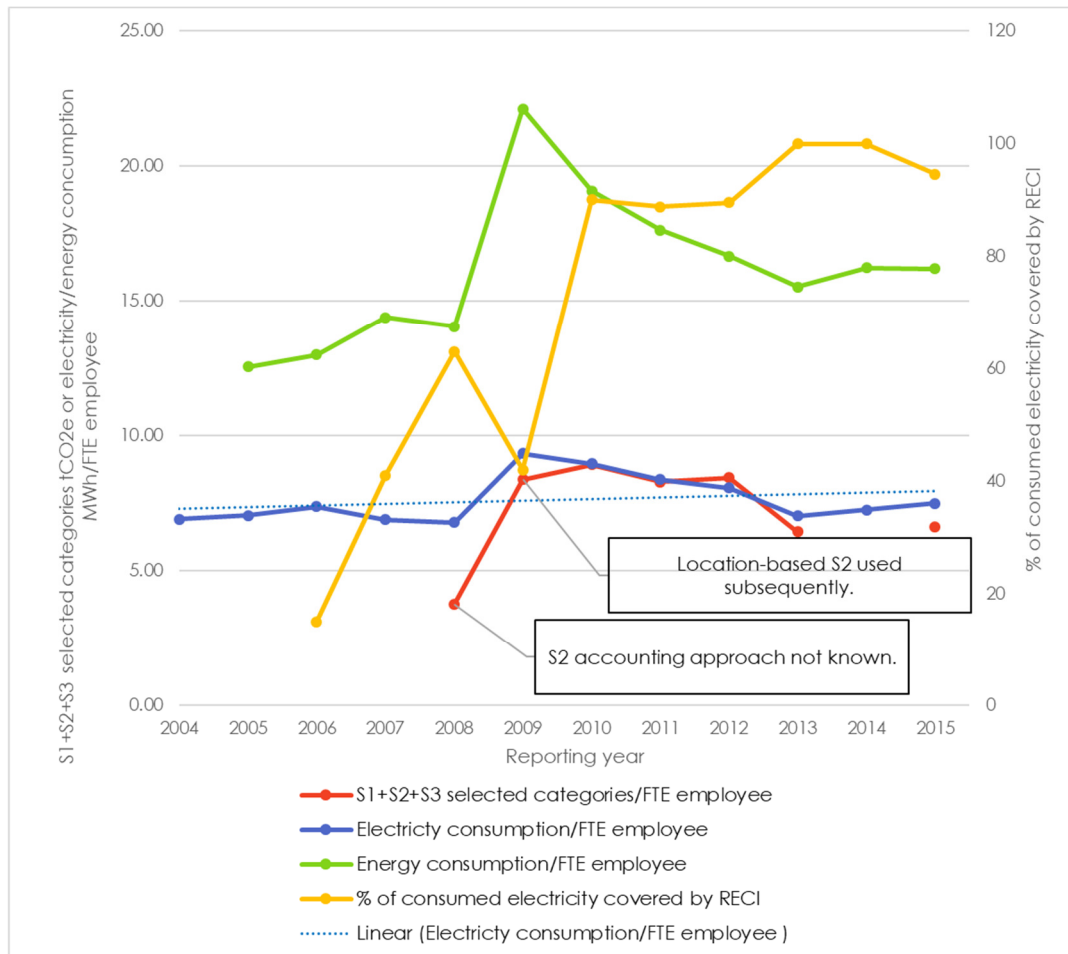
6.1.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

Interviewee 1 explained that the initial purchase of RECI in 2008 was opportunistic; Gamete was offered a good deal for the electricity. Subsequently Gamete increased the percentage bought for reputational reasons. Although emission reduction actions are described in corporate publications, they are not quantified prior to y/e 2009. Figure 5 shows subsequently mitigating activity was dominated by RECI use and that this was necessary to meet Target 1. RECI use looks like it will play a key role in meeting Target 2 that ends in 2020.

To assess if RECI use had led to displacement of other mitigating activities, I looked to see if there appeared to be a relationship between the percentage of consumed electricity and/or energy that was covered by RECI and emission intensity metrics. Gamete chose S1+market-based S2+selected categories of S3 for its latest target. Therefore, I used the same set of emission scopes for an intensity metric as this showed that Gamete was considering this set of emissions in aggregate. I used location-based S2 emissions when available as use of S2 emission figures reflecting contractual instrument use would obscure the effect of electricity efficiency/saving actions. I normalised the emission figures – and the electricity/energy consumption figures - using FTE employee numbers (see section 14.2.14 for discussion of denominator choice).

Figure 8 Gamete's emissions and electricity/energy consumption intensities and % of consumed electricity covered by RECI



Sources and notes: See section 14.2.3 for sources. Offsets use is not reflected in emission figures. A linear trendline is shown for electricity consumption/FTE employee.

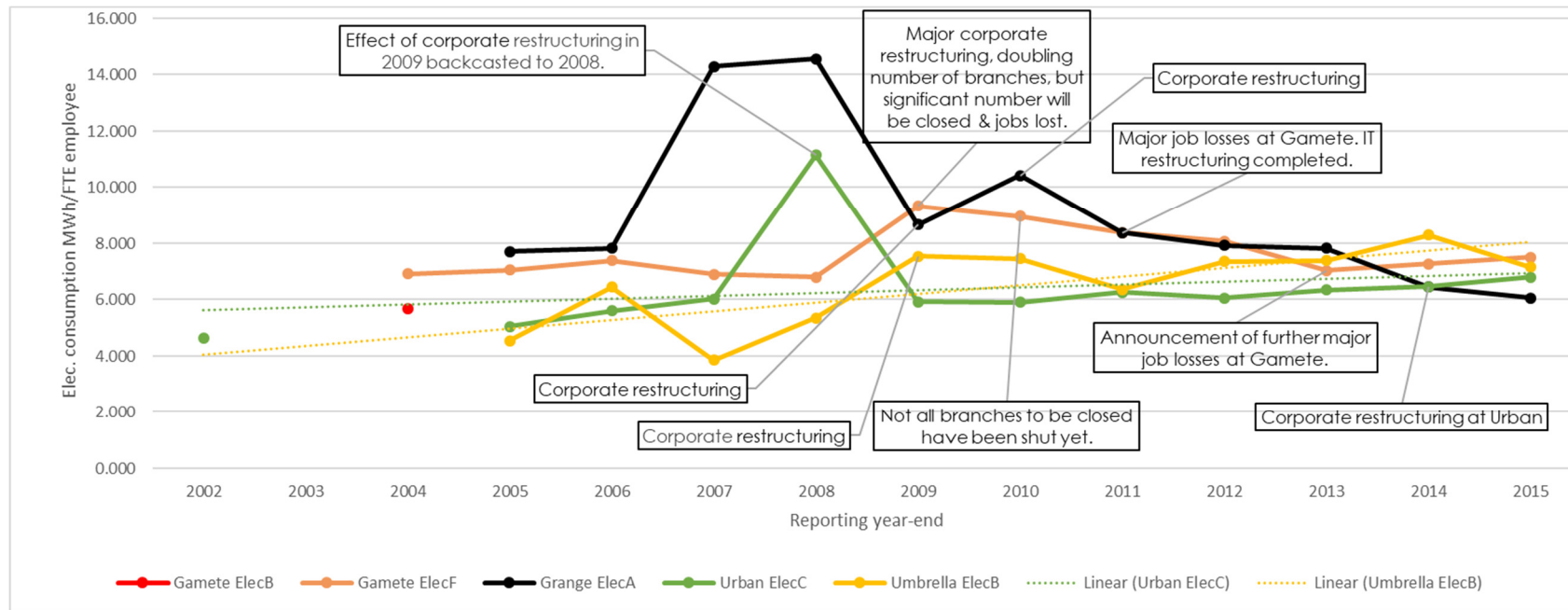
The intensity metrics increase in y/e 2009 when major corporate restructuring took place, increasing the size of the firm. The 2009 corporate responsibility report (p.6) said subsequently there would be both branch closures and job losses. The increases in intensity were probably due to duplicated premises and equipment while the denominator – FTE employees – was reduced more rapidly through the shedding of staff. The percentage of electricity covered by RECI dipped in that year suggesting that the electricity consumed in new parts of the firm was not already covered by RECI. In the case of emissions intensity, the scope 2 accounting approach in y/e 2008 is not clear while subsequently a location-based scope 2 approach has been used. If the y/e 2008 scope 2 figure reflects contractual instrument use, then this could account for the increase along with the corporate restructuring. There was a decline in emission, electricity and energy intensity metrics after the re-structuring while the RECI percentage increased. Overall, there does not seem to be a pattern in terms of the intensity figures and the RECI percentage, other than they seem to have been affected by corporate restructuring in 2009.

Interviewee 1 said there had not been any displacement. *“No, I don’t think that we would do more on energy efficiency in the case that we did not have the renewable energy. They are both important instruments and important ways for the environment,”* said Interviewee 1, adding that there were few emissions reduction options available to Gamete. *“We have look to see where can we save more than 60kWh,”* said Interviewee 1.

To test Interviewee 1’s assertion, I compared the bank’s electricity and energy consumption intensities with others in the group. If Gamete had lower intensities than the others in the group, this would suggest that many common mitigating activities had already been undertaken and there was no indication RECI use was drawing resources away from these. I did not want to use scope 2 figures reflecting contractual instrument use as I would not be able to see changes in electricity use. However, if I used location-based scope 2 figures, I would have to account for the differences in grid average emission factors between Germany and the UK – and the banks had overseas operations too. I decided it was more robust to focus comparison on electricity/energy consumption only. The disadvantage to this approach is that action to curb emissions of global warming refrigerants is excluded. However, I did not expect these to be significant for a bank. Offset use would also be excluded, but this was evaluated qualitatively in section 11.2.4.

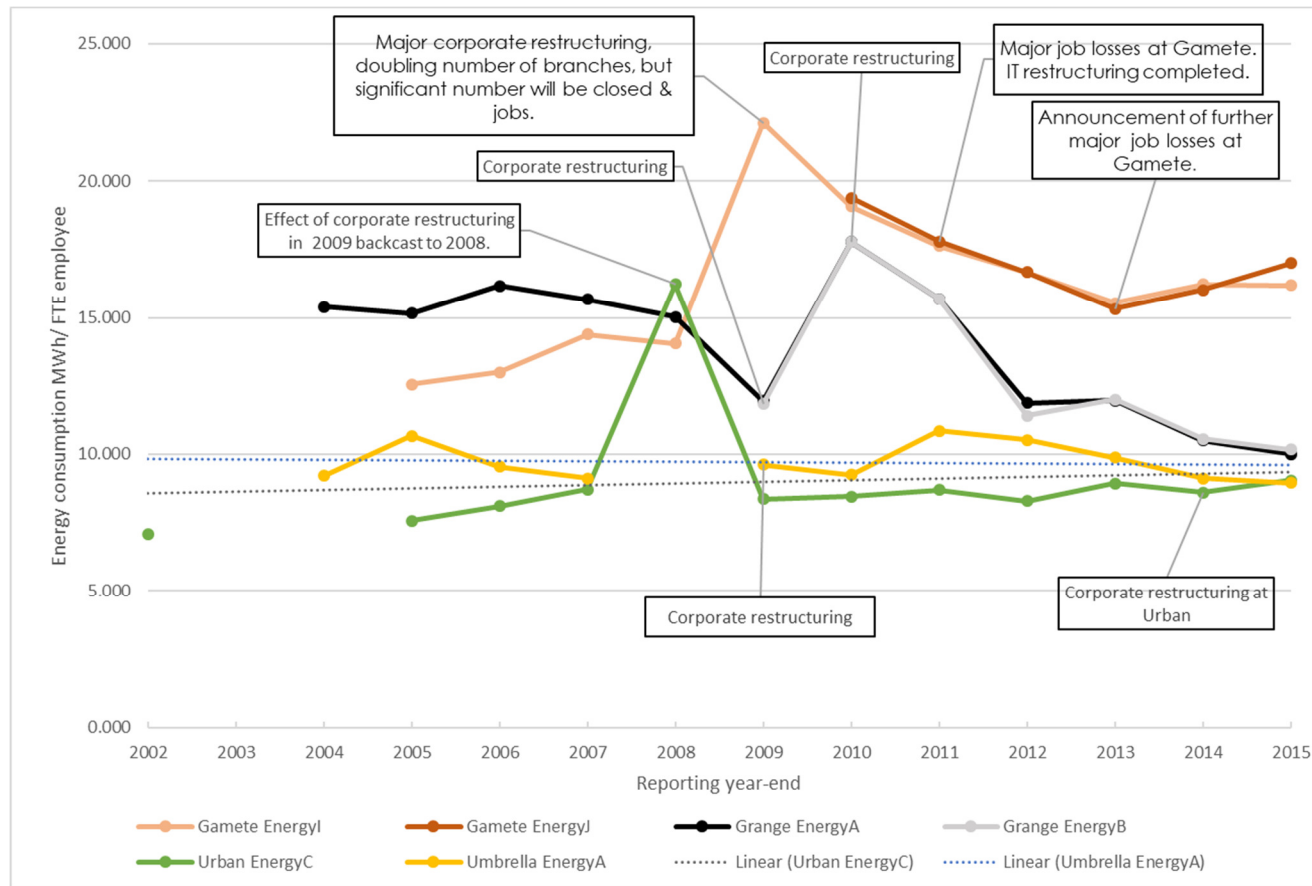
For both the electricity and the energy intensity metrics, I selected the most robust data-series for each bank based on my assessment of the underlying data, which is explained and sourced in section 14.2.14. I distinguished between the data-series using a letter e.g. ElecA, ElecB. Trendlines are only shown where they are considered needed. Otherwise they are omitted to reduce cluttering the graph. To add to the data label for Urban y/e 2008, the effect of corporate restructuring in y/e 2009 appears to have been reflected in the figure for y/e 2008. The bank took this approach for emissions figures (Figure 16).

Figure 9 Comparison of banks' electricity consumption/FTE employee



Sources & notes: See section 14.2.14 for sources. Linear trendlines are shown for Umbrella and Urban. This figure is reproduced in the accompanying A3 portfolio.

Figure 10 Comparison of banks' energy consumption/FTE employee



Sources and notes: See section 14.2.14 for sources. Linear trendlines are shown for Umbrella and Urban. This figure is reproduced in the accompanying A3 portfolio.

The electricity consumption/FTE employee graph shows that Gamete has had higher intensities than the two UK banks for most of the period considered. However, prior to corporate restructuring in y/e 2009, its intensity figures were converging with those of the UK banks. Following the corporate restructuring in y/e 2009, electricity consumption intensity declined again. This appears to be due to the aftermath of the corporate restructuring with redundant premises and equipment being taken out of service⁶⁹. Its declining intensity figures converged with those of the other banks, but with subsequent small increases which may - for y/e 2015 only - be due to a methodological issue. However, the overall picture is one of convergence with other banks' intensity figures. Therefore, the graph does not indicate that there were actions that the other firms were taking that it was not. Whether the firm might have increased its efficiency faster without RECI use cannot be assessed from the available data.

Turning to the energy consumption/FTE employee graph, the two German banks have had higher intensities than the two UK banks for all but one year from 2005-2015 and this exception appears due to an anomalous result for Urban rather than a change on the part of the German banks. This is a different picture to the electricity consumption/FTE employee graph. One reason may be the different climatic profile of Germany, half of which has a colder climate than the UK (Peel, Finlayson, and McMahon 2007). Therefore, increased heating demand could be an explanation for the German banks having higher energy intensities than the UK banks. However, Gamete's energy intensity has been slower to decline following restructuring compared to the other three firms, including Grange, which as a German bank is exposed to similar climatic conditions. The following paragraphs explore possible reasons why Gamete's energy intensity shot up following the restructuring.

The premises added to Gamete's estate following corporate restructuring were apparently more reliant on natural gas for heating than the bank's existing premises. Detailed energy figures in the bank's 2010 corporate responsibility report (p.15) show that following the corporate restructuring electricity usage increased by 230% and district heating by 198%, but gas increased by 352%, becoming 18% of the carbon footprint. The subsequent 2011 corporate responsibility report explains plans to replace use of natural gas with more energy-efficient district heating in parts of the bank's estate (p.50 and p.110).

⁶⁹ 2009 corporate responsibility report p.6.

Gamete's energy intensity did fall for y/e 2012 and 2013 but rose again afterwards⁷⁰. Natural gas consumption increased slightly in y/e 2015⁷¹.

There was site closure following the restructuring⁷². Y/e 2012-2015 saw successive drops in overall energy consumption⁷³. However, FTE employee numbers decreased proportionally more, resulting in the increased energy intensity in y/e 2014 and 2015⁷⁴. The bank said that while employee numbers had decreased (-3%), the energy needed to run their buildings had not reduced to the same degree (-1.3%)⁷⁵. Therefore, the slow decline in Gamete's energy intensity is probably due to an increased number of branches with fewer staff in them, with more of these branches heated by natural gas which Gamete suggests is less efficient than district heating schemes. However, despite this explanation, the question still remains: has RECI use reduced Gamete's drive to raise efficiency?

To answer this question, I turn to the availability of financial resources. Has this affected the GHG emission mitigation actions of Gamete? The finance for purchasing RECI has been largely protected because of public commitments to purchase enough for all its German electricity consumption (see section 6.1.6.3). The budget for energy efficiency measures seemed more flexible, although Interviewee 1 was adamant that RECI use was not squeezing out energy efficiency.

Gamete has given the extra cost of buying "green" electricity as 590,000€ in y/e 2012 and 551,700€ in y/e 2013⁷⁶, €603,860 in y/e 2014 and €700,000 in y/e 2015⁷⁷. What other mitigating options could this amount of money have bought? To answer this, I looked at the data provided by Gamete for the cost and cost-saving of other GHG mitigation actions using CDP questions (CDP2013-2017 3.3b) that asked for profiles of the mitigating actions undertaken by firms.

From this data, I was able to calculate the estimated lifetime savings in tCO₂e and any estimated financial savings minus initial costs over its estimated lifetime. This is a simplistic approach as there are other

⁷⁰ Until CDP2016 the bank excluded its overseas branches and subsidiaries. For y/e 2015 its CDP data includes those sources, which probably accounts for the divergence in y/e 2015 between its CDP figures (Gamete EnergyJ) and the GRI G4 format report – Gamete EnergyI - which was for the bank in Germany only (CDP2016 CC12.1a, 2015 GRI G4 format report G4-EN3).

⁷¹ 2015 GRI format report indicator G4-EN3.

⁷² 2009 corporate responsibility report p.6.

⁷³ 2014 corporate responsibility report p.12, 2015 Global Reporting Initiative format report indicator EN3

⁷⁴ Own calculations – see section 14.2.3.

⁷⁵ CDP2015 CC12.1a, CC12.3.

⁷⁶ CDP2013, 3.3b, CDP2014 3.3b.

⁷⁷ Gamete's 2014 GRI format report indicator G3-EN30 and 2015 GRI format report indicator G4-EN31.

financial considerations as described in Sorrell et al. (2004). However, it is an approach for which there is data. See section 5.7.2.4 for the methodology. The result is the graph of lifetime tCO₂e savings of mitigation measures versus cost savings minus investment (Figure 11). Each dot represents a mitigation project.

Figure 11 shows that Gamete has chosen comparatively high-cost, but high-impact RECI purchases and other mitigating options with relatively insignificant emission savings and a mixed bag of cost savings. The biggest annual emission saving offered by any of the other measures was a data centre energy efficiency project. It was estimated to save 2,784 tCO₂e, not quite 1 per cent of the total S1+S2+reported S3 emissions in the year in which the measure was reported (CDP2013 3.3b). This explains Gamete's perception that significant emission reduction actions other than RECI use were not available. If the RECI expenditure given in CDP2013 (CC3.3b) - 590,000 Euros - was redeployed, it could pay for this data centre project⁷⁸ 14 times over, but the cumulative lifetime emission savings would still only equal 28% of the emission reductions attributed to one year of RECI use in CDP2013 (3.3.b).

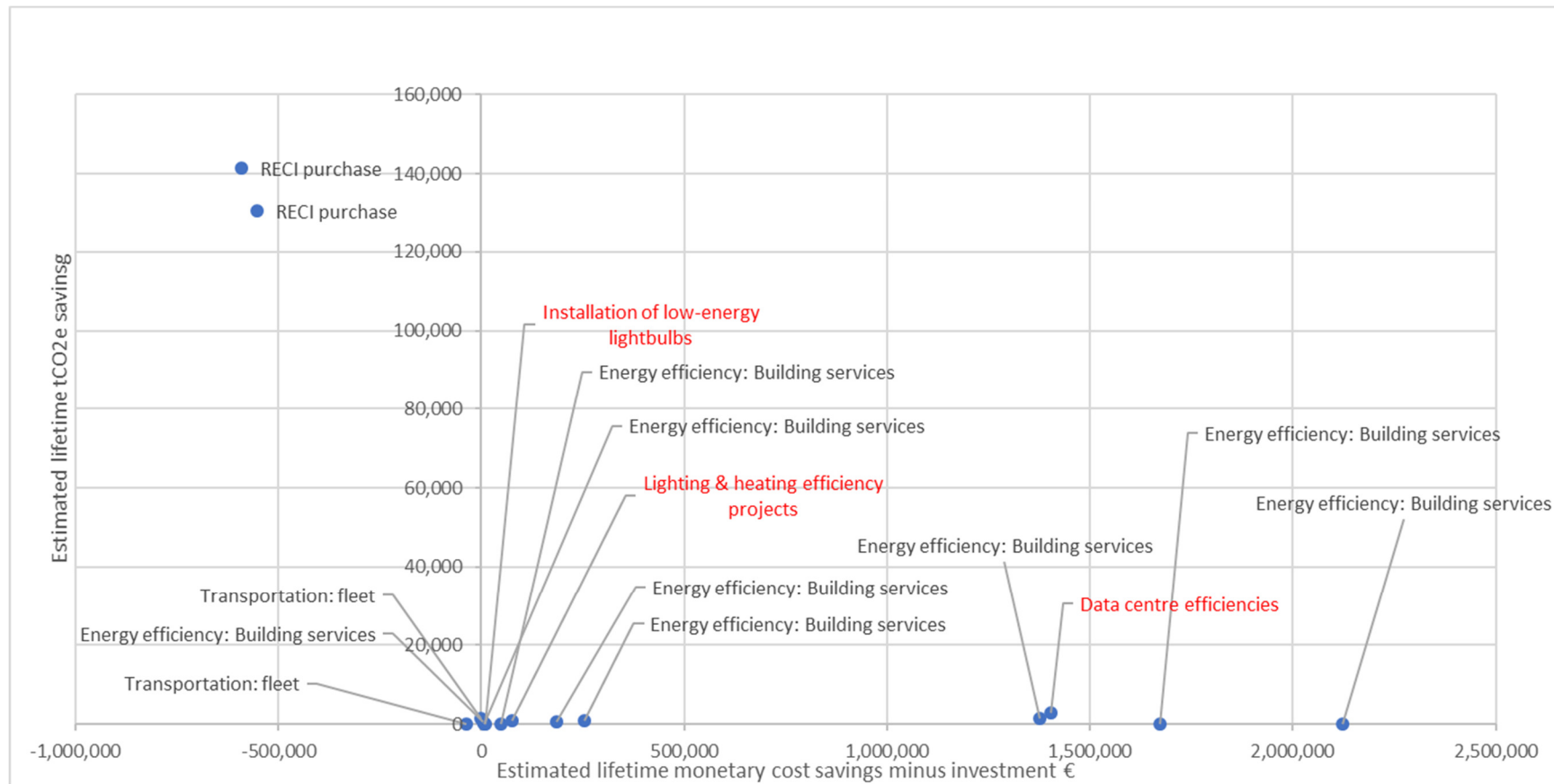
Regarding offset use, Gamete bank began buying RECI in 2008, the year the global financial crisis hit the bank⁷⁹ as it was a good deal financially. Subsequently the newly-formed environmental team saw a further benefit: its potential for reporting reduced emissions and presenting an upbeat news story. By the 2009 corporate responsibility report (p.57) it had committed to buying RECI for all its German electricity consumption and to work towards carbon neutrality, which entailed offset use. The first CDP record of offset use by Gamete found was in y/e 2010⁸⁰. So, rather than displacing offset use, RECI use appears to have encouraged offset use by facilitating the setting of a carbon neutrality target.

⁷⁸ The emission savings from this data centre energy efficiency project would be ongoing. Its lifetime is not given, so I have assigned 10 years to it.

⁷⁹ Interviewee 1, 2008 corporate responsibility report p.37, Spiegel Online 2008.

⁸⁰ CDP2011 14.

Figure 11 Gamete's estimated lifetime tCO₂e savings of mitigation measures versus cost savings minus investment cost



Sources: CDP2013-2017 CC3.3b. Notes: The labels in red font were assigned estimated lifetime according to methodology section 5.7.2.4 as follows: installation of low-energy lightbulbs (3 years), lighting and heating efficiencies which refers to motion detectors, energy saving lamps, LEDs, insulation and thermostatic radiator valves (3 years), data centre efficiencies which refers to use of absorbers for cooling and running centre at a higher room temperature (1 year).

To summarise the data used to answer RQ2, there does not seem to be a pattern to the intensity figures and the RECI percentage, other than the common impact of corporate restructuring in 2009. I compared the electricity and energy intensity figures with the other case study banks. After corporate re-structuring, Gamete's electrical intensity converges with those of the other banks. However, Gamete's energy intensity has been slower to decline. The slow decline in Gamete's energy intensity is probably due to an increased number of branches with fewer staff in them with more of these branches heated by natural gas which Gamete suggests is less efficient than district heating schemes.

Following the global financial crisis, there have been restrictions on capital available for investing in energy efficiency/saving while the budget for RECI has been more protected from cuts due to public promises made by Gamete about renewable electricity use. More money could be spent on energy efficiency/saving, but the effect on emissions would not be significant as the redeployment of the cost of RECI would not lead to large GHG emission reductions, given the other mitigation options Gamete sees that it has. The results are analysed in the discussion for RQ2 in chapter 12.

6.2 GRANGE

6.2.1 DATA SOURCES

Information on this firm is drawn from corporate publications, CDP datasets (2006 onwards were publicly available), and an interview with a manager, referred to as the Interviewee, conducted in-person on 10 January 2017 with follow-up emails, dates of which are given in the text. In profiling the firm's emissions, corporate report data has been used because the CDP datasets contain some scope 2 figures where the methodological approach used is either not requested or is not certain⁸¹. Corporate reports are explicit on this matter and produce a record of data from 2004-2016.

6.2.2 CASE DESCRIPTION

The Interviewee confirmed this is a German-incorporated bank with business services and a retail network. It is a holding company for its subsidiaries⁸². It underwent corporate re-structuring in 2010⁸³. It has provided financial services related to climate change e.g. emissions trading, financing renewable energy generation, and socially-responsible investment more broadly⁸⁴.

6.2.3 OVERVIEW OF DATA RELEVANT TO RQ1

The bank explained that reputation affected trust and trust was crucial to the operation of the financial sector. Following the damage done to the sector's reputation with customers, employees, the public and regulators by the global financial crisis⁸⁵, Grange wanted to show that it could operate sustainably in economic, social and environmental terms. It took steps to improve its reputation that were not limited to topics directly related to the global financial crisis e.g. its climate change approach. Overall the GHG mitigation strategy was driven by the firm's desire for a good reputation⁸⁶, although the Interviewee said the impetus for the carbon neutrality target was to meet environmental and social responsibilities. Actions to meet the carbon neutrality target were undertaken in this order of preference: energy saving, RECI use, offset use. Another reason given for the carbon neutrality target was demonstrating that climate change-

⁸¹ CDP2005, 2012, 2013, 2014, 2015.

⁸² Thomson One Reuters Fundamentals database accessed 11 August 2017.

⁸³ 2010 corporate responsibility report p.62.

⁸⁴ 2007 CSR report p.30, CDP2009 6.1.

⁸⁵ CDP2013 5.1f.

⁸⁶ CDP2013 5.1f.

related regulation did not need to be introduced and to improve its reputation (CDP2013 2.2a). Cost-saving was the driver of energy efficiency/saving (Interviewee). Just prior to setting the carbon neutrality target, the bank did have an electricity contract for Germany consumption that had a 20% component of renewable electricity. This contract had been selected on cost. It was the carbon neutrality target that drove subsequent use of RECI.

The Interviewee said opportunities for the firm to reduce emissions aside from RECI and offset use were limited. Competitors were monitored by the firm for CSR activity to see if there were ideas for improvement. Energy-saving initiatives with a payback of less than three years had been almost exhausted. While there might be initiatives with a payback of five years or more, it was almost impossible to get those approved internally. The firm leased the clear majority of its premises, so it might not benefit from cost-savings if the payback period exceeded the length of time it remained in the premises. However, it had negotiated measures to benefit the environment into some of its lease agreements⁸⁷.

⁸⁷ Interviewee, CDP4 (2006), emissions mitigation strategy question.

Table 10 Summary of factors affecting Grange's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors			
Carbon neutrality target	<u>Reputation and legitimacy</u> These played a major role in setting climate neutrality target, which in turn shaped the GHG mitigation choices of the firm.		<u>Organisational values</u> The desire to act responsibly was behind carbon neutrality target.	
GHG mitigating actions in general	<u>Carbon neutrality target</u> Energy-saving was the first step in the firm's carbon neutrality strategy, followed by RECI use and then offset use.		Stakeholders NGOs and UN organisations shaped Grange's CSR response and helped provide impetus for GHG mitigation.	
LCECI/RECI use	<u>Carbon neutrality target</u> This drove RECI use.	<u>Other firms</u> RECI use was seen as an environmental management norm among peer firms.	<u>Reputation and legitimacy</u> RECI use helped to make Grange's operations consistent with its financing of climate change-related products.	
Energy efficiency/saving	<u>Available finance and cost-saving</u> Cost-saving drove energy efficiency/saving, but the bank was running out of measures that met internal payback requirements.	<u>Leased premises</u> In some cases, the length of time left on the lease made it uncertain the bank would recoup the benefits of investing in energy saving/efficiency	<u>Other firms</u> Energy saving was seen as an environmental management norm among peer firms.	<u>Non-financial resources and capabilities and technical issues</u> There was a perception of a lack of new mitigating actions to undertake.
Self-generation of electricity	Limited use. PV installed at two sites.			
Refrigerant emissions	Expected to be insignificant within firm's inventory			
Offset use	<u>Carbon neutrality target</u> Offset use was the final step to achieving carbon neutrality.			

6.2.4 EMISSIONS OVERVIEW

Grange's scope 2 emissions were consistently an order of magnitude greater than its scope 1 emissions⁸⁸. Grange said in 2007 that 48% of its total global GHG emissions were caused by energy consumption

⁸⁸ CDP2009 10.1, 11.2 CDP2010 12.1, 13.1, CDP2011, CDP2012 8.2a, 8.3a, CDP2013-2015 8.2, 8.3, CDP2016 CC8.2, CC8.3.

(electricity, heating fuel and diesel for emergency generators)⁸⁹. The cause of the remaining 52% is not specified. By 2012 its estate of buildings accounted for 80% of its carbon footprint (83% in 2013). Leased properties account for 96% of the 5,000 buildings the firm occupies. The firm had 23 “green leases” – leases with sustainability criteria – in 2013⁹⁰.

6.2.4.1 Targets

Data on targets is presented because emission sources are typically aggregated together under target(s). Therefore, emission reductions from one source may compensate for lack of a reduction from another source. My assumption is that this could reduce the drive to act on the more difficult sources. Looking at targets also serves to identify appropriate intensity metrics to use to compare year-on-year changes in a firm’s figures and to compare firms.

Grange reported per employee intensity targets at country level in CDP 2007 (3a) and CDP2008 (3a). In 2008, it committed to become carbon neutral. The target was to achieve this by 2012/from 2013 onwards⁹¹. The Interviewee explained that the carbon neutrality goal related to scope 1, scope 2 and the business travel category only among scope 3 emissions. The firm thought it had the most control and opportunity to make emissions reductions in this category.

Figure 12 attempts to replicate the data in a graph in the 2012 corporate report (p.49). The emissions are labelled differently, but relate to scopes 1, 2 (location-based) and 3. Of the categories of scope 3 emissions, only business travel is shown to match the emissions included in the carbon neutrality target. This enabled me to add data from subsequent corporate responsibility reports⁹². My graph presents the data differently, but still illustrates the major role played by RECI and offsets in claiming carbon neutrality in y/e 2012.⁹³ In CDP2017 (CC3.1a) the bank said it anticipated setting a science-based target⁹⁴ in the next two years.

⁸⁹ 2007 corporate responsibility report p.35

⁹⁰ 2012 corporate report p.49, 2013 corporate responsibility report, pp.83-84.

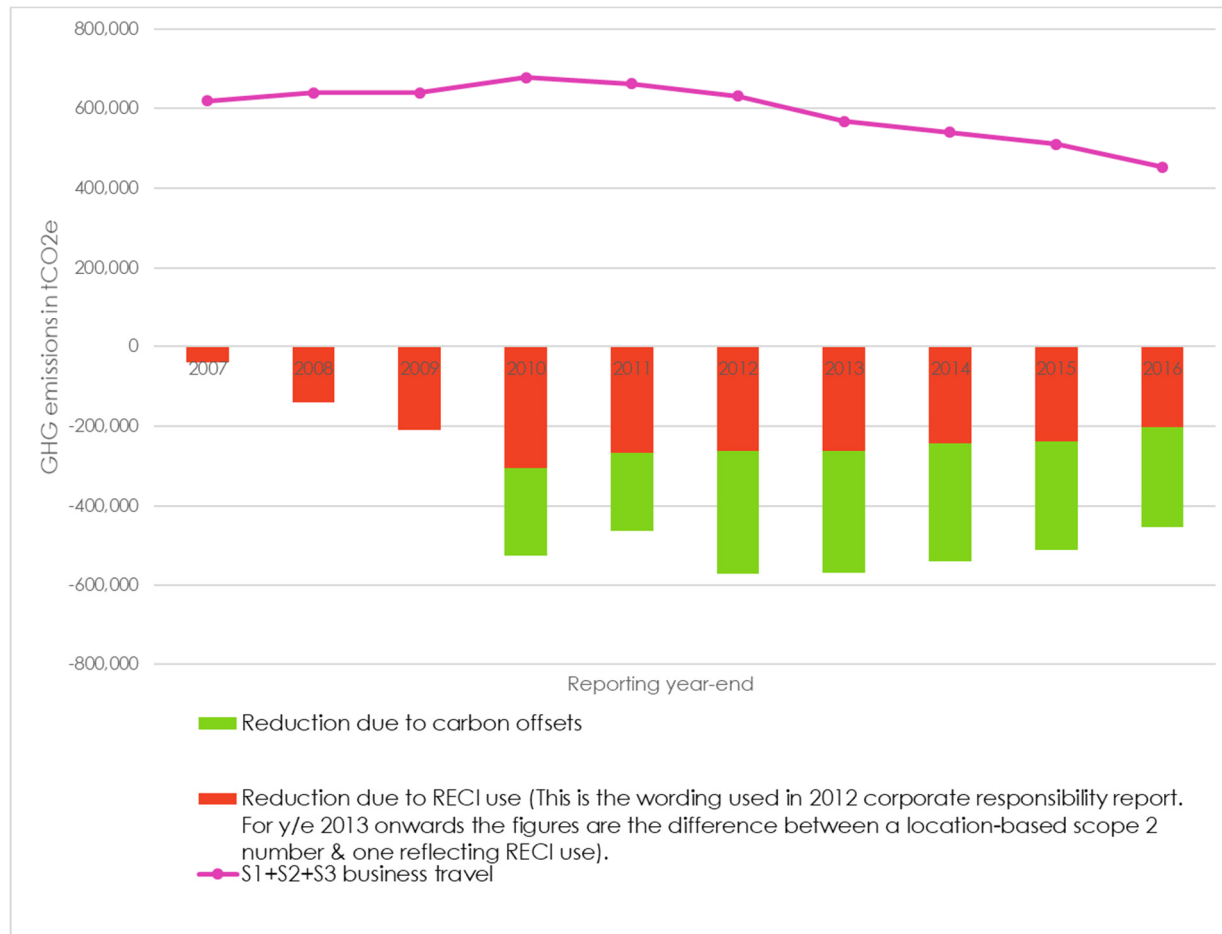
⁹¹ 2008 corporate social responsibility report p.28, CDP2009 23.5, 2012 corporate report p.49, CDP2013, 3.3b, interviewee. The precise expression of the carbon neutrality deadline varies.

⁹² Corporate responsibility reports 2013 p.86, 2014 p.86, 2016 p.83, 85, 87

⁹³ The Interviewee said that emissions data was adjusted to take account of corporate restructuring. This adjusts the emissions in the base year (in this case 2007) so that corporate re-structuring does not obscure the effect of other factors, such as incremental growth and mitigation actions, and progress towards targets. This is accepted GHG emissions accountancy practice in the Corporate Standard ((GHG Protocol Initiative 2004).

⁹⁴ See footnote 50.

Figure 12 Grange's scope 1, scope 2 and selected S3 emissions



Source: See section 14.2.4. Offsets are not reflected in S1+location-based S2+S3 figures.

6.2.5 ACTIVITIES RELATED TO GHG MITIGATION

The firm had the aim of being “... *a leading eco-efficiency manager in reducing our own environmental footprint.*” (CDP2013 2.2). The Interviewee said the overarching goal was to maintain carbon neutrality. The firm’s strategy was firstly to implement as many energy-saving initiatives as possible, e.g. building management optimization, use of LED lighting. Its second action was to increase the number of countries in which the company purchased RECI. The first record of use was for y/e 2006 which stated that 20% of the electricity used in Germany was renewable⁹⁵. This RECI was not selected for GHG mitigation purposes; it was selected using financial and best value criteria⁹⁶. Grange initially committed to procuring 100% renewable electricity for its consumption in Germany and two other countries in 2007⁹⁷. The carbon neutrality target was set in 2008 with the goals of reducing emissions by 20% each year. “*In 2008 we purchased 100% renewables in Germany which effectively accomplished our 20% target per year for the next 2 years. We then continued to buy new renewables contracts in other countries where we had large operations and certificates were available...*” (email 19 September 2018 from Interviewee). The Interviewee said eventually there were no more markets that had certification systems for renewable electricity. The firm reduced travel-related emissions significantly and bought offsets for the remainder. The firm achieved the goal of being carbon neutral in 2012 (see Figure 12).

The Interviewee said that activity in one scope did not affect emissions mitigation in another scope. The firm currently had three targets that worked against that happening: to maintain carbon neutrality, to reduce energy consumption and to reduce emissions in all scopes. CSR reports list separate targets on energy consumption, emissions and RECI use e.g. 2009 CSR report p.32.

Regarding energy efficiency and saving, the firm said “*There are both ecological and economic arguments for a drastic reduction in energy consumption. In order to increase the energy efficiency of our facilities the building technology is continuously improved. All [Grange] partners for technical facility management have signed agreements in which they promise to identify and implement potential energy-saving measures.*”⁹⁸

In terms of RECI use, Grange had had a variety of contractual arrangements: PPAs, energy attribute certificates bought separately from the supply contract. In 2016 German electricity consumption had been

⁹⁵ CDP 2006 1(a)(ii). Interviewee said in email dated 19 September 2018 that the date was 2007.

⁹⁶ Email from interviewee dated 19 September 2018.

⁹⁷ 2007 corporate responsibility report p.32, Interviewee.

⁹⁸ CDP4 (2006) emissions mitigation strategy question. This was also repeated in CDP2007 4(a)(v).

covered by energy attribute certificates for Norwegian hydroelectricity. The bank did not impose any conditions on the type or location of generation. The selection of RECI depended on cost and availability⁹⁹. The firm had an early understanding of the potential for double-counting of emission attributes through use of RECI but considered there were wider benefits.

“Through our sourcing of renewable energies, we are contributing to the promotion and expansion of ecologically friendly power. At the same time, we are aware that the calculation of renewable energies among consumers may result in double accounting of the reductions in CO2 emissions, and that this is currently a matter of debate among experts.” 2008 CSR Report p.34

The Interviewee said the bank did not have concerns about the low cost of GOs and the signal that was sending to the market. Opportunities for PV had been investigated at more than 100 sites identified through an initial feasibility study (2013 corporate responsibility report, p.83). PV generation had been installed at two sites (Interviewee).

6.2.6 FACTORS INFLUENCING A FIRM’S GHG MITIGATION CHOICES

(RQ1)

6.2.6.1 Individuals in firm

The decision by the firm’s board to go for carbon neutrality in five years was the biggest influence on its GHG mitigation activities. The Interviewee said the origin of this goal lay with an advisory committee. The 2007 CSR report described a climate change advisory board comprised of experts from business, science and politics to explore business opportunities in relation to emissions trading, energy efficient buildings, etc, (p.30). The management board approved the goal in 2008 (CDP2011 2.2a). The Interviewee was not familiar with the motivation given in CDP2013 (2.2) that the decision to maintain carbon neutrality was to reduce exposure to climate change-related regulation. The Interviewee said the impetus was to meet environmental and social responsibilities.

In summary, an advisory board comprised of experts from outside the firm were instrumental in the adoption of the carbon neutrality target by the board of directors.

⁹⁹ CDP2011 11.1b, CDP2012 11.1b, Interviewee.

6.2.6.2 International experience

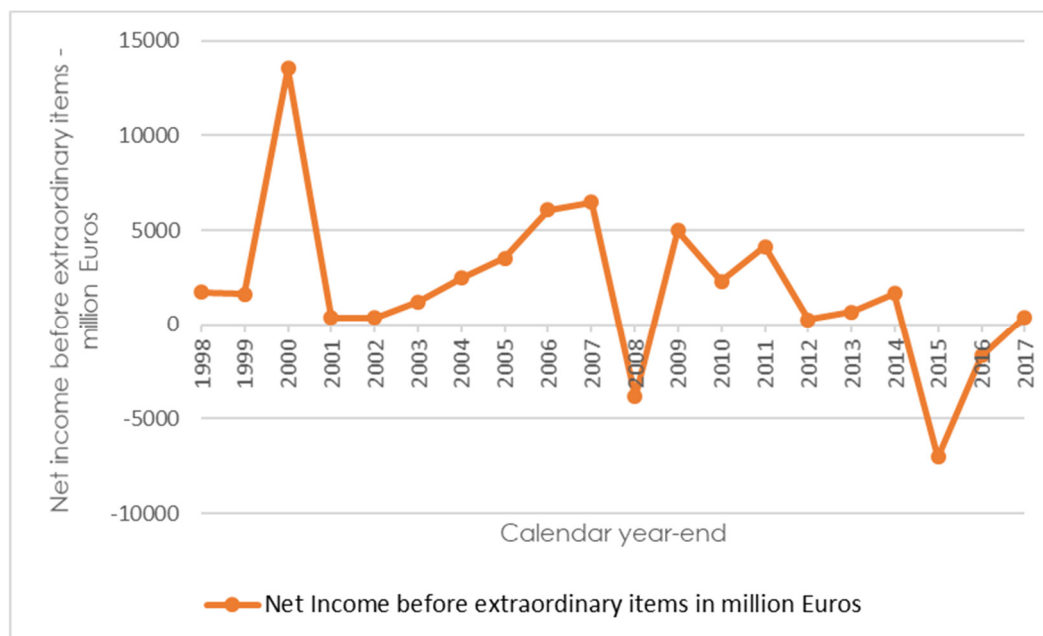
The company has international experience with operations in Europe, the Americas and Asia Pacific (2007 corporate responsibility report p.2, 2009 corporate responsibility report p.2, 2015 corporate responsibility report p.9).

No effect detected.

6.2.6.3 Available finance and cost saving

Grange was not as affected as much as the other three banks by the global financial crisis, although other events have affected its available finance performance as can be seen from the graph of net income before extraordinary items.

Figure 13 Grange's available finance



Source: Thomson One Reuters Fundamentals accessed 13 April 2018

The Interviewee commented on the impact of the link between available finances, emissions and mitigating activities. *"The biggest thing I have noticed over the years is the most significant factor in energy and emissions is business activity. So, in the early years if business was booming, employees would be able to fly anywhere they wanted. We would open up new offices whenever anybody wanted. We would consolidate traders into very energy intensive building. Everything would be given the green light. When there are downturns, the travel policy is tightened up massively based on cost and getting money to spend on energy-saving initiatives is also more difficult. Generally, there's less money available."* (Interviewee)

In CDP2015 (CC3.3c), Grange said that most internal eco-efficiency projects were zero- or low-cost. However, the Interviewee said that the cost of energy-saving initiatives was *"really significant"* and

although they could yield long-term savings sometimes a short-term view was taken when finances were tight. A positive financial assessment of energy efficiency/saving projects was made more likely by the carbon neutrality pledge as buying offsets put a price on carbon dioxide produced by the bank, even in jurisdictions with no climate change legislation. The firm began to factor this into financial decisions affecting deployment of capital and choice of suppliers¹⁰⁰. The Interviewee said about ten years ago Grange evaluated the cost of tCO₂e at 14€ based on the cost of UN offsets - Certified Emission Reductions (CERs). When the price of CERs plummeted, they switched to Voluntary Emission Reductions (VERs) that were a higher price but offered additional social, health, economic and environmental benefits. Grange now uses 5€/tCO₂e, even though the price of VERs has fallen below this. The premium for RECI use is negligible so is not added in.¹⁰¹

Energy costs have accounted for less than 0.01% of revenues, due to significant and continued energy efficiency efforts and environmental management systems¹⁰². To put this another way, less than or equal to 5% of the total operational spend was on energy¹⁰³.

Although cost-saving drove energy efficiency/saving, the Interviewee said it was difficult to find new measures to implement. *"We continue to try to find energy saving initiatives, but because we have been doing this for 6, 7, 8 years, for current projects we are looking at a return on investment is 3-5 years plus. So, the number of projects with a return on investment of three years or less you can count on one hand because they have all been done."* Resource efficiency projects were funded from the internal capital projects budget, but a lower return on investment was required for GHG mitigating projects (CDP2015-CDP2016 CC3.3c). The Interviewee said getting funding for more than five years was *"near impossible"* and the firm may not have the lease on the building at the end of the period, particularly as Grange was consolidating sites at that point in time. The 2012 corporate report (p.49) said the bank did negotiate its leases to include sustainability requirements.

The Interviewee said *"I can remember years ago in 2008, 9 when I was reporting into the CDP we had huge numbers of energy reductions which I was then able to write down. I remember last year it was pitiful compared to the previous years. What I think has happened is that we have continued to buy renewables almost everywhere where we can or where there is a certification system. However, our energy reduction initiatives have declined significantly... the return on investment of the projects that are left is just too low."*

¹⁰⁰ 2008 CSR report p.34, 2009 CSR report p.29, CDP2013 3.3b, CDP2015 2.2.

¹⁰¹ Email dated 19 September 2018 from Interviewee.

¹⁰² CDP2009 3.1, CDP2011 5.1b and CDP2013 5.1a.

¹⁰³ CDP2012 12.1, CDP2016 CC11.1.

In contrast, RECI were cheap. The Interviewee said *“It is actually more cost effective to buy renewables than it is to buy offsets and especially in the early years when we were buying carbon offsets. When the CERs were £12-14 Euros a tonne before the bottom fell out of the market, we were spending millions of Euros buying CERs.”*

In summary, available finance was a significant influence in increasing activities that caused emissions as well as the implementation of projects to mitigate them. The firm was running out of projects that met internal payback requirements or - in the case of some leased premises – would pay back before the bank’s lease was due for renewal.

6.2.6.4 Non-financial resources and capabilities and technical issues

The firm had not encountered technical barriers in implementing GHG mitigation projects. Photovoltaic schemes had been successfully implemented. (Interviewee) I discussed with the Interviewee the pattern of convergence of electrical consumption intensity and to a lesser extent energy consumption intensity shown by the four banks in Figure 9 and Figure 10.

The Interviewee commented that 15 years ago banks would run their operations – e.g. buildings, catering, energy procurement - themselves. Then there was a trend to outsource these activities to facility management firms that have expertise in these fields plus new technical areas such as electricity generation. He said that there had been a maturation in knowledge in facility management, which had peaked. There would need to be a technological step change to produce further reductions.

He said *“These facility management companies have obviously matured in their ability to do these things in facility management functions. So, there has been a growth of energy managers. There has been a growth in the knowledge of what type of projects can be done. We have people who have looked into putting wind turbines on our buildings and retrofitting solar film to our buildings' windows. So, the facility management companies can provide expertise in cutting edge technology to advise us, so they know how to optimise buildings to run. So, generally, what I am saying is that the knowledge of facility management companies in how to run buildings efficiently is at its peak at the moment, higher than it's ever been.”*

In summary, technical barriers were not encountered in implementing GHG mitigating projects. However, there has been a perceived lack of new mitigating actions to undertake.

6.2.6.5 Stakeholders

Grange used the term CSR in its earlier publications (2007 CSR report p.2, 2011 CSR report p.2), later seemingly to replace it with the term *“corporate responsibility”*. This is described in the following quote which places stakeholder expectations at the centre of defining its responsibilities.

“Our approach to corporate responsibility (CR) focuses on the three dimensions of sustainability to create economic, environmental, and social value. It aims to set the direction for a future-

orientated business strategy that balances economic success with environmental and social responsibility, all in line with the expectations of stakeholders.” (2016 corporate responsibility report p.15)

The 2016 corporate responsibility report (p.17) lists investors, shareholders, clients, employees, business partner/vendor/supplier, government/regulator, civil society/NGOs, community, and media.

Stakeholder NGOs and governmental bodies such as UN initiatives had had a significant bearing on firms' CSR responses. The Interviewee listed CDP, the United Nations Global Compact initiative¹⁰⁴, the Global Reporting Initiative¹⁰⁵, the GHG Protocol, UN Principles of Responsible Investment¹⁰⁶ as major drivers on CSR and went on to say *“For example, using the GRI has far greater influence on the shape, style and content of the report than any government,”* and *“...I do think these global actors like the CDP, WRI¹⁰⁷, GHG Protocol and the UN IPCC¹⁰⁸ are definitely more influential than government as far as CSR is concerned.”* The firm's 2016 corporate responsibility report (p.9) describes how the firm's license to operate will increasingly depend on its contributions to the UN Sustainable Development Goals. These include a climate change goal (United Nations undated).

Another stakeholder group – the shareholders – had shaped the bank's product offering. *“... managing environmental and social risks associated with investments and transactions will address reputational challenges that not only manifest themselves during annual general meetings [Grange] shareholders raised critical questions at our annual meeting).” (CDP2013 5.1f)*

In summary, shareholder concerns about the climate change implications of business deals influenced product offerings. NGOs and UN organisations shaped Grange's CSR response and helped provide impetus for GHG mitigation.

6.2.6.6 Other firms

The firm tracked competitor activity (Interviewee). The Interviewee said *“If you look at most banks, I think they do very similar things to what we are doing. I think you would do well to find a large investment bank*

¹⁰⁴ A programme to encourage sustainability in businesses (United Nations Global Compact n.d.).

¹⁰⁵ This is an independent international organisation that promotes sustainability reporting (Global Reporting Initiative n.d.).

¹⁰⁶ This is a proponent of responsible investing supported by the United Nations (Principles of Responsible Investment n.d.).

¹⁰⁷ World Resources Institute, one of the two organisations behind the GHG Protocol partnership (GHG Protocol Initiative 2004).

¹⁰⁸ Intergovernmental Panel on Climate Change n.d.

with or without the retail offering that doesn't buy renewables, that doesn't try to reduce energy because they are not business-as-usual, but they are what makes you competitive and a good corporate citizen [inaudible word]. It is kind of business-as-usual but it is perhaps be a good business."

In summary, the bank looked at other firms to assess their environmental management practices to see if its own activities were optimised to improve its financial performance and conformed to norms.

6.2.6.7 Regulatory and policy context

In the documents examined, there was little mention of *Energiewende*. An exception was a package of legislation, including building energy performance standards, that would affect the bank directly, but the strongest effect would be indirectly through its clients who may need extra credit or change their business models. The package was described as part of Germany's "*pioneering role*" on climate protection, which I took to mean *Energiewende*. (CDP2009 1.1). Examples of direct effects of regulation were the CRC Energy Efficiency scheme in the UK and the EU Energy Efficiency Directive¹⁰⁹ requiring firms to conduct energy audits, which was leading the firm to introduce ISO 50001. This was estimated to cost 100,000 € p.a.¹¹⁰

In CDP2013 (2.2a), the firm said the decision to maintain carbon neutrality was a means to reduce exposure to climate change-related regulation among other motivations. However, in interview in 2017, the Interviewee said GHG mitigation at the bank was driven by its carbon neutrality commitment which in turn was driven by its commitment to CSR. The cost of the bank's carbon neutrality commitment was initially linked to the EU emissions trading scheme (EU ETS) as Grange bought offsets valid for use under the scheme. When the EU ETS market was seen as dysfunctional, Grange switched to other offsets which were more expensive (email 19 September 2018 from Interviewee).

Intergovernmental actions such as United Nations Framework Convention on Climate Change¹¹¹ had an effect: "...things like COP21¹¹² where all the global leaders get together to try to hammer out that in effect has a sort of trickle down influence on us to be a better corporate citizen" said the Interviewee. COP21

¹⁰⁹ Directive 2012/27/EU (European Parliament and European Council 2012).

¹¹⁰ CDP 2009 1.1, CDP2011 5.1b, CDP2013 5.1a, CDP2016 CC5.1a, International Organization for Standardization (ISO) 2018b, Lazarate 2016.

¹¹¹ United Nations Framework Convention on Climate Change n.d.

¹¹² Conference of the Parties 21 in Paris in 2015 (United Nations Framework Convention on Climate Change n.d.)

had led Grange to commit to setting a science-based target (Interviewee). In CDP2017 (3.1a) it said it anticipated doing so in the next two years.

In summary, regulation has had a limited effect on its operational emissions.

6.2.6.8 Organisational values

The Interviewee attributed the carbon neutrality decision to acting responsibly in social and environmental terms.

6.2.6.9 Reputation and legitimacy

In the following paragraphs, I set out the links made by the bank between the reputation, legitimacy and CSR.

In 2007 CSR report (p.2), one of the top management team laid out the link between CSR, reputation, and the firm's activities. He explained that the firm's primary responsibility was to be profitable and grow. This created value for society too as the firm was an employer, sponsor and tax-payer. He continued: *"Our second priority as a good corporate citizen is to avoid negative externalities from our operations, striving to earn our money in the most socially responsible way possible. Social responsibility must not only be a firm component of our risk and reputation management, it must also be part and parcel of the way we do business."*

That statement was made at the onset of the global financial crisis. Statements made by the bank in the wake of the crisis show that restoring reputation and maintaining *"license to operate"*, which I understand as a perspective on legitimacy¹¹³, were enduring concerns. In CDP2013 (5.1f) it said *"...reputational benefits of our climate strategy include winning specific mandates and clients, attracting and retaining skilled staff, and being positively regarded by the public and policy makers, which helps to safeguard our license to operate. Demonstrating responsible investment practices and helping finance the transition to a low carbon economy is a way for [Grange] to help restore trust with society."* The group's sustainability strategy integrated environmental, social and ethical factors into business processes with the stated advantage of avoiding reputational risks and helping to address challenges in these areas (CDP2009, 25.3). Later in CDP2015 (5.1c) Grange said *"The trust in banks is at a record low due to perceived conflicts of interest, instances of wrong-doing and mistakes that contributed to the financial crisis. Banks therefore face the risk of a potential drop in sales if they do not improve our broad reputation including positive action on climate change and sustainability."* The Interviewee said following the global financial

¹¹³ See section 2.5 for discussion of license-to-operate.

crisis: *"We have had huge amounts of courses and training and information really drumming into us we put our clients first, we make sure value is shared equally and we make sure in a sustainable way and that is economically as well as socially and environmentally."* These statements show a clear link between the global financial crisis and trying to maintain legitimacy and improve the bank's reputation through CSR responses including action on climate change.

Turning to the specific decision to become carbon neutral, Grange explained (CDP2013 2.2a) *"[Grange] is focused on reducing its own environmental footprint and is carbon neutral since beginning of 2013. Among others, this decision was taken to create a building block for a credible overall climate change business strategy and to lift our public image in Germany and internationally (reducing reputational risks)."* Grange also goes on to state that climate neutrality ameliorated risk from climate change-related regulation (CDP2013 2.2a). In its answer to CDP2013 (2.2a), the bank is seen seeking consistency between its product offerings and its internal operations. The Interviewee attributed the carbon neutrality decision to acting responsibly in social and environmental terms.

Finally turning to the bank's products rather than operational emissions, Grange talked about the reputational risk from business deals that were harmful to the climate, which may cause it to lose clients and prompt changes to regulation. This could affect public trust in the bank, which would be part of a wider loss of public trust due to the global financial crisis. This had initiated a culture change in Grange with the aim of restoring the bank's *"contract with society"*, which from the following quote I understand as license-to-operate, which I argued in the literature review is a view of what legitimacy entails. *"We must renew the contract with society and strengthen the fabric of trust with all of our stakeholders. We have to demonstrate that we play a valuable role in society and that we act with integrity and responsibility. Client interactions are central to our business but implementing a culture of responsibility means understanding how our activities affect the environment and society (such as through climate change)"* (CDP2013 5.1e and 5.1f)

In summary, the bank's wish to improve its reputation and maintain its legitimacy played a major role in the establishment of a climate neutrality target, which in turn shaped the GHG mitigation choices of the firm.

6.2.6.10 Summary of findings for RQ2

Table 11 Summary of factors affecting Grange's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	The board of directors followed the recommendation of an advisory board to adopt the influential carbon neutrality target. The advisory board comprised experts from outside the firm.
International experience	No effect detected.
Available finances and cost-savings	This was a significant influence in increasing activities that caused emissions as well as the implementation of projects to mitigate them. Cost-saving drove energy efficiency/saving, but the bank was running out of measures that met internal payback requirements.
Non-financial resources and capabilities and technical issues	Technical barriers were not encountered in implementing GHG mitigating projects. There is either a lack of new mitigating actions to undertake or a perceived lack or a reluctance of facility managers to implement mitigating measures that are not the norm for their profession.
Stakeholders	Shareholders raised critical questions about environmental and social risks of business deals at bank's AGM. NGOs and UN organisations shaped Grange's CSR response and helped provide impetus for GHG mitigation.
Other firms	Grange looked at other firms to assess their environmental management practices to see if its own activities would improve its financial performance and conformed to norms.
Regulatory and policy context	Regulation has had a limited effect on its operational emissions.
Organisational values	A sense of responsibility motivated carbon neutrality target.
Reputation and legitimacy	Financing the transition to a low-carbon economy system was seen as a way of restoring society's trust in the bank following the global financial crisis. Reputation and legitimacy played a major role in the establishment of a carbon neutrality target e.g. the target was seen as building consistency between the bank's products and its internal operations. Carbon neutrality target in turn shaped the GHG mitigation choices of the firm.
Leased premises	In some cases, the length of time left on the lease made it uncertain the bank would recoup the benefits of investing in energy saving/efficiency.

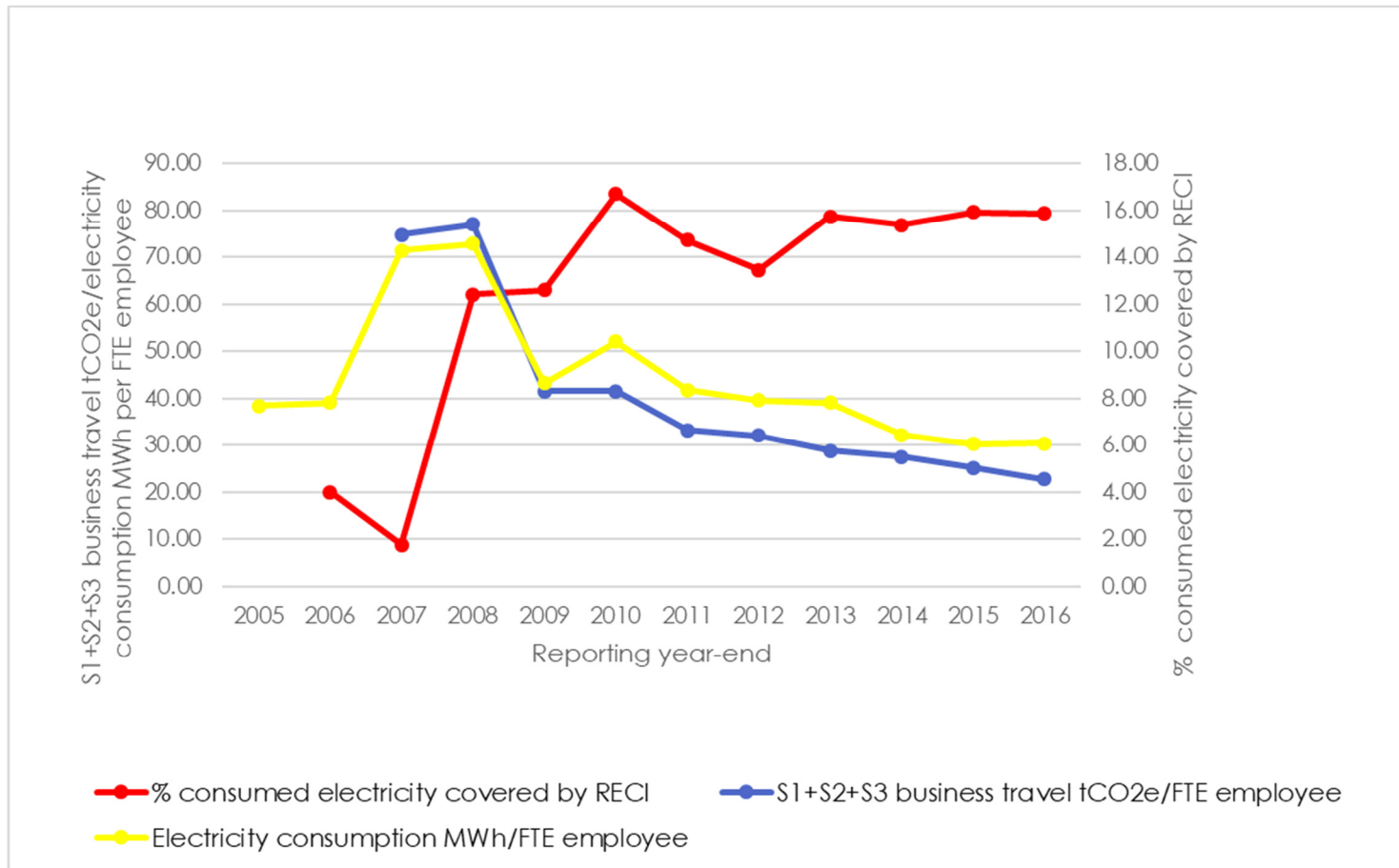
6.2.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES (RQ2)

Grange committed to procuring 100% renewable electricity for its consumption in Germany and two other countries in 2007¹¹⁴. The Interviewee said eventually there were no more markets that had certification systems for renewable electricity. The firm reduced travel-related emissions significantly and bought offsets for the remainder. Grange achieved the goal of being carbon neutral in 2012. This is illustrated in Figure 12.

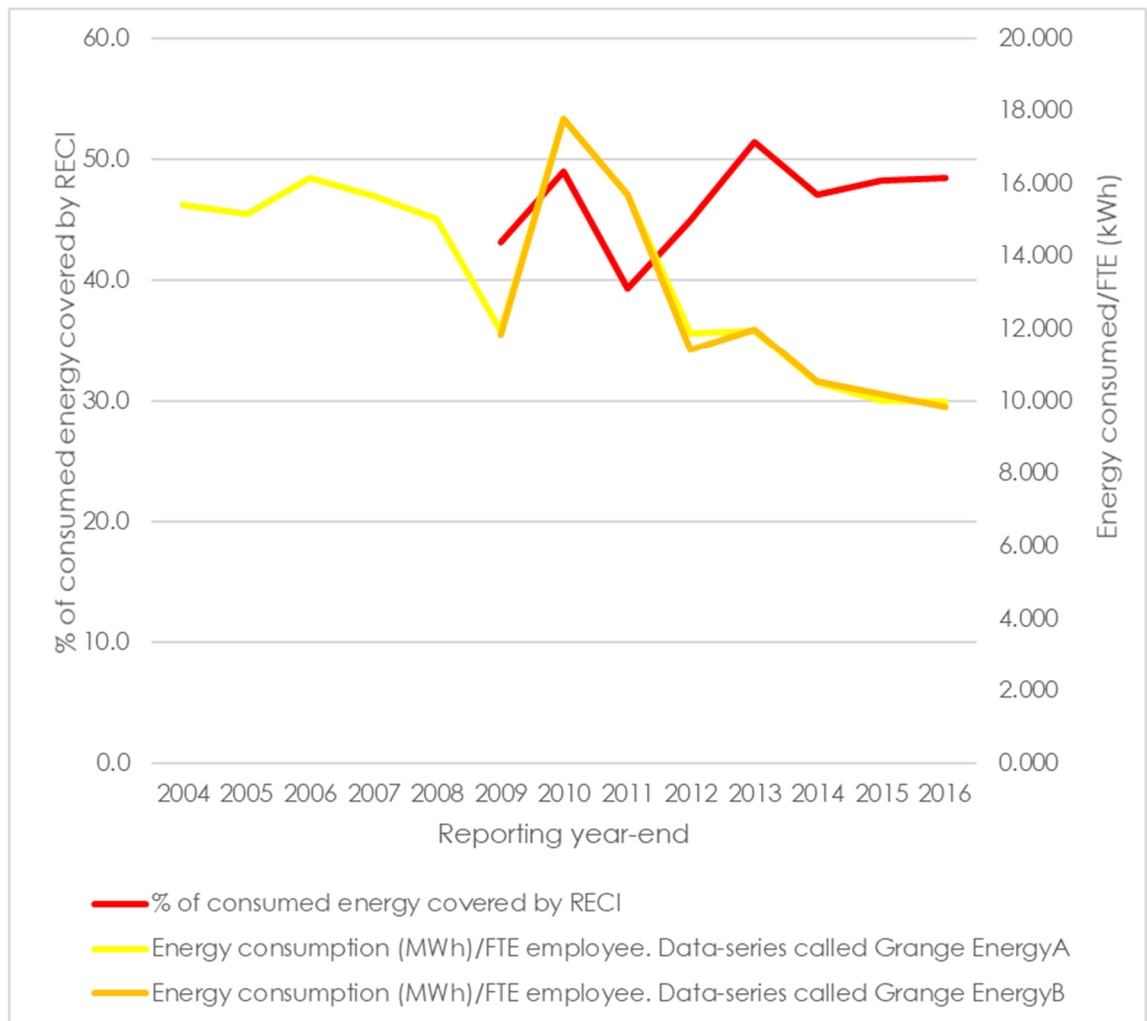
To investigate the effect of RECI use on other mitigating activities, I compared the percentage of consumed electricity covered by RECI with Grange's chosen aggregation of emissions for its target (S1+S2+S3 business travel) normalised by FTE employee and also electricity consumption/FTE employee and energy consumption per FTE employee. This is shown in the figures below.

¹¹⁴ 2007 corporate responsibility report p.32, Interviewee

Figure 14 Grange's emissions and electricity consumption intensities and % consumed electricity covered by RECI



Sources: see section 14.2.4. Offset use is not reflected in the emission figures.

Figure 15 Grange's energy consumption intensity and % consumed energy covered by RECI

Sources: See section 14.2.4. The two data-series for energy consumption (MWh)/FTE employee are from different data-sources. This is explained in section 14.2.4. Offset use is not reflected in the emission figures.

The first graph shows emission and electricity intensity metrics increasing to y/e 2008. The Interviewee said the 2005 and 2006 figures only include the bank's largest – and possibly most energy efficient – buildings. As more, less efficient buildings were included in the data, the intensity would increase. The Interviewee also said over time the use of modelling improved for sites where primary data was not available. Weather-related changes in consumption i.e. greater requirements for air-conditioning were another cause of significant changes in intensities (Interviewee). I found a further reason why electricity intensity figures increased in y/e 2007 and 2008. This is an effect of using re-stated data from the 2009

corporate responsibility report.¹¹⁵ Grange went through a period of intense corporate re-structuring in 2009 and 2010 which is likely to contribute to the dramatic changes in figures. Therefore, I will focus on y/e 2010 onwards.

The key point is that from y/e 2010 emissions, electricity and energy intensities broadly decline while the RECI percentage broadly increases. The Interviewee said cost is a driver of energy efficiency/saving. RECI use did not affect these activities. However, the firm was running out of its energy saving options with a payback of less than three years and had extended the payback requirement. I decided to check this by comparing its electricity/energy consumption intensity with other banks – as I did with Gamete (see Figure 9 and Figure 10).

Post-corporate restructuring, Grange's electricity intensity has been in steady decline and for y/e 2014 and 2015 it had been low relative to the other three banks. Grange has had higher energy intensities than both the UK banks for all but one year in the period examined. However, approximately half of Germany has a colder climate than the UK (Peel, Finlayson, and McMahon 2007) which could account for greater heating requirements. Post y/e 2010 energy intensity began to converge with those achieved by the two UK firms, even though the percentage of consumed energy covered by RECI is broadly rising. Therefore, neither graph indicates that there have been actions that other banks were taking that Grange was not.

Turning to offset use, the Interviewee confirmed that RECI availability enabled the bank to set a carbon neutrality target so had indirectly led to offset use (email dated 19 September 2018 from Interviewee).

To summarise, Grange has been a significant user of RECI. In CDP2006, it reported that 20% of the electricity used in Germany was renewable (1(a)(ii)), a figure that rose significantly (see Figure 12). However, a period of corporate restructuring makes it difficult to look for trends in the percentage of consumed electricity covered by RECI and emissions/electricity/energy intensity before y/e 2010. Y/e 2010 onwards these metrics are broadly in decline. Comparison with the other case study banks shows that its electrical intensity has been low and its energy intensity is converging with the two UK banks and is significantly lower than the other German bank. Therefore, there is no evidence to suggest RECI use has displaced electricity/energy efficiency/saving measures. Whether the bank might have reduced its emissions/electricity/energy efficiencies faster without RECI use cannot be assessed from the available

¹¹⁵ The 2009 corporate responsibility report (p.34) said some of the data for 2007 and 2008 had been restated due to a new calculation method, updated statistics and different emissions factors. This resulted in a large increase in electricity consumption being reported and a leap in electricity intensity from y/e 2007, the earliest year of restatement, to y/e 2009. This would also have been seen in the y/e 2009 intensity figure, but the original figure was replaced by a lower, re-stated figure from the 2011 corporate social responsibility report (p.44, 46).

data. Finally, RECI use facilitated the setting of a carbon neutrality target in y/e 2008 which requires offset use.

These results are discussed further in the discussion for RQ2 in chapter 12.

6.3 URBAN

6.3.1 DATA SOURCES

Data for this case is not as full as for the other three cases in its group as I was not able to interview a staff member specifically concerned with GHG management/energy procurement. However, I interviewed a senior manager concerned with corporate responsibility – referred to as the Interviewee - in a call on 10 August 2016 with subsequent follow-up emails, dates of which are given in the text. Corporate publications and CDP datasets were the sources of information on Urban. Its responses to CDP were public from 2004-2017.

6.3.2 CASE DESCRIPTION

Urban is a banking group with consumer-facing as well as business services¹¹⁶. It has been incorporated in the UK while it began responding to CDP (CDP4 (2006)-CDP2017). It has financed in renewable energy and provided services to help smaller businesses improve their sustainability¹¹⁷.

6.3.3 OVERVIEW OF DATA RELEVANT TO RQ1

Urban began to buy “green electricity” in 2004, three years after the Climate Change Levy was imposed on fossil fuels or electricity not generated using renewable or low-carbon methods. In 2007 – when the US sub-prime mortgage crisis hit – Urban choose to become carbon neutral. I speculate that this was a reaction to the unfolding crisis. Certainly, the bank sought to show leadership on climate change in the period 2007-2014. Its climate change approach fitted with its business model of developing relationships with its stakeholders. The bank thought its work on climate change would improve its reputation with customers and employee morale.

Urban did not continue to claim carbon neutrality. Changes in the regulatory and policy context disincentivised the use of RECI and LCECI purchase, which ceased to be reported to CDP after y/e 2009. These had been a major part of the package of measures used by Urban to be able to claim carbon neutrality. A further element was the use of offsets. In CDP2010 the bank said other options were more effective than offsets.

¹¹⁶ 2007 corporate report p.2, CDP2010 0.1.

¹¹⁷ 2016 corporate environmental publication p.1 and 2013 corporate publications p.56.

In contrast to earlier targets that were focussed on emissions, targets described in CDP2011 were framed in terms of reducing energy use measured in GWh and business travel measured in km, perhaps more useful for a bank curbing costs following the financial crisis than emission targets.

Then in 2015, a new contract to source a major amount of its electricity via a PPA for renewable electricity began. This coincided with the year in which the “GHG Protocol Scope 2 Guidance - An Amendment to the GHG Protocol Corporate Standard” (Sotos 2015a) was published. This legitimised firms’ reporting the reflection of RECI and LCECI in emission figures provided criteria were met. The firm, however, considered that it was not able to reflect the PPA in its emissions figures as it lacked a key piece of data relating to overall electricity consumption the in UK. However, the bank set a target in CDP2017 which is science-based¹¹⁸ and uses a market-based scope 2 approach. This suggests that it anticipates reflecting RECI use in its future emissions figures. Urban said the CRC Energy Efficiency raised the profile of climate change issues at board-level and led to the introduction of energy monitoring and investment programmes.

¹¹⁸ See footnote 50.

Table 12 Summary of factors affecting Urban's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors		
GHG mitigating actions in general	<u>Stakeholders</u> Internal and external stakeholders were important considerations in the bank's climate change work.	<u>Organisational values</u> In 2015 the bank said stakeholders had not identified climate change as a pressing issue, but it remained one for the bank.	<u>Other firms</u> Other firms' GHG mitigation targets were used as benchmarks by Urban.
LCECI/RECI use	<u>Regulatory context</u> Appears to have encouraged and subsequently discouraged RECI/LCECI use.	<u>Available finances</u> I infer that available finance was a factor in the firm's move away from RECI and LCECI use which may have saved the firm money.	
Energy efficiency/saving	<u>Regulatory context</u> Incentivised energy efficiency investment.	<u>Stakeholders</u> Internal and external stakeholders were a consideration in energy reduction targets.	<u>Cost-saving</u> I infer that a shortage of finance led to a shift in focus from emission reduction to energy-saving.
Self-generation of electricity	Not investigated – a minor activity		
Refrigerant emissions	I assumed to be insignificant within firm's inventory.		
Offset use	Driven initially by short-lived carbon neutrality target and then rejected due to doubts about the efficacy of offsets in reducing carbon emissions.		

6.3.4 EMISSIONS OVERVIEW

In CDP2009 Urban described its main sources of emissions as energy consumption and business travel¹¹⁹. In 2015 the bank said gas and electricity were its main emission sources¹²⁰. However, examination of the bank's figures leads me to conclude that this is out of its scope 1, 2 and scope 3 business travel sources, rather than the full spectrum of scope 3 sources. CDP data shows further scope 3 categories that were significant e.g. emissions associated with capital goods and purchased goods and services¹²¹. Some of the mitigation data shown in Figure 16 Urban's scope 1 and scope 2 emissions aggregates reductions across the three scopes. However, Scope 3 emissions are subject of separate targets to scopes 1 and 2, so these are not considered further, as their achievement is unlikely to have a close bearing on the use of RECI/LCECI.

6.3.4.1 Targets

Early targets in (CDP4 2006 8 and CDP2009 23.9) focussed on emission reductions. Later targets in CDP 2011 (3.1a) focussed on reducing energy use measured in GWh and business travel measured in km. The energy target excluded data centres as it was having to run parallel data centres following major corporate restructuring, but the bank stated in CDP2012 (3.1a) and CDP2013 (3.1a) that year-on-year its data centre energy consumption was stable. The energy target was met five years early in 2015.¹²²

By CDP2017 Urban was still reporting targets to reduce energy consumption and business travel. However, it had added GHG emission targets which it said were science-based but had not been approved by the Science-Based Targets initiative¹²³. These were S1+S2 targets with target years of 2020, 2030, and 2050 that used the market-based scope 2 approach, although Urban still did not report a market-based scope 2 figure. There were scope 3 targets, but these were separate from the S1+S2 target, so are not considered further (CC3.1a and CC8.3a).

¹¹⁹ CDP2009 9.4.

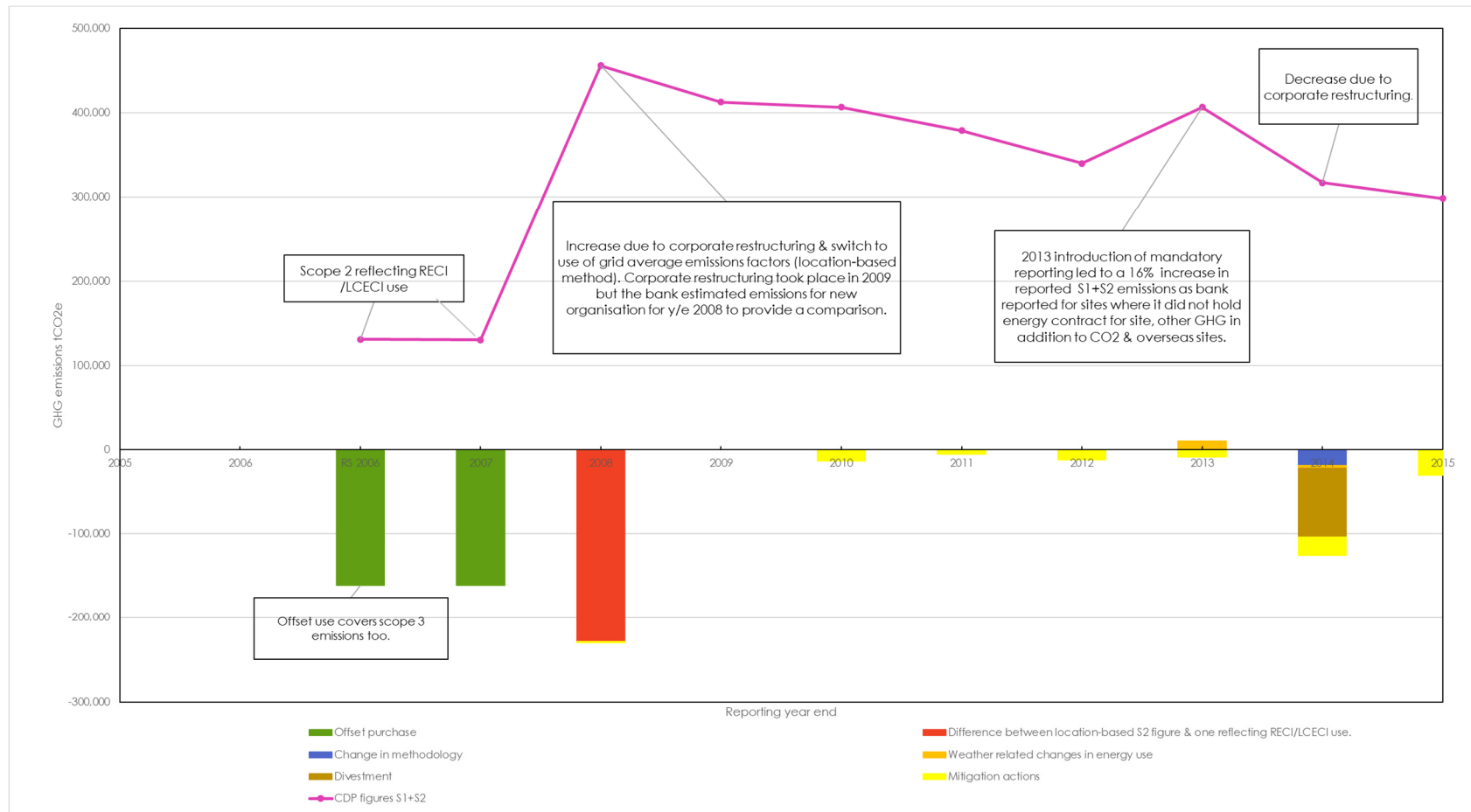
¹²⁰ 2015 corporate environmental publication p.2.

¹²¹ CDP2014 CC14.1.

¹²² 2015 corporate publication p.3.

¹²³ The Science-based Target initiative is a collaboration between CDP, the UN Global Compact, World Resources Institute (one of the two GHG Protocol partners) and the World Wide Fund for Nature. (Science Based Targets initiative n.d.a).

Figure 16 Urban's scope 1 and scope 2 emissions



Sources: see section 14.2.5. Offsets are not reflected in plots of emission totals. This figure is reproduced in the accompanying A3 portfolio.

The increase in the emissions in y/e 2008 is due to corporate restructuring¹²⁴ and the bank following a request from CDP to use grid average emission factors to report its purchased and consumed electricity-related emissions¹²⁵. Then in y/e 2013 there was the step-change in the number of scope 3 categories the bank was reporting. This coincided with the introduction of mandatory reporting of GHG emissions for UK quoted companies (*The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013*). This led to the bank accounting for additional sites and GHGs in addition to carbon dioxide, leading to a 16% increase in reported S1+S2 emissions in its 2013 annual report (p.75). In y/e 2014 there was further corporate restructuring leading to a decrease in emissions¹²⁶.

6.3.5 ACTIVITIES RELATED TO GHG MITIGATION

Urban began to purchase “green” electricity in 2004¹²⁷. It bought significant quantities of RECI to apply to electricity consumption - 13% and 12% in y/e 2006 and 2007 respectively - and larger quantities of Good Quality CHP GOs, bringing the percentages of RECI/LCECI purchased to 65% and 65% respectively¹²⁸.

In the 2007 corporate responsibility report (p.15), it said it had bought 161,000 tCO₂e of offsets to become carbon neutral for y/e 2006 in terms of property- and travel-related emissions. From the accompanying text, the carbon neutrality target appears to have been set in March 2007 and there is no mention of it in CDP4 (2006). The 2006 corporate responsibility report is no longer on the firm's website. The 2007 corporate responsibility report (p.15) said Urban would buy offsets to become carbon neutral in y/e 2007. In CDP2008 for y/e 2007, Urban reported that it had bought 161,000 tCO₂e of offsets but Urban went on to say that expiring RECI contracts (LCECI are not mentioned) may not be renewed at previous levels. No reason was given¹²⁹.

CDP6 (2008) questionnaire asked firms to use grid average emission factors to report their headline scope 2 figure, although a second scope 2 figure could be reported – if firms wished – that reflected electricity contracts (CDP 2008). Urban reported emission reductions due to RECI/LCECI use in y/e 2008 (CDP7 2009 12.1). The following year, in CDP2010, the firm reported that it had used RECI (LCECI are not

¹²⁴ CDP2009, Further information to 10.6.

¹²⁵ CPD2009 11.1.

¹²⁶ 2014 annual report p.29.

¹²⁷ 2007 corporate responsibility report p.15). See the section 6.3.6.7.

¹²⁸ Own calculation using CDP2008 2(b)(y)(i) data.

¹²⁹ CDP2008 2(b)(y)(i) 2(g), 3(a)(iv).

mentioned) for 40% of its electricity consumption in y/e 2009¹³⁰, but RECI use was not reflected in the emission figures.

After y/e 2009 and until y/e 2015, I found no external reporting of RECI use in terms of emission figures in tCO₂e or the amount purchased in MWh in CDP responses or the publications inspected. Urban said this was related to scope 2 accounting issues and the design of the CRC Energy Efficiency scheme that did not reward RECI use¹³¹.

Then, in y/e 2015, Urban entered into a Power Purchase Agreement (PPA) for renewable electricity in 2015, although again it did not reflect this in its GHG emission figures¹³². Changes in RECI and LCECI use are covered in detail in section 6.3.6.7.

Although offsets were used in y/e 2006 and y/e 2007, no offset use was reported in CDP2009 for y/e 2008 and is explicitly rejected in CDP2010.

“The starting point of our climate change agenda is reducing our use of resources. We believe we can have the most positive impact by reducing the amount of resources we use in the first place – rather than by offsetting our use. We do not purchase carbon offsets, for example, as we believe we can have a greater and more measurable impact by reducing the amount of carbon we generate through our business operations.” (CDP2010 9.1)

Mitigation actions have included energy-efficient lighting, energy efficiency and transport emission reduction measures (CDP2009 23.8), PV installation (2011 environment report p.8), optimisation of building management systems, new boiler controls, lighting and building management upgrades to improve energy efficiency (2014 annual report p.29). In its 2013 CSR report, Urban reported participation in a tree-planting project to offset emissions (p.57).

6.3.6 FACTORS INFLUENCING A FIRM’S GHG MITIGATION CHOICES

(RQ1)

6.3.6.1 Individuals in firm

Asked if particular individuals or groups within the firm had driven its climate change position, the Interviewee said: *“Yes, definitely, although I would say as with any organisation, chief executives and leadership teams change. So perhaps those people who initially drove it may not be in the business now,*

¹³⁰ CDP2010 Further Information to 14.1.

¹³¹ CDP2010 Further information section for question 14. See section 6.3.6.7.

¹³² 2015 corporate publication p.4, CDP2016 CC8.3a, 2016 annual report p.25, 2017 environmental publication p.2.

some of them probably are.” Although a specific individual was described as a recognised leader on business approach to climate change (CDP2010 8.2b), the Interviewee said: “... if I could get across that our interest remains constant. The people who manage it may have changed, but that almost doesn’t matter, I guess. It will be different again in five years’ time when there is another set of people looking at it and managing it.”

In summary, Urban’s climate change-related activity was not dependent on individuals within the firm.

6.3.6.2 International experience

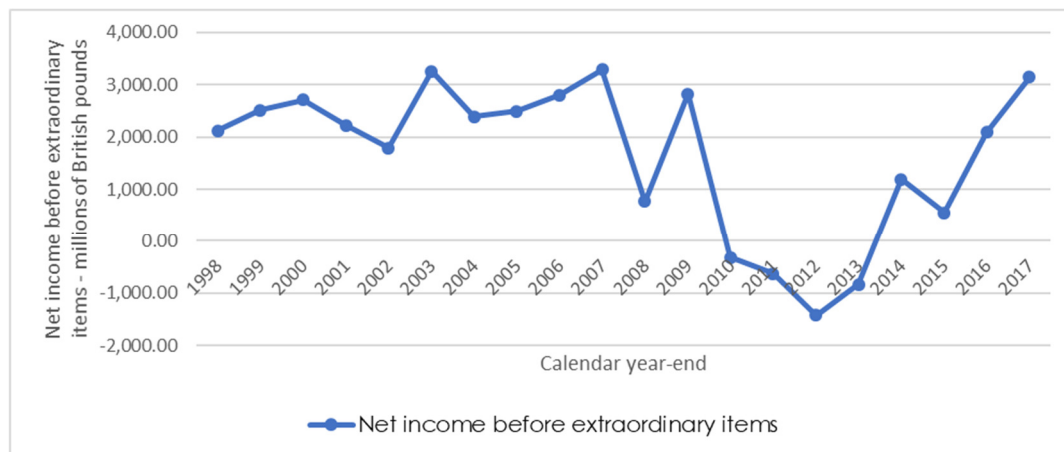
Although the bank has had offices in 25 countries, it has had a consistently strong domestic market focus over the period analysed (CDP2007 2(a)(iii), CDP2008 2(c)(i), 2014 annual report p.6, Interviewee).

No effect detected.

6.3.6.3 Available finance and cost saving

I assume that it is the impact of the global financial crisis that can be seen in Urban’s available finance post-2007 (Figure 17).

Figure 17 Urban’s available finances



Source: Thomson One Reuters Fundamentals accessed 13 April 2018

I was not able to interview a staff member connected with decisions on mitigating activities to find out how a decline in available finance impacted Urban’s choices. However, it appears to have led to a focus on reducing resource use rather than emissions directly (2010 corporate responsibility report p.18). This was reflected in its expression of targets. Early targets focussed on emission reductions (CDP4(2006) (8), CDP2009 (23.9)). They were superseded by targets on reducing energy use and business travel reported in CDP2011 (3.1a) which may be reflective of the negative figure shown in Figure 17 for y/e 2010. Offset use – another expense which was integral to its carbon neutrality assertion – ceased (see section 6.3.5.).

However, the firm said that its cessation of its use of offsets was related to a change of opinion on their efficacy (CDP2010 9.1) By CDP2017 Urban was still reporting its target to reduce energy consumption and business travel (CC3.1). However, it had added GHG emission targets.

The CRC Energy Efficiency scheme placed a cost on carbon and did not reward RECI use (see section 6.3.6.7). The cost of carbon was added in to the firm's energy budget forecasts (CDP2015 3.3c, CDP2016 3.3c). However, energy costs were not a significant outlay for the firm: 0.65% of total operating cost in CDP2008 2(h)(ii)) and less than or equal to 5% of total operational spend in later years¹³³. Nevertheless, there were dedicated budgets for energy efficiency¹³⁴.

In summary, I infer a reduction in available finance moved the firm from emission targets to targets that would be more likely to lead to cost-savings. I also infer that available finance was a factor in the firm's move away from RECI and LCECI use which may have cost the firm money.

6.3.6.4 Non-financial resources and capabilities and technical issues

A lack of availability of non-financial resources and capabilities was not mentioned in corporate publications, CDP responses or by the Interviewee. The bank has described its access to technical expertise via a facilities management company in CDP2008 and in again in 2013¹³⁵. However, I was not able to interview a staff member more closely connected with the technical aspects of GHG mitigation and/or energy use.

No evidence that availability of non-financial resources and capabilities was a factor in the firm's choice of GHG mitigating actions.

6.3.6.5 Stakeholders

Urban had its own phrase for CSR – a distinctive term that would identify the firm. However, the Interviewee said that this term and CSR could be used interchangeably. The Interviewee said that the firm's conception of CSR meant it was driven by the firms' stakeholders. Stakeholders included employees, customers, government bodies, their investors, suppliers, trade unions, industry groups,

¹³³ "Less than or equal to 5%" was the lowest band that a firm could select in this multiple-choice question "What percentage of your total operational spend in the reporting year was on energy?" in CDP2012 (12.1) and CDP2016 (CC11.1).

¹³⁴ CDP2012 3.3c, CDP2015 3.3c, CDP2016 3.3c.

¹³⁵ CDP2008 1(a)(iv), 2013 corporate publication p.53.

NGOs, society, other businesses with common environmental interests¹³⁶. Its conception of CSR included reducing the firm's environmental impact¹³⁷.

Urban sought to be seen by stakeholders as responsible. In the 2007 corporate responsibility report, the bank said *"Corporate responsibility, focused on the creation of employee engagement, customer satisfaction and brand loyalty, has a major part to play in supporting our business strategy. It helps promote trust in the [Urban] brand and reinforces customer loyalty and advocacy"* (p.6).

It quoted a 2007 consumer poll that reported that 45% of consumers believed companies should do more to protect the environment, adding *"While customers may not turn to their bank first in relation to their climate change expectations, they do want and expect companies, with which they do business, to act responsibly. Overall reputation is likely to be a greater influence on consumer choice than specific "green" products in the short term."* (CDP2008 1(a)(iii)).

Energy reduction targets were considered to be important for stakeholders externally and useful for engaging internal stakeholders i.e. employees (CDP2010 9.1). Employee satisfaction depended in part on the bank's environmental, ethical and social reputation. (2007 corporate responsibility report p.8).

Urban saw its climate change work as a means of deepening its stakeholder relationships that were key to its business model. *"This supports our customer-oriented strategy where we look to develop our business based on deep relationships as opposed to a product-led approach favoured by others"* (2007 corporate responsibility p.6). This was further elaborated in CDP2010; *"There are many opportunities to work with partner organisations to produce business solutions to carbon management and to build stronger relationships with our key external stakeholders based on our commitment to carbon reduction"* (8.2b). However, by 2015 the bank said its stakeholders had not identified climate change as a pressing issue although the bank said: *"...for us, it remains a priority issue, year in, year out"* (2015 corporate environmental publication p.1).

The Interviewee said the diversity of the bank's customers created many different drivers for its climate change approach plus there was the influence of NGOs and what sustainability indices were looking for¹³⁸.

¹³⁶ 2011 corporate environmental report p.4, 2013 corporate responsibility report p.58, p.62, 2015 annual report p.19.

¹³⁷ 2013 CSR report p.69.

¹³⁸ Both NGOs and sustainability indices would be encompassed by the list of stakeholders given at the start of this section.

In CDP2017, it set a science-based target which CDP had begun to incentivise via its scoring system in CDP2016 (CDP 2016a and b), although the firm may have taken this step independently.

However, the influence of the NGO partnership, the GHG Protocol Partnership, was explicit on its reporting. The GHG Protocol's scope 2 guidance (Sotos 2015a) was published in 2015 after five years of public debate organised by the GHG Protocol. In the same year, the bank began sourcing 25% of its electricity through a low-carbon electricity PPA (2015 corporate publication p.4) after a six-year hiatus of reporting and apparently using RECI¹³⁹. However, it did not reflect this in market-based emission figures nor energy consumption figures reported to CDP2015 (11.4). Its answer to CDP2016 (CC8.3a) explains that there was uncertainty over residual emissions factors available for the UK. Residual mix emission factors are applied to electricity whose method of generation is not known and are needed to calculate a market-based scope 2 figure. The firm said in CDP2016 (CC8.3a):

"Due to present uncertainty with residual emissions factors available for the United Kingdom and our ongoing efforts to obtain evidence of renewable supply that meets the good quality criteria set out by the GHG protocol; we have calculated our Market-based emissions by way of the UK grid average... This is in accordance with GHG protocol guidance."

This shows the effect of the protocol on Urban's reporting practices and possibly its electricity procurement too.

Urban made references to showing leadership. In the 2007 corporate responsibility report (p.10) the bank described its emissions reduction target as the biggest of any top 20 FTSE company. The bank saw it as key to its business to be at the cutting edge of thinking on climate change (CDP2008 1(a)(v)).

Collaborating with stakeholders – suppliers, other businesses and regulators – was fundamental to leadership (2011 corporate environmental report p.4). Further references were made to its leadership on the climate change issues and the reputational benefits (CDP2010 8.2b). It continued to see itself as a leader, seeking to drive the UK and international environmental agenda (including legislative process) (CDP2015 2.1). However, the Interviewee said: *"We are definitely not positioning ourselves as a leader, but we know that we have a big role to play in supporting that transition to a low-carbon economy."*

In summary, the bank talked about the influence of a range of stakeholders. In 2007 stakeholders were described as key to its business model which it saw as building relationships as opposed to devising new products. The influence of the NGO partnership, the GHG Protocol, on its reporting practices was explicit.

¹³⁹ See section 6.3.5.

6.3.6.6 Other firms

In the 2007 corporate responsibility report (p.10) the bank described its emissions reduction target as the biggest of any top 20 FTSE company. The firm's ambition in reducing environmental impact continued to be benchmarked against other firms, both peers and firms seen as cross-sector leaders. *"Going forward we will continue to review our targets to ensure they stretch us to achieve more."* (2017 corporate publication p.2). The bank collaborated with a competitor to share services delivered by a third party which led to GHG emission reductions (CDP2010 8.2b).

Other firms' GHG mitigation targets were used as benchmarks by Urban.

6.3.6.7 Regulatory and policy context

Urban was affected by the addition of the Climate Change Levy by the UK government to the price of many energy sources¹⁴⁰. Exemption from the main rate of this tax which was introduced in 2001 could be gained through the use of Levy Exemption Certificates. These certificates were issued for the generation of renewable electricity and electricity from highly-efficient CHP (GOV.UK 2017). Urban began buying "green electricity" in 2004¹⁴¹. The exact contractual instrument was not specified. The following quote suggests that Levy Exemption Certificates may have been used to reduce the cost of energy. Urban said *"However, the increasing cost of energy makes it important to seek ways to reduce energy consumption and/or purchase electricity from renewable sources"* (CDP4 (2006) no question number).

For y/e 2006, it purchased "green electricity" (avoiding about 19,000 tCO₂ of emissions) and Good Quality Combined Heat and Power (avoiding about 31,000 tCO₂). It bought similar quantities for y/e 2007. Whether this was covered by Levy Exemption Certificates is not stated. The remainder of property- and travel-related emissions were covered by offsets for y/e 2006 with the intention to do the same for y/e 2007 to claim carbon neutrality¹⁴².

In 2008 there were changes in scope 2 accounting approaches that potentially restricted RECI/LCECI reporting. In May 2008 CDP requested that companies use the grid average emission factor in reporting its scope 2 emissions figures (CDP 2008). The following month Defra published guidance advising

¹⁴⁰ CDP2008 1(a)(i).

¹⁴¹ 2007 corporate responsibility report p.1.

¹⁴² 2007 corporate responsibility report, p.15.

companies to do the same for y/e 2009 emission accounts (Defra 2008). This approach was developed in subsequent CDP and Defra guidance (CDP 2009, Defra, and DECC 2009).

Urban reported emission reductions due to RECI use in y/e 2008 (CDP7 2009 12.1) but did not for y/e 2009 even though the bank purchased RECI to cover 40% of its purchased electricity (LCECI is not mentioned)¹⁴³. Urban said *“DEFRA introduced changes in 2008 to the way renewable energy is treated, meaning that renewable energy is no longer zero-rated for carbon emissions. The Group is now subject for the first time to climate change legislation – the CRC Energy Efficiency Scheme – which is focused on energy reduction and does not include incentives for purchasing renewable electricity. We currently pay a premium for renewable electricity. Given the current regulatory environment – which does not incentivise the purchase of renewable energy - and our focus on energy and cost reduction, we may reconsider our approach.”* (CDP2010 Further information section for question 14). I infer from this that there was a perceived reputational benefit from RECI use that was reduced by the change in Defra’s recommended accounting approach for LEC-backed electricity.

No RECI used was reported in subsequent CDP reports including CDP2013, even though restrictions on reflecting RECI in headline scope 2 figures were removed by CDP (CDP 2013). It did not do so in the CSR reports from 2010-2014 that I examined.

Then in 2015 the firm started to buy approximately 20-25% of its electricity through a renewable electricity, 10-year PPA¹⁴⁴. However, the PPA is not reflected in the its GHG emission totals for y/e 2016 and 2017¹⁴⁵ due to *“...uncertainty with residual emissions factors available for the United Kingdom and our ongoing efforts to obtain evidence of renewable supply that meets the good quality criteria set out by the GHG protocol”* (CDP2016 CC8.3a).

In CDP2010 (3.5), the bank said CRC Energy Efficiency increased awareness of energy and climate change issues at board level and lead to the introduction of a new governance, monitoring and investment package. The bank invested in energy reduction, spending or budgeting to spend between £2.55 million

¹⁴³ CDP8 (2010), Further Information to 14.1.

¹⁴⁴ 20% taken from 2014 environmental publication PDF p.3. 25% taken from 2015 corporate publication p.4.

¹⁴⁵ CDP2016 CC8.3a, 2016 annual report p.25, 2017 environmental publication p.2. While not reflected in emission totals, Urban reported that the PPA displaced 56,000 tCO₂e of emissions that would otherwise be sourced from the national grid (2015 corporate environmental publication p.4).

and £5 million pa.¹⁴⁶. In CDP2015 (5.1a) the bank reported that yearly CRC Energy Efficiency payment was £5.5 million. It said regulation like CRC Energy Efficiency led the bank to continue investing in environmental activities, working with its facilities management company which had 36 full-time equivalent employees working on energy management¹⁴⁷.

Urban also fell within the compass of the EU directive on the energy performance of buildings¹⁴⁸, heat metering regulations¹⁴⁹, Article 8 of the EU Energy Efficiency Directive transposed as Energy Saving Opportunities Scheme in the UK¹⁵⁰, and the EU Emissions Trading Scheme via a data centre¹⁵¹.

In CDP2010 the firm discussed the important role it had to play in the transition to a low-carbon economy, its related partnerships with other firms, local government and other entities and its services for smaller businesses looking for advice on environmental issues (p.18). There are two instances where the firm's financing of renewable energy generation is described in relation to targets set by the UK and Scottish governments¹⁵². The Interviewee described the broader context created by regulators as an influence *"...we know that we have a big role to play in supporting that transition to a low-carbon economy. So, lots of different things are driving that, so it is very...it is driven by the external environment whether that's a change in government, or UN initiatives, or COP21 was obviously has driven a lot of interest outside the organization in climate change. So, lots of different drivers."*

In summary, regulation and the global policy context has been a significant influence on the GHG mitigating activities of Urban.

6.3.6.8 Organisational values

Urban has talked about its organisational values within the context of its activities as a whole (2013 corporate responsibility report, 2015 annual report p.6 chairman's address, Interviewee), but also specifically relation to climate change. Referring to stakeholders' interest in climate change action, Urban

¹⁴⁶ Spending £5 million in 2010, £2.55 million in 2011, budgeting of £5 million in 2012 and £3.6 million in 2014 (CDP2012 5.1, CDP2015 2.2a).

¹⁴⁷ 2016 corporate responsibility report, p.2, CDP2015-CDP2016 3.3c.

¹⁴⁸ CDP2009 23.8.

¹⁴⁹ CDP2015 5.1a.

¹⁵⁰ CDP2015 5.1a, 3.3c.

¹⁵¹ CDP2014 13.1b.

¹⁵² 2010 corporate responsibility report p.21, 2012 corporate responsibility report p.37.

said that while its stakeholders had not identified it as an immediate concern “...for us, it remains a priority issue, year in, year out” (2015 corporate environmental publication p.1).

Urban’s action on climate change was internally driven.

6.3.6.9 Reputation

While there were mentions of the influence of reputation on the firm’s GHG mitigation choices, this did not emerge as a strong connection. Reputation was not given as a driver for carbon neutrality which was claimed in 2007 for y/e 2006¹⁵³, although Urban did write that overall reputation on climate change activities would be more of an influence on customer choice than “green products” (CDP2008 1(a)(iii)). Two years later, in CDP2010 the bank wrote that leadership on climate change issues would lead to an enhanced reputation. It listed leadership roles it had undertaken on this issue (8.2b). However, the Interviewee said that while the bank believed it had a significant role to play in combating climate change, it was not setting itself up as a leader.

I infer from Urban’s comments on Defra’s change to its recommendation on how to account for renewable electricity in corporate GHG accounts that there had been a reputational driver to RECI use and that it saw this reputational advantage was diminished by the change. This along with the approach to RECI use in the CRC Energy Efficiency scheme and the cost of RECI was leading it to re-consider RECI use. (CDP2010 Further information section for question 14). However, an explicit direct link from reputation to specific GHG mitigation operational choices was not encountered.

In summary, the bank saw reputational benefits from taking leading roles on climate change. There was an implied connection between reputation and RECI use, but an explicit, direct link to specific mitigation actions was not encountered.

¹⁵³ 2007 corporate responsibility review p.11.

6.3.6.10 Summary of findings for RQ1

Table 13 Summary of factors affecting Urban's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	Urban's climate change-related activity was not dependent on individuals within the firm.
International experience	No effect detected.
Available finances and cost-savings	I infer a reduction in available finance moved the firm from emission targets to targets more likely to lead to cost-savings and was a factor in the firm's move away from RECI and LCECI use which may have saved the firm money.
Non-financial resources and capabilities and technical issues	No evidence this was a limiting factor.
Stakeholders	Urban talked about the influence of a range of stakeholders. In 2007 stakeholders were described as key to its business model which it saw as building relationships as opposed to devising new products. Influence of NGO GHG Protocol was explicit on its reporting practices. CSR rating agencies and sustainability indices were an influence.
Other firms	Other firms' GHG mitigation targets were used as benchmarks by Urban.
Regulation and policy context	Appears to have encouraged and subsequently discouraged RECI/LCECI use. UK government GHG emissions reporting guidance has shaped Urban's reporting. UK regulation CRC Energy Reduction Commitment incentivised energy efficiency investment. Global policy context has influenced on the GHG mitigating activities of Urban.
Organisational values	In 2015 the bank said stakeholders had not identified climate change as a pressing issue, but it remained one for the bank
Reputation	The bank saw reputational benefits from taking leading roles on climate change, but an explicit, direct link to specific mitigation actions was not encountered.

6.3.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

Urban began buying “green electricity” in 2004¹⁵⁴. Significant percentages of consumed electricity covered by RECI/LCECI were reported for y/e 2006-2009¹⁵⁵, although RECI/LCECI use was not reflected in emission figures for y/e 2009. In 2015, the bank began sourcing 25% of its electricity through a low-carbon electricity PPA (2015 corporate publication p.4). However, it did not reflect this in market-based emission figures nor energy consumption figures reported to CDP for y/e 2015 and 2016¹⁵⁶ nor was it reflected in GHG emission figures for y/e 2016 and 2017 in corporate publications¹⁵⁷. Therefore, since y/e 2009, the effect of electricity efficiency/saving activities on GHG emission figures would be fully visible.

I looked at Urban’s S1+S2/FTE employee vs. % electricity covered by RECI/LCECI. See Figure 18. As the PPA was a recent, but significant development, I decided that I would calculate a further emission intensity for y/e 2016. No pattern is discernible. The emissions intensity trends upwards over the period shown¹⁵⁸, although the percentage of consumed electricity covered by RECI/LCECI falls in terms of what is reported to CDP. In the period when the PPA commenced, emission intensity fell. There is no evidence to suggest that displacement has occurred, although I cannot assess from the evidence whether emission intensity would have fallen more in the absence of the PPA. However, Urban’s targets have mostly been framed in terms of business miles travelled and energy consumed, so it was against energy use/FTE employee that I considered the effect of RECI/LCECI purchase. I used FTE employee as a denominator for the reasons given in section 14.2.14. I additionally considered electricity use/FTE employee as electricity is a dominant source of emissions (see section 6.3.4).

¹⁵⁴ 2007 corporate responsibility report p.15.

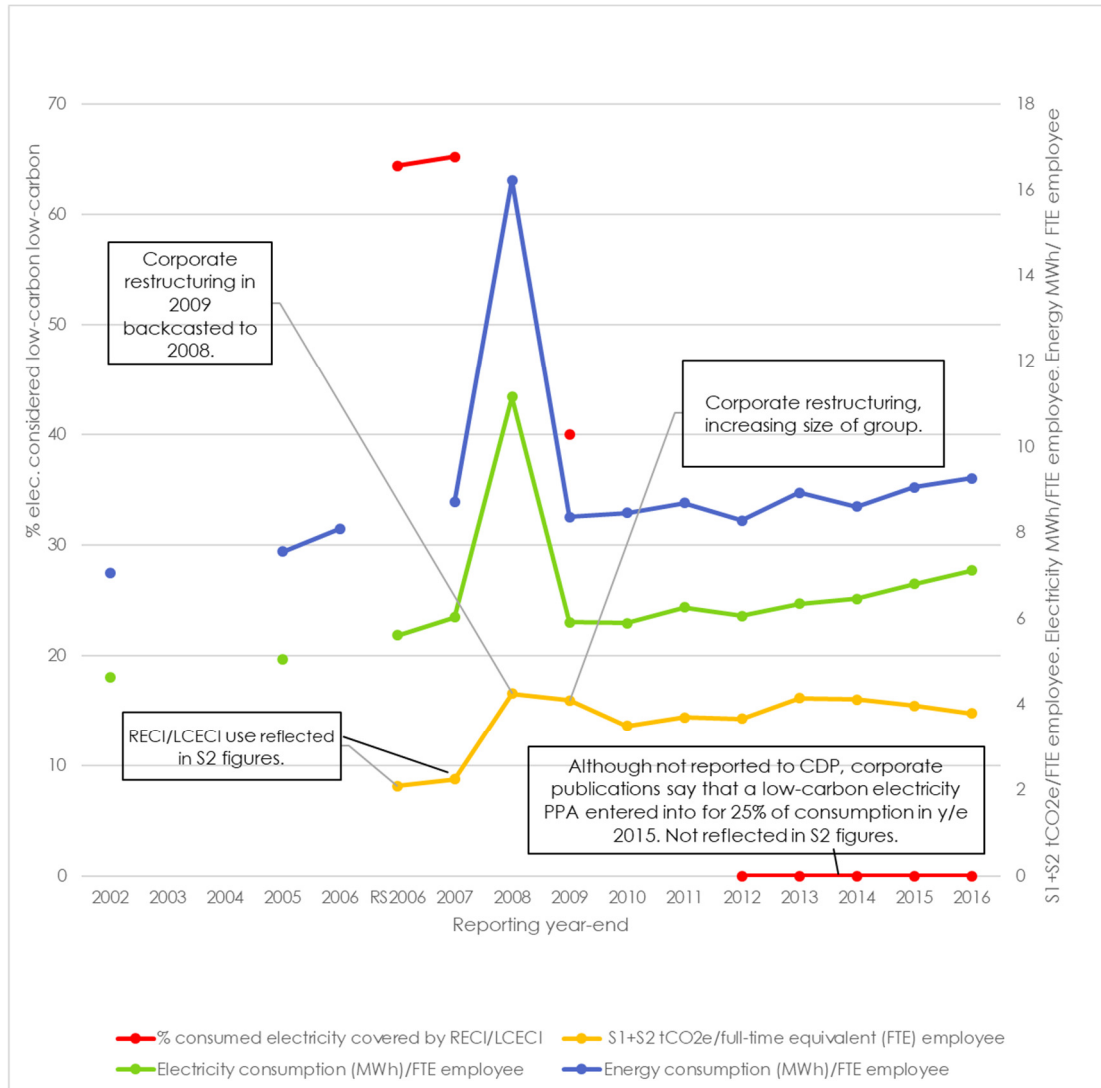
¹⁵⁵ CDP2008 2(b)(y)(i), CDP2010 Further Information section to 14.1.

¹⁵⁶ CDP2016 and CDP2017 (11.4).

¹⁵⁷ 2016 annual report p.25, 2017 environmental publication p.2.

¹⁵⁸ Corporate restructuring in y/e 2009 increased Urban’s emissions. To enable year-on-year comparison, Urban estimated what would have been the effect on emission if the restructuring had taken place in y/e 2008 and reported that figure to CDP2009 (Further information to question 9). However, the FTE employee figure for y/e 2008 had not had the same treatment and represents the firm as it was in y/e 2008. Therefore, I have used the y/e 2009 FTE employee figure as I assess it will result in a more representative emission intensity figure for y/e 2008.

Figure 18 Urban's emissions and electricity/energy consumption intensities and % electricity covered by RECI/LCECI



Sources: see section 14.2.5. Offset use is not reflected in the emission figures. This figure is reproduced in the accompanying A3 portfolio.

Looking at the bank's electricity and energy intensities, the most noticeable feature is the spike in intensity in y/e 2008 when it underwent corporate restructuring. It seems likely that the y/e 2008 electricity and energy consumption data was back-cast to reflect the corporate re-structuring while the FTE employee number was not. Indeed, if the y/e 2008 FTE employee number is replaced by the y/e 2009 figure, the intensity becomes 8.902 MWh/FTE employee for electricity intensity and 6.118 MWh/FTE employee for energy intensity, an increase but not so steep. The change in intensities is so dramatic that this explanation is very likely. In terms of a relationship with the percentage of consumed electricity covered by RECI/LCECI¹⁵⁹, none is discernible.

Turning to the graphs comparing the electricity and energy intensities of all the firms in my bank group (Figure 9 and Figure 10), prior to y/e 2009 Urban's electricity consumption/FTE employee was low among the group of banks, a position that continued after y/e 2009 until y/e 2014, although its electricity intensity was increasing. This is not due to the completeness of Urban's electricity data collection more closely matching the completeness of the count of employees over time. Urban said it no longer has any excluded sources after 2013 (see Table 35). Yet intensity continued to increase year-on-year after this date to converge with other banks.

The energy/FTE employee graph has similarities to the electricity/FTE employee graph. Overall the trendline for Urban shows a slight increase, although - other than the figure for y/e 2008 - Urban's energy intensity figures have been notably low.

To summarise, given the steady increase in both electricity and energy intensities irrespective of external reporting of RECI and LCECI, there is no evidence that RECI and LCECI use displaced electricity/energy efficiency/saving measures, although it is not possible for me to assess what would have happened in the absence of their use. Emissions intensity does not show quite the same steady increase, but again there does not appear to be any connection with RECI/LCECI use. In CDP2017 Urban said it was setting a science-based target using a market-based scope 2 approach, which suggests that Urban will be reflecting its current RECI use in its emission figures, but it is too early to discern any effect.

In this case, I judge that RECI and LCECI use enabled the setting of a carbon neutrality target and that RECI and LCECI use did not displace offset use. They pre-dated it and reduced the GHG emissions that would need to be offset, thereby reducing costs. Once Urban stopped reflecting RECI and LCECI in its emission figures, it ceased to buy offsets. The results are discussed further in chapter 12.

¹⁵⁹ I did not calculate the percentage of consumed energy – as opposed to consumed electricity - covered by RECI/LCECI as I do not have consumed electricity in MWh for y/e 2009. Given the similarities, between the electricity and energy intensity data-series, it did not seem likely to offer extra insight anyway.

6.4 UMBRELLA

6.4.1 DATA SOURCES

Data sources for this bank were corporate reports and CDP datasets that were all public except for CDP4 (2006) and CDP2017. I interviewed two managers: a sustainability manager (Interviewee 1) and a manager with responsibility for the firm's operational environmental footprint, as opposed to the environmental impact of its lending activities (Interviewee 2). The interviews were both calls on 1 September 2016 and 28 October 2016 respectively.

6.4.2 CASE DESCRIPTION

Umbrella is a UK-incorporated financial institution. It is a group of firms with significant overseas operations. It offers a wide range of financial services including retail. It has offered lending products for energy efficiency schemes as well as renewable energy installations.¹⁶⁰

6.4.3 OVERVIEW OF DATA RELEVANT TO RQ1

Umbrella was buying RECI in 2003 and probably before this. Whether the Climate Change Levy on electricity and fossil fuels with the exemption for electricity from renewable generation was an incentive for this is not known. In its 2005 sustainability report the bank said that it saw its use of RECI as supporting the development of renewable electricity.

Renewable electricity and energy efficiency were found to be popular with stakeholders (CDP2007 1(a)(ii)). In 2007 a massive £55 million investment programme in energy efficiency/saving was launched. However, Interviewee 2 said around 2008 the firm was attracting attention for not setting environmental targets. The firm decided to rectify this and employed Interviewee 2 and another person to implement targets. Interviewee 2 described a personal commitment to addressing environmental issues. The two employees wanted to move the firm's approach from compliance to proactivity. However, coincident with this was the onset of the global financial crisis. The £55m allocation evaporated in the heat of the financial crisis (Interviewee 2).

The financial sector's reputation had been eroded by the crisis, but in its 2009 sustainability report the firm saw work on sustainability as a way of repairing the damage. However, by the 2014 sustainability report,

¹⁶⁰ CDP2010-2015 introduction, CDP2013 2.2a, Interviewee 1.

environmental issues seem to have slipped down the list of stakeholders' priorities. It was listed as key issue by only the NGOs and civil society. It was not even among the list of top issues raised by employees whose morale and loyalty it had been expected would be improved by the firm's environmental activity.

From 2013 onwards, there was an additional motivation; the Interviewee 2 said serious consideration was given to energy efficiency/saving as energy costs became a significant overhead. Furthermore, the firm cited the effect of many climate change- and/or energy-related regulations, focussing on the CRC Energy Efficiency Scheme which increased energy costs and was cited as a significant driver of energy efficiency investment. When the removal of the Climate Change Levy exemption for renewably generated electricity was announced, the increase in cost was seen as inconsequential and continuing with the purchase of RECI was seen as the moral course of action.

The Interviewee 1 said the firm had moved beyond maintaining its social license to operate, which I understand as legitimacy (Suchman 1995), through CSR to differentiating its approach to business through the goal of enduring value creation for core stakeholders. However, re-building trust and credibility in the firm was still needed. I see this as the bank re-establishing legitimacy.

Therefore, there has been a range of motivations for GHG mitigation. Cost-cutting has done most to focus attention on energy efficiency/saving, but the personal motivations of employees, organisational values, the desire for a good reputation, legitimacy and to be seen as an attractive employer have all been an influence.

Table 14 Summary of factors affecting Umbrella's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors			
GHG mitigating actions in general	<u>Stakeholders</u> Stakeholders, particularly employees, motivated the firm's focus on climate change, although largely without specifying actions.	<u>Reputation and legitimacy</u> The desire to gain the support of employees and public following global financial crisis drove the firm's climate change response, but it was also seeking a reputation for sustainability that differentiates itself from its peers.	<u>Other firms</u> Other firms have been used for benchmarking.	<u>Individuals within firm</u> Have pushed the agenda of environmental management.
LCECI/RECI use	<u>Organisational values</u> Moral course of action to use RECI.			
Energy efficiency/saving	<u>Regulatory context</u> Regulations – principally CRC Energy Efficiency regulation - drove energy efficiency investment.		<u>Available finance and cost-saving</u> Available finances have had a significant effect on its energy efficiency/saving plans with the global financial crisis ending major investment but need to cut costs as a result of crash has been an ongoing driver.	
Self-generation of electricity	Not discussed in interview or encountered in documentary evidence.			
Refrigerant emissions	Assumed to be insignificant.			
Offset use	<u>Organisational values</u> Offset use was going to happen but does not appear to have occurred.			

6.4.4 EMISSIONS OVERVIEW

From y/e 2006-2015, scope 2 emissions have been reported as an order of magnitude larger than scope 1 except for y/e 2008¹⁶¹. Umbrella said its 2015 scope 1 emission figures included emissions from fluorinated gas loss and fuel consumption in its premises and vehicles¹⁶². Scope 2 emissions were from electricity, district heating and district cooling in Umbrella's premises.

6.4.4.1 Targets

In this section I review the scope of emission reduction targets to understand the role that RECI use may play in meeting targets and whether this may influence efforts to reduce emissions in scope 1 and scope 3. Interviewee 2 explained that Umbrella's first targets were set in about 2009 and were achieved but did not generate much interest internally and *"They weren't embedded in what we do. They were standalone"*. (Interviewee 2). Subsequently there was a target to reduce absolute emissions (scope of target is not explicit but appears to relate to S1+S2) by 20% from a 2007 base year by 2011 which is shown in Figure 19 as Absolute Target 1a¹⁶³. Scope 2 approach is not known. This target has been presented differently in CDP2011 (3.1a) and is shown as Absolute Target 1b¹⁶⁴. Interviewee 2 said the absolute target was met. In the following paragraph, I look at other targets that have been set by Umbrella to decide whether RECI use might displace Scope 3 emission reduction activities, which would necessitate that I included Scope 3 emissions in my analysis.

Umbrella went on to set S1+S2+S3 targets for different countries (CDP2010) as well as a CDP2013 target (3.1a) to reduce energy use and associated emissions, which was met but is not shown in Figure 19 due to uncertainty over its specification. In CDP2016 (CC3.1a) new absolute targets were listed. The first was for S1+location-based S2 and the second for S3 business travel. The S1+S2 target is shown in Figure 19 as Absolute Target 3. Scope 3 data has not been added to the emission graph as it seems unlikely that

¹⁶¹ This assessment is based on the data used for Figure 19, the sources for which are given in section 14.2.6.

¹⁶² 2015 sustainability report, p.36.

¹⁶³ CDP5 (2007) 3(a).

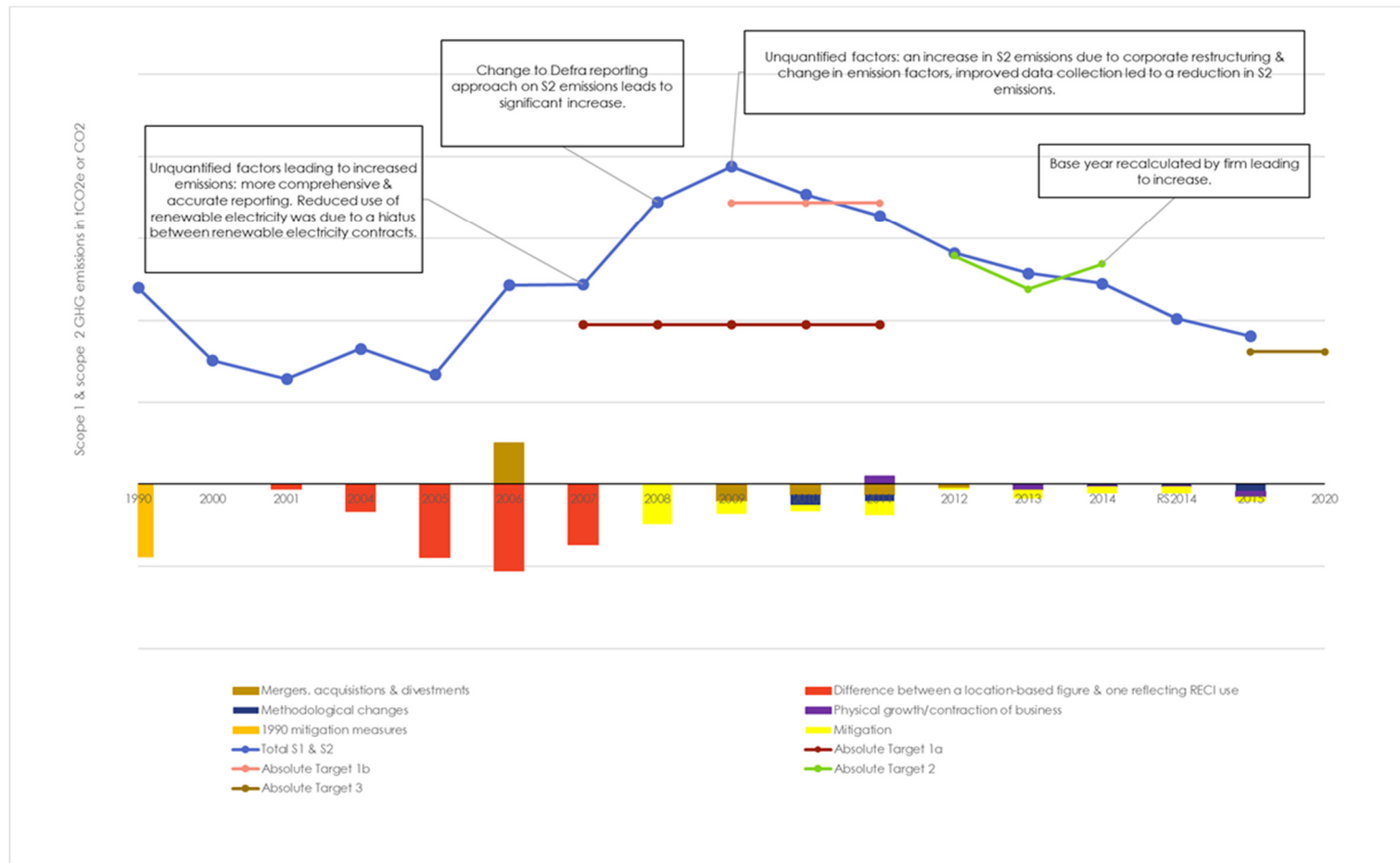
¹⁶⁴ Umbrella explained in CDP2011 3.1a "This activity has been categorised as an absolute target because it relates to a defined programme of savings, however [Umbrella] have not committed to an absolute emissions reduction overall as the Group does not think that this will best represent our approach towards carbon management. During this period as [Umbrella] implements changes to its strategic approach and business divestments, the carbon footprint will change accordingly (likely decreasing) and this may mask the impact of environmental reduction initiatives."

emissions reductions due to RECI purchase in scope 2 would displace activity on scope 3 when it has its own target. Overall, it would seem most appropriate to consider Umbrella's RECI use with respect to scope 1 and scope 2 emission sources only.

In CDP2016 (3.1) Umbrella said it expected to set a science-based target¹⁶⁵ in the next two years.

¹⁶⁵ See footnote 50.

Figure 19 Umbrella's scope 1 and scope 2 emissions



Sources: see section 14.2.6. This figure is reproduced in the accompanying A3 portfolio.

6.4.5 ACTIVITIES RELATED TO GHG MITIGATION

Umbrella reported significant early emission reductions. It began energy reduction initiatives in 1988 with no-/low-cost measures saving £1 million p.a.¹⁶⁶. By CDP1 in 2003 the firm said that it had reduced its GHG missions by 40% from a 1990 base year.

The earliest date found of RECI purchase was in 2003 when RECI was applied to 14% of its total electricity consumption¹⁶⁷. By 2007 the percentage of Irish and UK electricity consumption covered by RECI was 100% and continued to be reported at or close to 100% until y/e 2015¹⁶⁸. Across the global estate, the percentage was almost 50% (2007 sustainability report p.25). Although not labelled as such, I have assumed the RECI and consumption data that I have used to calculate RECI percentages for y/e 2009-2014 were global figures. These range from 57-66%¹⁶⁹.

CDP2009 specified that LECs were bought via the firm's electricity supplier for consumption in the UK for y/e 2008 and for the Republic of Ireland too while Renewable Energy Certificates (RECs) were bought for North American consumption¹⁷⁰. A product that gave a supplier-specific emission factor (although not backed by contractual instruments) was bought in y/e 2012 and 2013¹⁷¹. Umbrella did not report that it was using RECI for y/e 2015 as it was not backed by "*good quality instruments*"¹⁷². Interviewee 2 said the supplier was going to rectify this and Umbrella was going to continue to buy renewable electricity.

As already discussed, there had been a £55 million budget which shrank during the global financial crisis. However, subsequently mitigation projects were undertaken. The 2010 sustainability report (p.37) lists energy-reduction measures, high-efficiency data centres, divestment of properties. The 2014 sustainability report (p.42) also reports that energy efficiency measures were undertaken.

Offsets were going to be used (CDP 2007 1(b)(iv)). However, this does not appear to have happened or at least this was not publicly recorded. No discussion of setting a carbon neutral goal was found.

¹⁶⁶ CDP3 (2005) risks and opportunities question.

¹⁶⁷ CDP4 (2006) emissions reduction strategy question.

¹⁶⁸ 2007 sustainability report p.25, CDP2011 11.2, CDP2012 11.2a, CDP2015 11.2a.

¹⁶⁹ 2010 sustainability report p.37, 2011 sustainability report p.37-38, 2012 sustainability report p.37. I calculated figures using CDP2014 11.2 and 11.4 and CDP2015 11.2 and 11.4.

¹⁷⁰ CDP2009 12.1, CDP2011 11.2a, CDP2012 11.2a, CDP2015 11.2a, Interviewee 2.

¹⁷¹ CDP 2013 11.2, CDP2014 11.2.

¹⁷² CDP2016 CC11.4.

6.4.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

(RQ1)

6.4.6.1 Individuals in firm

Interviewee 2 and a colleague were recruited to implement environmental targets. They “...set off trying to change the emphasis to ‘Let’s be proactive’. Let’s do right thing rather than ‘Let’s be legal’.” (Interviewee 2). Interviewee 2 had a strong personal interest in advancing environmental protection activities. The firm had not reflected its RECI use in its scope 2 figures following Defra changing its reporting guidance (Defra 2008). Then the GHG protocol’s scope 2 guidance was published (Sotos 2015a) and it stopped reporting to CDP that it was buying RECI in MWh terms. Interviewee 2 said in 2016 it should be in position to present location- and market-based figures but its plan at that time was not change the way its location-based current target was calculated, although this might be reviewed. “I am very keen on us not looking like we are manipulating the figures,” said Interviewee 2.

Although cost was the primary driver at the time of interview (2016), the Interviewee 2 said: “It’s not the only reason. It’s not something we should shout about too much. There are a lot of people – and I learnt this years ago - who also believe in what we do [on environmental protection].” At board level, there was also support from a female director with a particular interest in reducing operational emissions.

In summary, individuals within the firm with a personal interest in environmental protection pushed the agenda of environmental management in Umbrella.

6.4.6.2 International experience

The bank has considerable international experience with operations in Europe, the Americas and Asia and a significant overseas customer base (CDP 2010-2015 introduction). The firm’s international experience did not have a discernible influence on its GHG mitigation.

No effect.

6.4.6.3 Available finance and cost saving

In the early 2000s, the firm said its energy costs were not significant compared with its operating costs, income and market capitalisation¹⁷³. However, by its 2005 corporate responsibility report (p.27) the firm

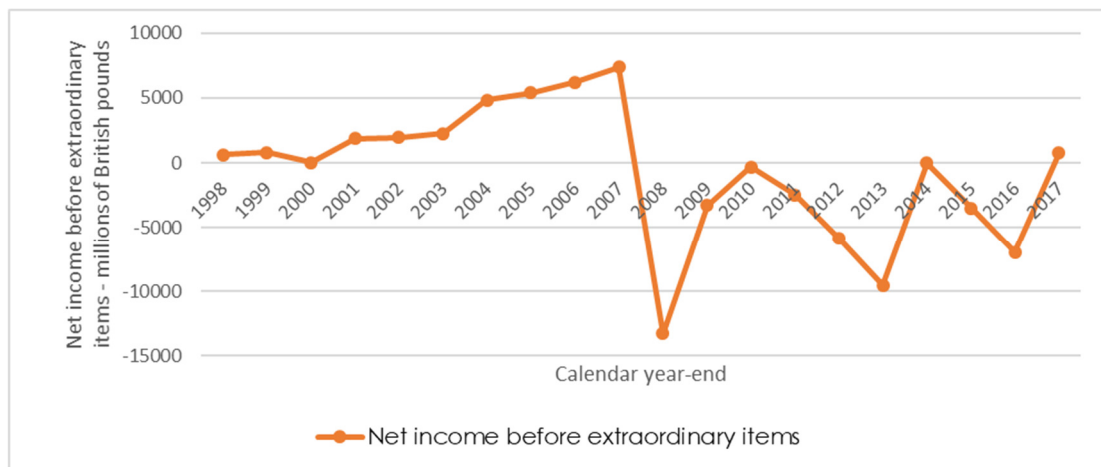
¹⁷³ CDP3 (2005) and CDP4 (2004) energy costs question.

said there was a clear financial case to reduce resource use. Two years later, it foresaw regulatory changes that would increase energy costs through fiscal measures, although this was not a major risk as energy costs were still small. Energy costs represented 0.58% of total operating costs in y/e 2007¹⁷⁴.

*“With regards to our supply chain, energy and travel costs are most likely to be affected by regulatory and fiscal changes in the near future. To minimise risk to our business model, we are investing heavily in energy efficiency and telecommunications equipment (video-conferencing, online presentation tools etc-...) ... As energy and travel costs make up a small proportion of our cost base... we believe that these measures are sufficient to mitigate any significant impact on our business at this stage.”*¹⁷⁵

The firm launched a significant energy efficiency/saving programme of £55 million to be spent from January 2007 to December 2009¹⁷⁶, but the global financial crisis meant the programme fizzled out, although it did meet its absolute emission reduction target for the period (Interviewee 2). To give a sense of scale to that £55 million budget, subsequent dedicated budgets to reduce energy consumption were £3 million in CDP2015 and CDP2016 (CC3.3c). I assume this was per year. The impact of global financial crisis severely limited Umbrella’s available finance as can be seen from the graph of net income before extraordinary items.

Figure 20 Umbrella’s available finances



Source: Thomson One Reuters Fundamentals accessed 13 April 2018

¹⁷⁴ CDP2008 2(h)(ii).

¹⁷⁵ CDP2007 1(a)(ii).

¹⁷⁶ CDP2009 23.11.

This led to an emphasis on reducing operational costs and hence resource use. In CDP2010 (9.1) the firm said reducing operating costs was one of three key priorities for the firm.

“The objective of reducing operational costs is driving much of the work we are doing to minimise energy use and travel and the resultant greenhouse gas emissions. Our CO₂ emissions reduction target of 65,000 tonnes between 2009 and 2011 is largely to be achieved through energy and travel reduction measures that, although occasionally requiring up-front investment, will save us operating costs in the long-run. ... Therefore, the business strategy of reducing operating costs has helped to drive the development and approval of emission reduction targets and associated behaviours.” CDP2010 (9.1)

The Interviewee 2 said from 2013 onwards energy cost was taken much more seriously; it was one of the firm’s biggest overheads, although energy costs were less than or equal to 5% in CDP2012 (12.1) and CDP2016 (CC11.1). Nevertheless, the impact of the global financial crisis had made the bank very cost-conscious. *“We are forever being given cost reductions. We have cost reduction targets.”* (Interviewee 2)

In summary, available finances have had a significant effect on its energy efficiency/saving plans with the global financial crisis cutting short a major programme. However, the need to cut costs as a result of the financial crash has been an ongoing driver of energy efficiency/saving.

6.4.6.4 Non-financial resources and capabilities and technical issues

In the early 2000s Umbrella partnered with outside organisations to gain technical input on energy efficiency¹⁷⁷. The firm had found that giving energy reduction targets to employees outside of the energy team had increased the number of ideas for mitigation actions. It had nonetheless begun to run out of its own ideas for reducing emissions. However, it had found a way of increasing its exposure to new possibilities through a novel form of external partnerships. (Interviewee 2)

No evidence was found that availability of non-financial resources and capabilities or technical issues was a factor in the firm’s choice of GHG mitigating actions.

6.4.6.5 Stakeholders

The Interviewee 1 did not reject the description of CSR from Crane, Matten and Spence (2013). However, Interviewee 1 explained that Umbrella had moved on from CSR - whose goal it saw was maintaining its social license to operate - to sustainability. Sustainability had stakeholders at its heart and was described

¹⁷⁷ CDP3 (2005) and CDP4 (2006) product development questions.

as what needed to be done to ensure the firm was an enduring business that created long-term value of all types for its core stakeholders (Interviewee 1).

In 2008 the firm defined its stakeholders as “...groups and individuals who have an interest in, and may be affected by, our business activities”¹⁷⁸. This was elaborated to “...those who have a direct interest in our business and those who have an interest in how we manage our business because of the wider impact of our actions: employees, customers, shareholders, investors, governments, regulators, consumer groups, non-governmental organisations (NGOs) and the media” (2010 sustainability report p.5).

In the interview with the Interviewee 1, I said that corporate publications gave me the impression that the bank’s direction on sustainability was driven by stakeholders, rather than being internally-originated, and was incorporated into the business strategy to achieve business success. Interviewee 1 replied “Yes, I mean so our stakeholders are defined as our shareholders as well as broader stakeholders which includes suppliers, employees, civil society, the third sector, you know, investors, etc., so using that definition I would say yes it’s very much about trying to listen to what the expectations are and it is trying to address them.”

The firm conducted an annual stakeholder review to monitor reputational priorities (CDP2007 (1(a)(iii))) By 2010 there were monthly public opinion surveys in addition to employee and customer surveys, analyses of regulators and investors’ opinions, and benchmarking against peers. The inputs were used to guide the firm day-to-day to ensure it was meeting stakeholder expectations. (2010 sustainability report p.8).

There was evidence of declining stakeholder interest in climate change. The 2006 corporate responsibility report (p.7) carried a list of issues that reflected their importance to stakeholder groups combined with the importance of those groups to the firm. “Direct” stakeholders (investors, customers, employees) given more priority than “indirect” – government/regulators, media, and NGOs. Environmental issues were sixth on the list of priorities. The firm focussed on climate change in its discussion of how it addressed environmental issues. The 2008 sustainability report broke out concerns by stakeholder group with NGOs, suppliers and the wider banking industry reported as listing climate change/the environment as a concern (p.7-8). By the 2014 sustainability report, only NGOs and civil society were prioritising environmental issues including the firm’s lending policy on fossil fuels. Operational GHG emissions were not specified (p.13). However, there does not seem to have been a diminution of climate change response; the Interviewee 2 said “We are ahead of our competitors. We were lagging. We are now leading.”

¹⁷⁸ 2008 sustainability report p.7-8.

Employees have been a recurring consideration in the firm's climate change strategy. Employee engagement was a factor that led to incorporation of climate change into long-term strategy (CDP2006 2.2a). Meeting environmental challenges was found to be a priority for employees in an annual stakeholder review in CDP2007 and CDP2008¹⁷⁹ although in CDP2008 this was narrowed to a focus on the firm's lending activities. Employee interest led to the creation of a package of environmental activities and opportunities that was intended to be *"...an employee proposition that will significantly increase levels of staff engagement and loyalty and will help to attract and retain the best people, as expectations of employee environmental propositions continue to rise"*¹⁸⁰. In CDP2009 (6.1) the bank said: *"Engaging employees on environmental issues forms a key part of our wider sustainability objectives as well as our efforts to improve employee morale and loyalty."* However, despite the employee-related advantages, Interviewee 2 said that the firm's focus on energy efficiency was not serious until 2013 onwards when the cost of energy became a significant outgoing.

The influence of the NGO partnership, the GHG Protocol partnership, was implicit. Its revised guidance on scope 2 reporting (Sotos 2015a) specified *"quality"* criteria to be met in order to reflect RECI in emissions figures. Umbrella stopped reporting RECI use for y/e 2015. The firm said *"Green electricity is purchased, however as it is not backed by good quality instruments, we have taken the decision not to account for this energy as low carbon in our reporting"* (CDP2016 CC11.4). I infer that the RECI did not meet the GHG Protocol's scope 2 quality criteria. The firm's electricity supplier was going to rectify this in 2016 (Interviewee 2). The firm will present location- and market-based figures in future but will not change the way its current target is calculated. *"I am very keen on us not looking like we are manipulating the figures,"* said Interviewee 2.

Another NGO may have been influential. CDP had begun to incentivise science-based targets via its scoring system (CDP2016a and b). In its CDP2016 response (3.1) Umbrella said it expected to set a science-based target in the next two years, although the firm may have taken this step independently in reaction to the 2015 Paris UNFCCC COP meeting.

In terms of other stakeholders pushing for a specific activity for mitigating emissions from the firm's operations, in CDP2007 1(a)(iii) Umbrella listed environmental initiatives popular with stakeholders. This included use of renewable electricity in operations and premises achieving certified high sustainability standards. Offsets were going to be used *"...as an effective climate change awareness raising measure"*

¹⁷⁹ Question number 1(a)(iii) for both.

¹⁸⁰ CDP2007 1(b) and CDP2008 1(b)(iii).

for employees, customers and other stakeholders” (CDP2007 1(b)(iv)), but this does not appear to have happened or at least this was not publicly recorded.

In summary, stakeholders, particularly employees, motivated the firm’s focus on climate change, although without asking for specific actions. The GHG Protocol’s revised scope 2 guidance appeared to affect Umbrella’s reporting of RECI.

6.4.6.6 Other firms

Umbrella looked to other banks to benchmark its GHG emissions, seeking to set a target in the top 25% compared to its peers in the financial service industry (CDP2009 23.5). The Interviewee 2 said the firm monitored competitors on their operational GHG emissions; *“We are ahead of our competitors. We were lagging. We are now leading.”*

In summary, other firms have been used to assess Umbrella’s activities to ensure it is setting comparatively ambitious targets.

6.4.6.7 Regulatory and policy context

This section looks first at the regulatory and policy context most closely related to RECI before considering the wider regulatory and policy environment.

In 2001 the Climate Change Levy was imposed on the cost of electricity and fossil fuels with an exemption from the main rate for electricity generated renewably (GOV.UK 2017, HM Revenue and Customs 2015a). The firm bought RECI from 2003 and probably before that¹⁸¹. The first specification of the contractual instrument purchased was for y/e 2008 when it was stated that Levy Exemption Certificates (LECs) were being bought. Interviewee 2 joined Umbrella after the firm started to use RECI but said the CCL did not have a role in this decision. Umbrella said its use of RECI supported the future development of renewable electricity (2005 corporate responsibility report p.28). There were subsequent references to LEC use.¹⁸²

Initially the firm reflected this high RECI use in its emission figures (CDP1 emissions question, CDP2008 2(a)(iii)). However, it stopped for y/e 2008 due to the change in Defra guidance on how to account for RECI use (Defra 2008), although it did still report purchases measured in MWh in response to CDP

¹⁸¹ Umbrella had a group energy strategy for 2000-2004 which had the target of using a minimum of 5% renewable electricity. In 2003 it was 14%.

¹⁸² CDP2009 12.1, CDP2011 11.2a, CDP2012 11.2a, CDP2015 11.2a, Interviewee 2.

questions on electricity consumption (CDP2009 12.1)¹⁸³. Even this was not reported in y/e 2015 when the firm said: “*Green electricity is purchased, however as it is not backed by good quality instruments, we have taken the decision not to account for this energy as low carbon in our reporting*” (CDP2016 CC11.4). I assume this is linked to the quality criteria in the GHG Protocol’s scope 2 guidance published in 2015 (Sotos 2015a).

When it was announced that LECs would be discontinued (HM Revenue and Customs 2015a), the firm decided that it would nevertheless continue with its renewable electricity support. The Interviewee 2 said this was “*the right thing to do*” and the cost implications were minimal.

Turning to the wider regulatory and policy context, in CDP4 the firm said regulations - Vehicle Excise Duty, company car tax, planning and building regulations - had reinforced existing business motivational drivers, but did not specify further (CDP4, no question number).

The CRC Energy Efficiency scheme, which was operational from 2010, was identified as presenting risks and opportunities, both financially and reputationally as it included a public energy performance league table¹⁸⁴. Umbrella performed well in the table¹⁸⁵. Nevertheless, the scheme was initially estimated to cost the firm £5 million a year¹⁸⁶, falling to £4.2 million a year¹⁸⁷. The firm invested about £11.5 million in measures to reduce energy use and emission reductions (CDP2011-2013 5.1). Changes to the CRC Energy Efficiency scheme led to an estimated extra £1 million-£2 million p.a. in costs for Umbrella. The firm invested £2 million in energy efficiency measures designed in part to reduce its CRC tax burden. (CDP2014-2015 CC5.1a).

Compliance with the Article 8 of the EU Energy Efficiency Directive (2012/27/EU)¹⁸⁸ also drove investment in mitigating activities¹⁸⁹. Other regulations that have had “*a significant influence*” on both the type of

¹⁸³ Interviewee 2 said she did not think the change in Defra guidance had any effect as Umbrella was not reflecting RECI use in its emission factors anyway. However, I have attached more weight to the contemporaneous record of the answer to CDP2009 12.1 which implies the Defra guidance did lead to the change.

¹⁸⁴ CDP 2010-2013 5.1a/6.1a, Norton Rose Fulbright (2010).

¹⁸⁵ 2011 sustainability report p.37.

¹⁸⁶ CDP2011 5.1.

¹⁸⁷ CDP2012 5.1, CDP2013 5.1.

¹⁸⁸ European Parliament and European Council 2012

¹⁸⁹ CDP2014-CDP2016 CC3.3c, (GOV.UK 2018)

services Umbrella provided and how it managed its own operations were primarily incentives for installing renewable energy generation (CDP2013 2.2a).

In summary, changes to the Defra guidance on GHG emission reporting and accounting altered the way it reflected RECI purchases in its emission figures. Regulations – principally the CRC Energy Efficiency regulation - drove energy efficiency investment.

6.4.6.8 Organisational values

The Interviewee 2 explained that pre-2008 the firm's attitude to GHG mitigation was a compliance-only approach, but in 2008 the firm became interested in setting environmental targets and this was done the following year; *"They realised that everyone was saying the bank was not setting targets."* Although the environment team was well-staffed and the firm had taken the decision to set targets, Interviewee 2 said she and her colleague recruited to work on environmental targets still had to *"change the mind-set"* within the firm. *"We set off trying to change the emphasis to 'Let's be proactive'. Let's do right thing rather than 'Let's be legal',"* said the Interviewee 2. Umbrella ran programmes to engage employees and change behaviour (Interviewee 2).

A discussion of the moral course of action in relation to sustainability appeared in the 2012 sustainability report in a commentary by the Head of Sustainability (p.30) and in subsequent sustainability reports (2013 p.3, 2014 p.30, 2015 p.26). It also occurred in the interviews with both interviewees. Interviewee 1 described how the bank had a fiduciary responsibility to stakeholders and was seeking to follow a moral compass. Its approach to sustainability, part of the "DNA" of the bank, stemmed from its values of *"...doing the right thing, thinking long-term"*. Asked if there were instances when consideration of a wider group of stakeholders took priority over financial gain, the Interviewee 1 said *"I wouldn't say it takes precedence. It is on par with some of our other priorities. I don't think one necessarily needs to take precedence over the other. ... It is possible to do the right thing and still be a profitable company and that is the approach that we are going for."*

Interviewee 2 said morals motivated the firm's decision to support renewable electricity generation and to continue to do so even after the financial incentive of the Climate Change Levy (CCL) exemption was removed by the UK Government; *"With the cancellation of CCL¹⁹⁰, we have had to make a decision whether to continue to buy green as such, but it did not go to senior board. It was passed because it was*

¹⁹⁰ I think the Interviewee is referring to the end of the exemption from the tax via use of LECs, not the end of the tax itself which continues to exist HM Revenue and Customs (2015a and 2015b).

seen to be the right thing. That was why it was done." Interviewee 2 said that there had not been any benefit to the firm from its support for renewable electricity generation.

Offsets were going to be used; *"We will use carbon offsetting in selected areas of our business as a means of effecting environmental improvements through an efficient market mechanism (maximising carbon mitigation per unit of investment), and as an effective climate change awareness raising measure for employees, customers and other stakeholders"* (CDP 2007 1(b)(iv)). This action is included under organisational values as it shows how a commitment to using market mechanisms for GHG mitigation measures, although offset use does not appear to have happened or at least this was not publicly recorded.

In summary, Umbrella has set itself a moral compass which steers it down the path of sustainability. A specific decision that arose from this occurred after the UK government removed the tax incentive for RECI (the Climate Change Levy exemption) when the bank decided it was morally right for it to carry on using RECI.

6.4.6.9 Reputation and legitimacy

There has been an enduring focus on reputational issues. In CDP2007, Umbrella said annual surveys of stakeholders were conducted to inform the bank of priority issues¹⁹¹. The firm's chief executive said the work the bank was doing on sustainability would help to rebuild the firm's reputation and show a side to the firm that had been overshadowed by the financial crisis (2009 sustainability report p.4). By 2010 there were monthly surveys conducted¹⁹². Interviewee 2 said that when the bank came to set its second set of environmental targets in 2011, it was looking for ways to address the impact of the global financial crisis; *"[Umbrella] was changing. It was looking for a way to gain employee and public support for what we were doing [section unable to hear]. So, the environment went further up the radar though it still wasn't immensely high on the list."* The firm said in CDP2013 (2.2a) that *"Employee engagement and reputational aspects have led to an incorporation of climate change into long term strategy."*

Reputation was not mentioned by name, but the Interviewee 1 did talk about the bank wanting to re-build credibility and trust following the global financial crisis. However, the bank had moved on from CSR which was seen as what needed to be done to maintain its social license to operate to sustainability. *"For us, sustainability is no longer about securing our social licence to operate. It is about how we can use*

¹⁹¹ CDP2007 1(a)(iii)

¹⁹² 2010 sustainability report p.8.

sustainability fundamentally to differentiate our business” said Interviewee 1, adding “We are definitely the next level up. I am not saying we are there yet because there is always scope to improve, but we are definitely passed the stage of Corporate Social Responsibility in my view.”¹⁹³

In summary, the desire to gain the support of employees and the public following the global financial crisis drove the firm’s climate change response, but it was also seeking a reputation for sustainability that differentiates itself from its peers.

6.4.6.10 Summary of findings for RQ1

Table 15 Summary of factors affecting Umbrella’s GHG mitigating activities – by factor

Factor	Finding
Individuals in firm	Individuals with a personal interest in environmental protection pushed the agenda of environmental management in Umbrella.
International experience	No effect.
Available finances and cost-savings	Available finances have had a significant effect on its energy efficiency/saving plans with the global financial crisis cutting short a major programme. However, the need to cut costs as a result of the financial crash has been an ongoing driver of energy efficiency/saving.
Non-financial resources and capabilities and technical issues	No evidence this was a factor.
Stakeholders	Stakeholders, particularly employees, motivated the firm’s focus on climate change, although without asking for specific actions. The GHG Protocol’s scope 2 guidance appeared to affect Umbrella’s reporting of RECI.
Other firms	Other firms have been used to assess Umbrella’s activities to ensure it is setting comparatively ambitious targets.
Regulatory and policy context	Changes to the Defra guidance on GHG emission reporting and accounting altered the way it reflected RECI purchases in its emission figures. Regulations – principally the CRC Energy Efficiency regulation - drove energy efficiency investment.
Organisational values	Bank has set itself a moral compass which steers it down the path of sustainability. A specific decision that arose from this occurred after the UK government removed the tax incentive for RECI (the Climate Change Levy exemption), the bank decided it was morally right for it to carry on using RECI.
Reputation and legitimacy	The desire to gain the support of employees and public following the global financial crisis drove firm’s climate change response, but it was also seeking a reputation for sustainability that differentiates itself from its peers.

¹⁹³ The description of CSR based on Crane, Matten and Spence (2013) was used in this discussion to ensure we were talking about the same concept.

6.4.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

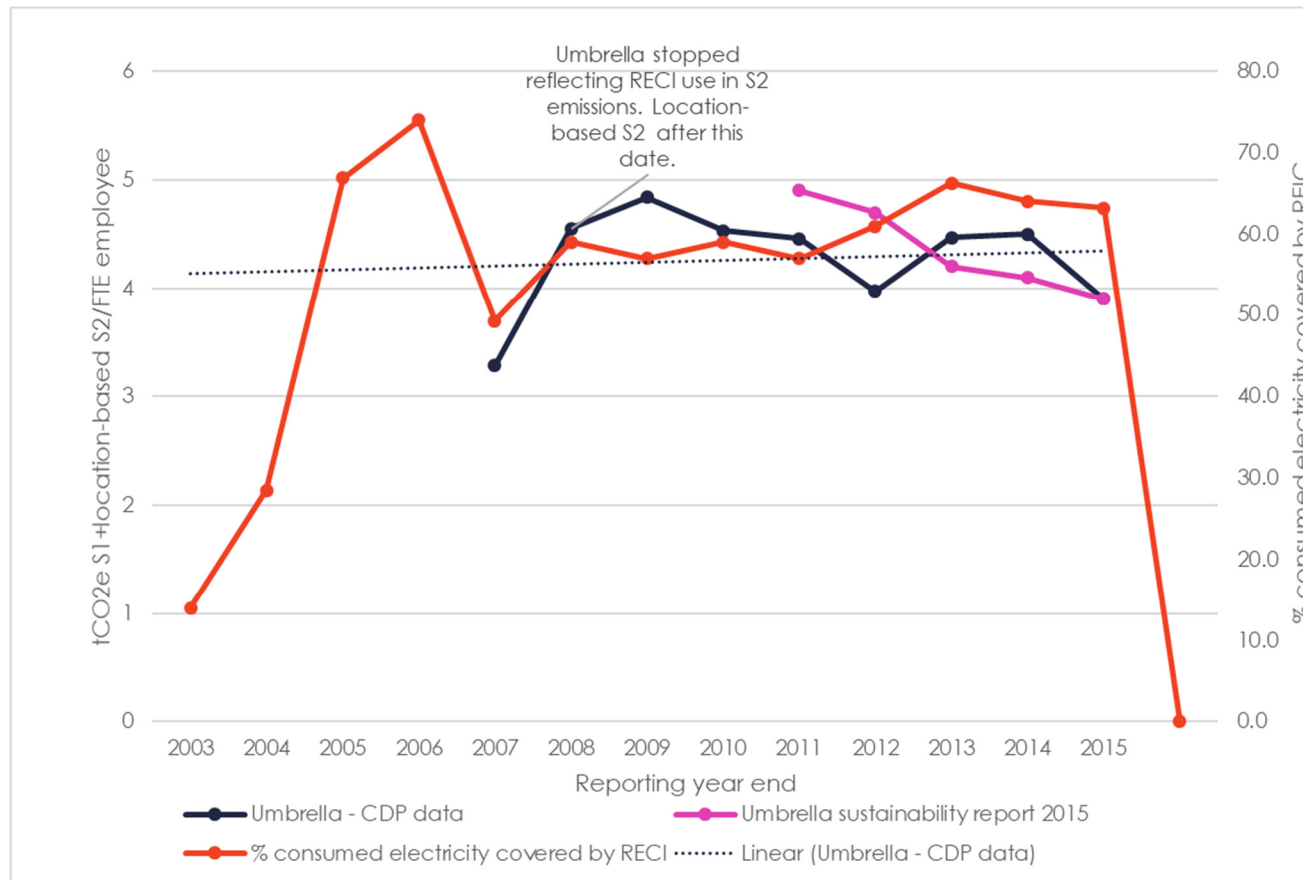
Umbrella bought large quantities of RECI; “*Since 2007, 100% of our electricity use in the UK (and 63% of our worldwide electricity use) has come from renewable sources*” said the bank in the 2014 sustainability report (p.43). It stopped reflecting the purchase in its emission figures in y/e 2008 due to the change in reporting guidance from Defra (CDP2009 12.1) that recommended organisations apply the average emission factor for electricity from the national electricity grid. Interviewee 2 explained that Umbrella had not reflected contractual arrangements in emission figures since then. However, it did still report the use of RECI in terms of MWh used or the percentage coverage of its electricity consumption in answer to CDP’s energy questions and in corporate reports¹⁹⁴.

However, 2015 sustainability report does not mention RECI use, although p.34 does show “sustainable energy” in a diagram about reducing environmental impact of its own operations. In CDP2016 CC11.4, the firm did not specify any RECI use as “*it is not backed by good quality instruments*”. Interviewee 2 said this was going to be addressed by its supplier and the firm planned to report both location- and market-based figures in the future. However, Interviewee 2 said in October 2016 that the plan at that time was not to apply the market-based approach to its current target even though this would produce a significant reduction in reported scope 2.

Turning to the effect of RECI use on other GHG mitigation actions, Umbrella has had a variety of targets. Most relate to S1+S2. Following on from what Interviewee 2 said about having not reflected RECI use in emission figures, I have taken the emission intensity metrics in CDP responses and corporate publications from y/e 2008 as location-based and normalised S1+location-based S2 by FTE employee in Figure 21. I could not discern a pattern that suggested a displacement of focus on other GHG mitigating activities in this graph.

¹⁹⁴ 2010 sustainability report p. 37, 2011 sustainability report p.37-38, CDP2011 11.2, 2012 sustainability report p.35-37, CDP2012 11.2a, 2013 sustainability report p.31, 2014 sustainability report p.43, CDP2014 11.2 and 11.4, CDP2015 11.2 and 11.4.

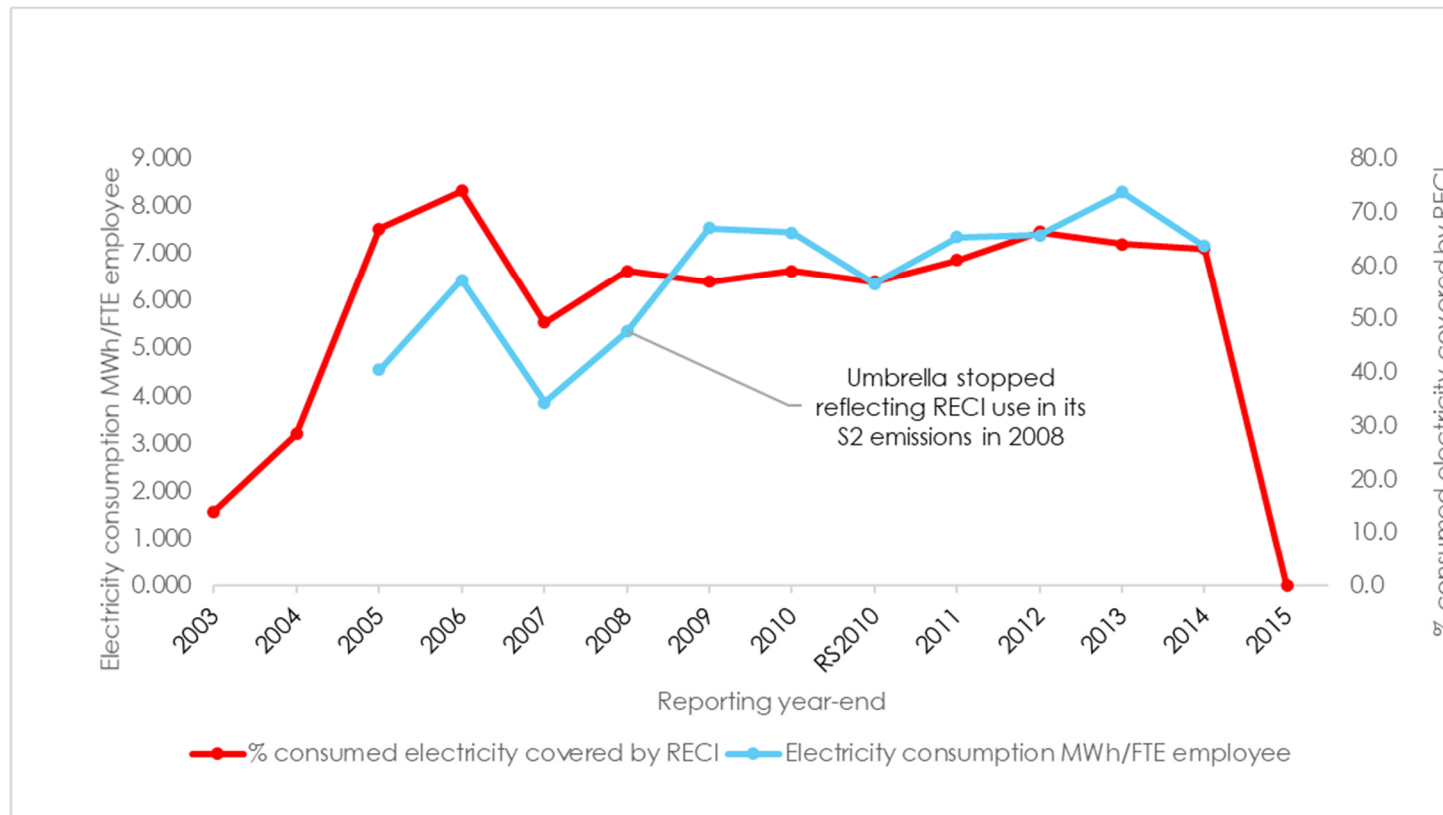
Figure 21 Umbrella's emissions intensity and % consumed electricity covered by RECI



Sources: see section 14.2.6. This graph shows emissions data from two sources (CDP data and Umbrella's 2015 sustainability report). A linear trendline is shown for the CDP data.

I also looked at electricity and energy consumption normalised by FTE employee (see Figure 22 and Figure 23). Note with Umbrella, I was able to plot energy consumption normalised by FTE employee against % RECI in energy consumption. In a number of other studies, the energy intensity has been plotted against % RECI in electricity consumption.

Figure 22 Umbrella's electricity consumption intensity and % consumed electricity covered by RECI

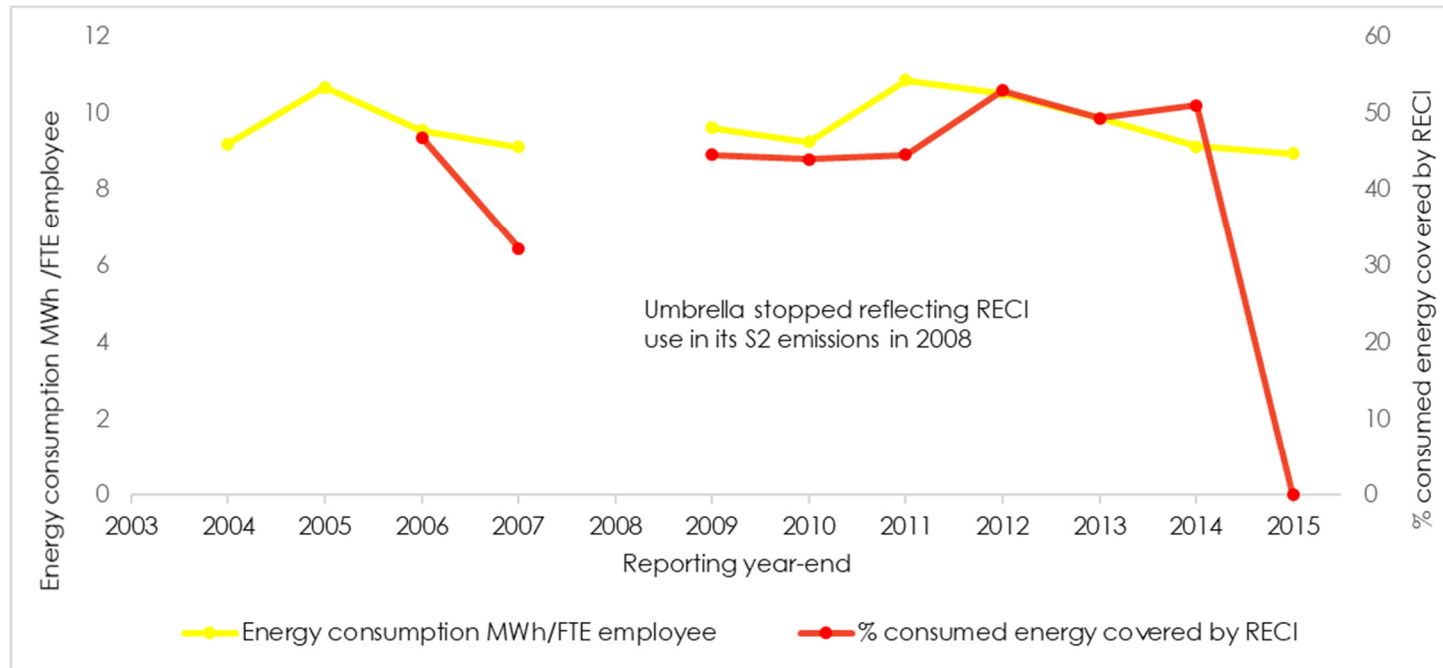


Sources: see section 14.2.6.

Figure 22 does show a mirroring of trends between electricity intensity and the percentage of electricity consumption covered by RECI. However, the peak and dip in electricity intensity y/e 2005-2008 would be difficult to implement in response to the percentage of RECI being bought as electricity efficiency/saving measures have some lead-in time, even those that are focused on behavioural change rather than changes to equipment. I would suggest that RECI use may have been adjusted in response to electricity consumption to report reduced emission figures. After y/e 2008 the bank no longer reflected RECI purchases in its emission figures (CDP2009 12.1). If RECI use had been displacing electricity efficiency/saving by obscuring their benefit in terms of reduced GHG emissions, then I would expect to see a decrease in electricity intensity subsequently. Instead electricity consumption/FTE employee increased, converging with those of the other three banks (see Figure 9). Therefore, I do not see any RECI use impact on electricity efficiency/saving. Similarly, there is no obvious relationship between energy consumption/FTE employee and the RECI percentage in Figure 23. Energy intensity maintained a broadly stable trajectory.

Interviewee 2 was unequivocal that the firm's support for renewable electricity had not impacted on other GHG mitigation activities. Its cost was minimal. The major driver of energy efficiency was cost-saving.

Figure 23 Umbrella's energy consumption intensity and % consumed energy covered by RECI



Sources: see section 14.2.6.

To summarise, a high percentage of Umbrella's electricity consumption was covered by RECI. However, they were not reflected in emission figures from y/e 2008 and so the effect of electricity efficiency/saving on emission figures would have been visible. Interviewee 2 said the extra cost of RECI was negligible. Therefore, from y/e 2008 there does not seem to be a reason why RECI would have displaced other GHG mitigating action nor is there any pattern in the graphs either before or after y/e 2008 that I can explain as a result of RECI use. Overall the evidence does not suggest that RECI use has displaced other GHG mitigating actions.

The results are discussed further in the discussion for RQ2 in chapter 12.

7 THE BUSINESS-TO-BUSINESS (B2B) FINANCIAL INSTITUTIONS CASE STUDIES

Two financial institutions had been grouped on selected characteristics in the three years preceding their first year of purchase of RECI. Initially I thought that the UK case had first reported buying RECI to CDP for y/e 2014¹⁹⁵ and the German case for y/e 2012¹⁹⁶. Based on those dates, they met the similarity criteria of sector, number of employees and the metrics of available financial resource. However, following the interview with the UK case, it emerged that the first year of RECI use was in 2007 via an overseas firm that joined the UK-incorporated firm to become a UK-incorporated group. Further reading of the documentary data showed that in 2008 the group reported that it was using RECI/LCECI¹⁹⁷. The earlier start meant that the two cases were still aligned in terms of sector and net income, but not in terms of employee numbers¹⁹⁸. However, I kept them as cases as at least both firms had comparable visibility in my judgement which Bowen (2000) found to be an aspect of firm size that was linked with environmental management in UK firms.

Due to the nature of their business, only one B2B financial institution case could be found in each country (Germany and the UK). Three years before Geode's first purchase of RECI, Geode was categorised as "Other Diversified Financial Services" in the CDP dataset. Ursa was listed as "Diversified financials – UK and Ireland" in CDP2007¹⁹⁹. In CDP2016 both were listed in the same category of "Specialized finance". I called the group "Business-to-business (B2B) financial institutions" to distinguish them from the banks group which included financial institutions with consumer-facing revenue streams.

¹⁹⁵ CDP2014 C11.2.

¹⁹⁶ CPD2012 3.3b.

¹⁹⁷ CDP2008 2(a)(iii)

¹⁹⁸ Comparing the German and UK firms based on the new date of 2008 meant that the German firm was on mean average more than seven times bigger in terms of employee numbers than the UK firm in the three years preceding first purchase of RECI. I could no longer access the data for cash flow for the firms for the relevant years when I repeated the grouping process.

¹⁹⁹ CDP did not begin to categorise firms until CDP2007.

7.1 URSA

7.1.1 DATA SOURCES

Data sources for this bank were corporate reports and CDP datasets from CDP2007 onwards. I interviewed the Sustainability Manager – referred to as the Interviewee - in person on 22 March 2017, followed by emails (23 March 2017) and a phone call (24 March 2017).

7.1.2 CASE DESCRIPTION

This case is a group that was created in 2007 with the merger of UK-incorporated firm and another firm. Further acquisitions and major investment followed. The most relevant of these occurred in 2011 when an acquisition was made of a firm with well-known sustainability-orientated products²⁰⁰. CDP has had this case listed as a UK-incorporated firm during the period it has publicly responded to CDP2010-2016.

The group supports investment in “*clean*” energy²⁰¹ and the integration of CSR considerations into investment decisions. It has also been involved in supporting climate change-related investment more broadly²⁰².

7.1.3 OVERVIEW OF DATA RELEVANT TO RQ1

Cost savings were said to be the primary driver of energy efficiency/saving reduction measures, the main type of mitigation measure within the group. Reputation was a significant secondary consideration. The group said it wanted to meet stakeholder expectations. The most important stakeholders were investors and client companies. Expected reputational benefits may lead to projects going ahead that would not otherwise have done so based on a financial evaluation. Sustainability ratings were an important factor in that reputation and gave a strong steer to the GHG mitigation choices the group makes. These non-state actors gave greater direction than the UK state, although the UN FCCC’s COP21 - in which the UK government participated - gave an opportunity to raise the issue of climate change with the group’s senior management. There was evidence that employees below board level were nudging the group towards action on climate change. UK laws were a driver of GHG mitigation action.

²⁰⁰ Group website accessed 2 July 2017.

²⁰¹ CDP2015 CC6.1a, CC6.1c.

²⁰² CDP2015 CC2.4a.

Table 16 Summary of factors affecting Ursa's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors				
GHG mitigating actions in general	<u>Stakeholders</u> Investors have influenced Ursa's climate change approach with Ursa's performance judged using sustainability ratings & stock market indices. Customer interest in working with suppliers that were proactive on climate change was a further motivation. Employee interest was a driver, albeit not significant.	<u>Reputation & legitimacy</u> Reputation was an important consideration. Sustainability ratings & stock market indices were seen as factors in determining that reputation & were therefore important influences, even to the extent of steering Ursa towards particular mitigation actions. Ursa had to encourage sustainable & responsible development of its own operations & its client firms to maintain its legitimacy.	<u>Other firms</u> Close attention was paid to how other firms were performing in sustainability ratings & stock market indices, so that the actions that were needed to achieve the desired score could be identified.	<u>Regulation & policy context</u> GHG emission reporting regulations have been effective at raising the profile of the firm's GHG mitigation efforts among the most senior people in the firm as have international events such as UNFCCC's COP21.	<u>Individuals in firm</u> Personal interest in climate change among Ursa personnel helped to increase the attention paid to the issue within the firm.
LCECI/RECI use	<u>Sustainability rating agency</u> CDP steered Ursa towards RECI use through its incentivization of science-based targets.		<u>Non-financial resources & capabilities and technical issues</u> A lack of technically-appropriate energy saving options steered Ursa towards use of RECI.		
Energy efficiency/saving	<u>Cost-savings</u> Main driver of energy efficiency.	<u>Reputation & legitimacy</u> Occasionally projects have gone ahead that had been rejected on purely financial grounds because they were necessary to meet targets.			
Self-generation of electricity	Under consideration by firm.				
Refrigerant emissions	Insignificant within firm's inventory.				
Offset use	<u>Reputation & legitimacy</u> CDP rewarded firms setting science-based targets & DJSI was considering this. Science-based target methodologies did not recognize offset use. So, this was rejected.				

7.1.4 EMISSIONS OVERVIEW

A graph of Ursa's scope 1, 2 and 3 emissions is shown below Figure 24. Scope 2 emissions have usually been an order of magnitude higher than scope 1 and scope 3 business travel emissions. The group had grown and acquisitions increased its emissions. Changes in the organisational boundary used for reporting increased the emission sources covered and more scope 3 categories were reported over time. It is not clear from most CDP responses what accounting approach had been used for Ursa's RECI use. The Interviewee thought an approach that reflected RECI use had been applied. However, Figure 24 shows it has not had a major impact on Ursa's overall emissions. The purchase represented 7% of total consumed electricity in y/e 2014-2016²⁰³. Refrigerant emissions were an insignificant part of Ursa's GHG emissions inventory²⁰⁴.

7.1.4.1 TARGETS

Data on targets is presented because emission sources are typically aggregated together into target(s). Therefore, reductions in emissions from one scope may compensate for lack of a reduction from another scope. My assumption is that this could reduce the drive to act on the more difficult scope to tackle.

The group has had several targets. All of them have been intensity targets e.g. office-related S1+S2 emissions per FTE employee and data centre-related S1+S2 emissions per m² of data centre²⁰⁵. It has also had targets for S1+S2+S3 in tCO₂e normalised by revenue and by FTE employee²⁰⁶. In CDP2016 (3.1) the scope 3 categories were specified as upstream sources including air and rail travel, water and waste. Therefore, these scope 3 categories have been included in Figure 24 of the group's emissions. It was also specified that a market-based scope 2 approach would be used for the target. However, a location-based scope 2 approach has been used in Figure 24 wherever possible to show the impact of RECI/LCECI use. The group had already met all but one of its climate change targets which had had a due date of 2020 and was at the time of interview looking to set new targets.

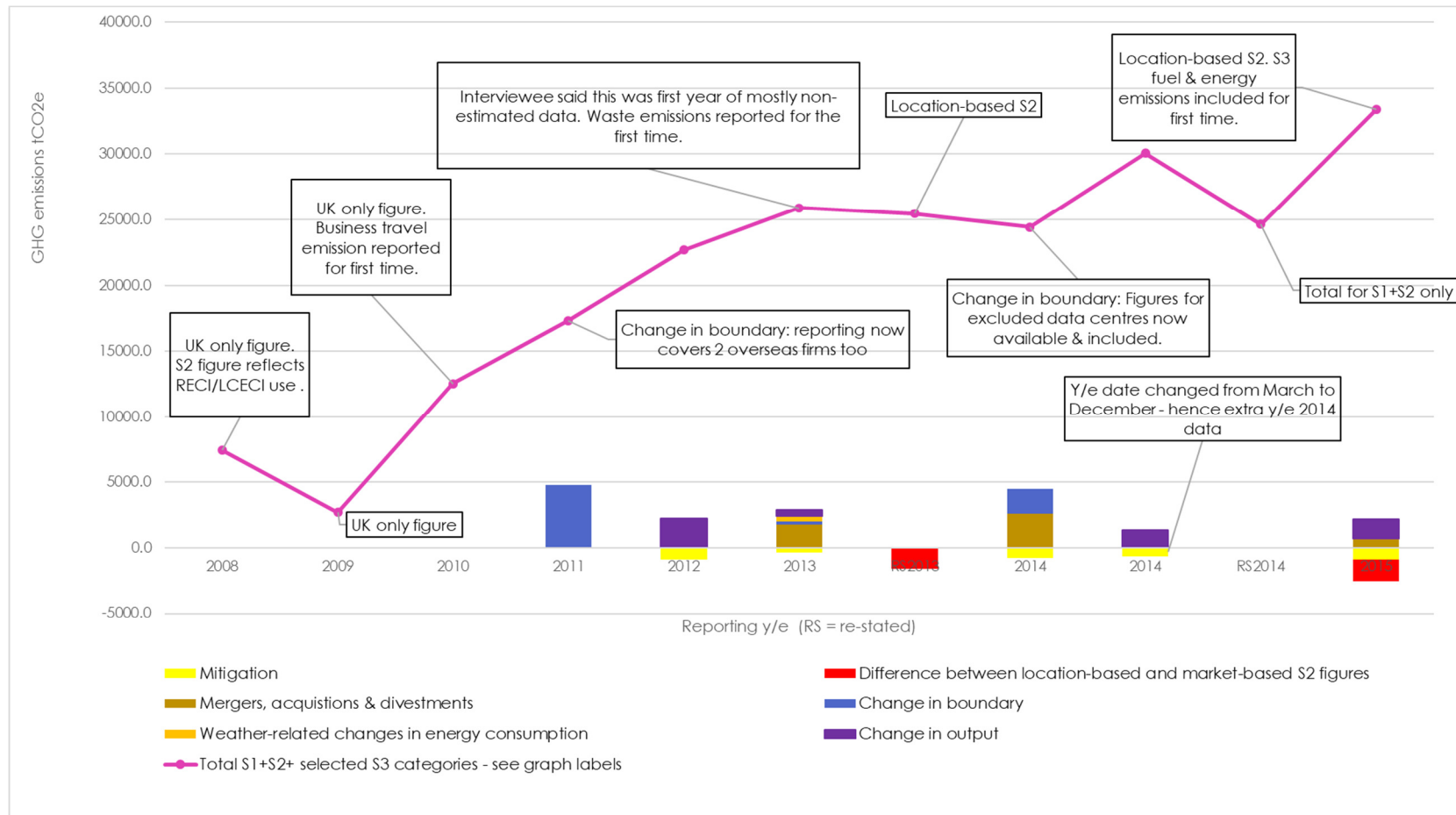
²⁰³ Own calculations based on CDP2014 CC11.2, CC11.4, CDP2015 CC11.2, CC11.4, CDP2016 CC11.4, CC11.5.

²⁰⁴ Email 23 March 2017 from Interviewee.

²⁰⁵ CDP2014 CC3.1b, CDP2015 CC3.1b.

²⁰⁶ CDP2014 CC3.1b, CDP2015 CC3.1b.

Figure 24 Ursa's scope 1, scope 2 and reported scope 3 emissions



Sources: See section 14.2.7. This figure is reproduced in the accompanying A3 portfolio.

7.1.5 ACTIVITIES RELATED TO EMISSIONS MITIGATION

The group was formed in 2007. One component of the new group had a Power Purchase Agreement with a hydroelectric plant that commenced in 2004. *“It was an opportunity to use a green energy at a very good cost, and has since remained at a good cost and as [Ursa] has taken the step of using green energy at this site, we are keen to maintain that,”* said the Interviewee²⁰⁷. In CDP2008²⁰⁸ Ursa said “It is also part of our strategy to purchase only green utilities from renewable sources in the future against our current portfolio of green and GQCHP.” GQCHP can stand for Good Quality Combined Heat and Power. Electricity from renewable generation and GQCHP was exempt from the main rate of the Climate Change Levy, a UK tax imposed on the use of electricity. Production from these sources was evidenced by Levy Exemption Certificates (LECs) which were used to claim the exemption. (GOV.UK 2017, HM Revenue and Customs 2015a). However, no mention of LECs nor further mention of this strategy was found and the person involved with the issue had left Ursa.

Ursa was considering greater use of RECI. This had been driven by CDP and DJSI which were rewarding science-based targets within their scoring.²⁰⁹ The Interviewee said the choice of RECI would probably be determined by flexibility of the instrument and explained that energy supply contracts were agreed over a period of years. Switching to a renewable electricity tariff or purchasing energy attribute certificates could be implemented within those contracts whereas this may not be possible if the contractual instrument was a Power Purchase Agreement. It was also considering PV generation in a country with more sunshine than the UK (Interviewee).

Mitigating-activities included optimising the voltage to equipment, more electricity-efficient lighting, data centre heat management and electricity efficiency²¹⁰. Ursa reported environmental behavioural change programmes²¹¹.

²⁰⁷ 23 March 2017 email - Interviewee.

²⁰⁸ CDP2008 2(a)(iii)

²⁰⁹ While CDP do reward science-based targets within their scoring methodology (CDP 2016a), DJSI said that it did not at the moment, although this was under consideration (email from RobecoSAM DJSI Helpline dated 22 February 2018). Science-based targets represent an allocation to the firm of the GHG emissions reduction needed to keep global temperature rise below 2 degrees Centigrade compared to pre-industrial levels (Rickard 2018).

²¹⁰ CDP2011 3.3a, CDP2013 12.1a, CDP2016 CC3.3b.

²¹¹ Corporate responsibility reports 2012 p.14, 2014 p.20, CDP2015 5.1b.

7.1.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES (RQ1)

7.1.6.1 Individuals in firm

There were signs of individuals within the group competing for slack (Cyert and March 1963) by trying to win senior executives' support for their agenda. External events such as the UNFCCC's COP21 event in Paris drew the attention of senior executives at the group to climate change and gave employees working on the issues the chance to discuss it at a higher level. The Interviewee said *"It gave a stronger handle for escalating the conversation within the [group]"*. The Interviewee also said *"Yes, a good score from CDP is a very helpful driver for change. There's no question, along with DJSI."* This suggests sustainability ratings were a welcome support for staff advocating for climate change activity.

The Interviewee said *"I would say there are individuals within the business that are more passionate about this than others."* One senior leader had a personal connection with a high-profile individual who was working on resource efficiency and had talked about the issue; *"... through a lot of those conversations [resource efficiency] has grown on the agenda. So, that kind of personal involvement from a senior leader has had an impact."*

In summary, personal interest among Ursa personnel in climate change helped to increase the attention paid to the issue within the firm.

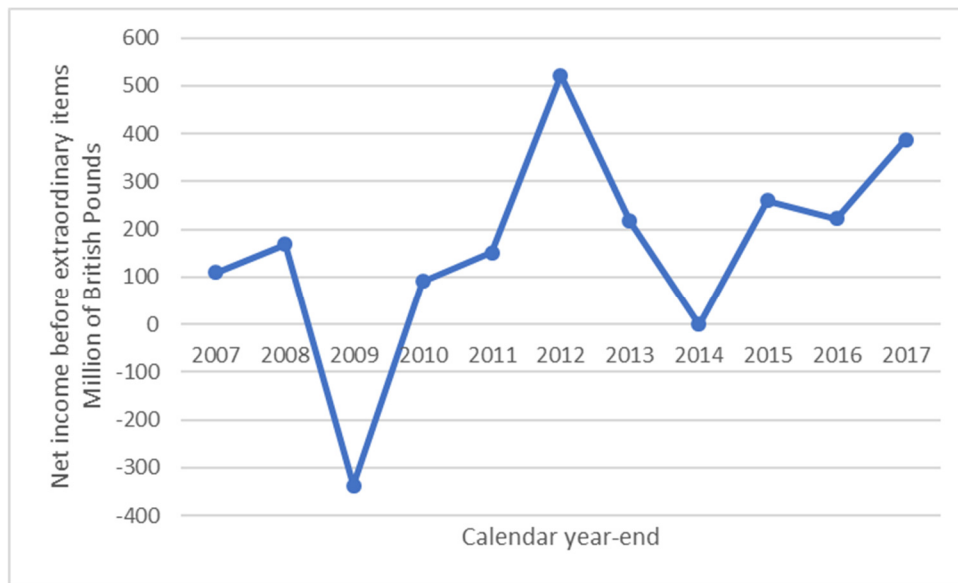
7.1.6.2 International experience

The group had employees of 51 different nationalities. Six nationalities are represented on the executive committee. It operated in 16 countries spread across the globe (2014 Corporate Responsibility Report, p.15, 33). However, the firm's international experience did not have a discernible influence on its GHG mitigation options.

No effect detected.

7.1.6.3 Available finances and Cost-saving

As can be seen from Figure 25, my proxy for available finance - net income before extraordinary items - has only dipped below zero once since Ursa's formation as a group. Ursa said the cost of achieving its carbon reduction targets were less than 0.5% of operational expenditure (CDP2015 CC6.1c). Available finance was not as a constraint on most potential GHG mitigating projects, although there had been projects on an historic building that had been ruled out because of the high required investment (Interviewee). Therefore, available finance had not been a significant limiting factor on choice of mitigating activity.

Figure 25 Ursa's available finance

Source: Thomson One Reuters Fundamentals accessed 13 April 2018

The Interviewee was clear that cost reduction was the main driver of energy efficiency projects, although energy costs were not significant relative to total operational spending. Energy costs were less than or equal to 5% of total operating costs over a span of several years (CDP2012 12.1, CDP2016 CC11.1).

The Interviewee said the payback period of each energy-saving project was considered, but there was not a specific payback period below which a project must fall to go-ahead. Instead other factors were also considered such as whether a project was needed to meet a GHG emission reduction target or to meet stakeholder expectations. Occasionally projects had been approved that would not have been implemented on solely financial grounds.

“But in saying that every year we look at what the potential is for energy-saving projects and look at setting our targets around that, so the targets set and agreed at the start of every year - at least the year-on-year targets - and that is based on what energy efficiency could take place at the different sites across the group. So, there is an active conversation, sure there is the financial impact, but say for example we want to make sure we can achieve the five per cent reduction target this year and we need to be completing these kinds of projects. So, it may mean targets there are perhaps one or two projects that are approved, that wouldn't have been. But financial is definitely the primary driver.” (Interviewee)

Non-financial drivers of GHG mitigating activities are considered further in subsequent sections.

In summary, availability of finance was not encountered as a factor in most GHG mitigation decisions. Cost-savings were the major driver of energy-efficiency.

7.1.6.4 Non-financial resources and capabilities and technical issues

The Interviewee said that technical knowledge of both the potential benefits and/or costs GHG mitigation measures was a likely constraining factor, particularly in the earlier days of the group's work on GHG mitigation. The Interviewee said Ursa was finding it hard to identify additional energy saving measures to implement. In particular, the historic nature of one key building constrained the options available to the firm. Self-generation of electricity was possible only at some locations, so this steered Ursa towards the use of RECI when it assessed how it could meet a science-based target.

The group's level of technical knowledge about GHG mitigation options was a likely constraint on their implementation, particularly earlier on in Ursa's development of its climate change activities. A lack of technically-appropriate mitigation options steered Ursa towards use of RECI when it considered achievement of a science-based target.

7.1.6.5 Stakeholder influence

Ursa used the term "*corporate responsibility*". However, the Interviewee agreed that the description of CSR that I took from Crane, Matten and Spence (2013) was similar to its conception of corporate responsibility. Ursa's 2012 Corporate Responsibility Report listed stakeholders as: customers, shareholders, employees, partners and suppliers, regulators and other regulatory bodies, the communities in which the group operates, and the environment. The Interviewee said investors and client companies were the most important stakeholders. Performance benchmarks were reviewed to ensure Ursa reflected "*stakeholder expectations*"²¹².

The Interviewee said there had been an increase in investor engagement on the issue of climate change with Ursa's approach judged through its score in sustainability ratings or stock market indices. Perceived investor interest in the sustainability benefits of a project might lead to it going ahead when it would have been rejected on purely financial grounds, but these would be isolated instances. As for customers, the group said in CDP2015 (CC6.1c) that clients were increasingly interested in climate change and wanted to work with firms that have a proactive approach.

Ursa said positive engagement with climate change could result in "*minor*" reductions in staff recruitment and retention costs of less than 10% (CDP2015 CC6.1c), although the Interviewee qualified this by explaining that group philanthropy in terms of giving either employee time or finances was more attractive to staff. Perceived staff interest in the sustainability benefits of a project might occasionally lead to it going

²¹² 2014 Corporate Responsibility Report p.5.

ahead when it would have been rejected on purely financial grounds, but employees were not a significant driver (Interviewee).

CDP and Dow Jones Sustainability Index²¹³ were considered stakeholders where Ursa have inputted into their consultations on changes to their scoring methodologies and other processes²¹⁴. However, the influence of sustainability ratings and indices via the potential effect on firm's reputation has been considerable as described in the section 7.1.6.8.

Investors have influenced Ursa's climate change approach with the group's performance judged through sustainability ratings and stock market indices. Customer interest in working with suppliers that were proactive on climate change was a further motivation. Employee interest was a driver, albeit not significant.

7.1.6.6 Other firms

Ursa assessed its success with DJSI and CDP relative to peer firms, but previously it did not consider that increasing RECI use was necessary to maintain its position relative to other firms. The Interviewee said *"I think with indices like DJSI and CDP it wasn't deemed to be a strong enough factor that it was necessary to go for it. Even if it was a strong factor in the index if we looked say to see what peers were doing at the time or average scores in the indices, then there was no... it was not deemed that there was any need to take that step to achieve a certain score or a certain level of recognition in the indices."*

Close attention was paid to how other firms were performing in sustainability ratings and indices, so that the actions that were needed to achieve the desired score could be identified.

7.1.6.7 Regulatory and policy context

Ursa said it was *"...deriving further energy efficiency and GHG emissions reduction through participation in the UK CRC Energy Efficiency Scheme..."*²¹⁵. Ursa was also covered by the Climate Change Levy.

However, the Interviewee said the cost of the CRC Energy Efficiency and the Climate Change Levy in the context of the overall energy spend was not sufficiently high to drive change.²¹⁶ The group spends more

²¹³ This index is based on assessment by RobecoSAM (n.d.).

²¹⁴ Email dated 23 March 2017 from Interviewee.

²¹⁵ CDP2013 3.3c.

²¹⁶ I gave greater weight to the Interviewee's view as he had a longer perspective on the impact of these regulations as the interview took place in 2017.

than £5 million annually on utility consumption. The CRC Energy Efficiency costs £212,000, i.e. 4%.²¹⁷ Ursa said it was also deriving further energy efficiency through participation in the Energy Saving Opportunities Scheme²¹⁸.

The Interviewee said in interview that reporting regulations had served to raise the profile of climate change within the firm though. The UK mandatory emissions reporting regulations for quoted companies (*The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013*) require GHG emissions to be stated within the annual report, a flagship publication that the Interviewee said is reviewed by more of the board and senior management team than a corporate responsibility report.

External events such as the UNFCCC's COP21 event and the Road to Paris campaign had an important role in drawing the attention of senior executives at Ursa to climate change. The Interviewee said COP21 was "...part of that changing conversation." This evolution can be seen in consecutive CDP responses. CDP2015 asked "*Would your organization's board of directors support an international agreement between governments on climate change, which seeks to limit temperature rise to under two degrees Celsius from pre-industrial levels in line with IPCC scenarios such as RCP2.6?*" (CC2.4). Ursa answered "No opinion." In CDP2016 Ursa pledged its support for the Paris Agreement and to taking action to ensure that it was met (CC2.2a).

In summary, fiscal measures have not been sufficiently high to drive energy efficiency change. GHG emission reporting regulations have been effective at raising the profile of the firm's GHG mitigation efforts among the most senior people in the firm as have international events such as COP21.

7.1.6.8 Reputation and legitimacy

Reputation is frequently mentioned in its CDP responses. Ursa saw a positive reputation on climate change as creating business opportunities and helping to attract and retain employees. It said managing the group's reputation on climate change entailed marketing its climate change products and achieving its carbon reduction targets. Occasionally this led to projects going ahead that would not have been implemented on financial grounds alone.²¹⁹

²¹⁷ CDP2015 5.1b.

²¹⁸ CDP2016 CC3.3c. The Energy Savings Opportunities Scheme is the UK transposition of Article 8 (4 to 6) of the EU Energy Efficiency Directive (2012/27/EU) (GOV.UK 2018).

²¹⁹ CDP2015 CC6.1c and CDP2016 CC6.1c). CDP2015 CC6.1c, Interviewee.

One important aspect of managing its reputation was to be consistent in the approach taken across its operations and products (CDP2016 CC6.1c). Some of the group's products had a sustainability focus. The Interviewee said *"...I think as the group's focused on product and services, particularly some of the [sustainability-related products], the need for the group to be leading its performance within its sector is also extremely important."* If Ursa did not encourage sustainability and responsibility in its own operations and in its client firms, it risked losing credibility and license to operate in the market²²⁰, which I understand as legitimacy (Suchman 1995).

Another important aspect of reputation was performance in sustainability ratings. Both CDP and Dow Jones Sustainability Index were very significant drivers of the group's decisions regarding GHG mitigation actions as the following sequence of events shows. In 2011 there was an energy survey of the main property and data centre. RECI use was discussed in comparison with energy efficiency measures, with the latter chosen for financial reasons. The Interviewee said: *"So it was purely a cost decision back then and I think it was perceived that there wasn't enough of a driver say for any of the sustainability indices or rankings, even perhaps the group's perception of the significance of the environmental impacts for investors and other stakeholders..."*

By 2017 this perception of the importance of RECI for getting a good score had changed. The Interviewee explained that this had been driven by CDP and DJSI which were rewarding science-based targets within their scoring. The Interviewee said RECI use was the only way that Ursa could meet a science-based target.

"We could keep going with energy efficiency until we look at science-based targets. The science-based target is a really significant factor in going for the renewables. I would think if renewables were weighted more strongly in CDP and DJSI I think that would also be a real factor."
(Interviewee)

The Interviewee also said *"If we were looking at a science-based target out to 2030 for example, it might require something like 50% reduction in absolute scope 2 emissions. Therefore, short of, like you say, renewables generation or something of that nature - particularly given that 50% of the group's total emissions including scope 3 come from the data centres. Data centres are an ever-increasing sort of underpinning of the business. Then, as the business grows, energy use is only going to continue to grow so renewables is the only way that we will be able to achieve a 50% reduction target."* This group was primarily considering renewable energy attribute certificates. The Interviewee said offsets had been ruled

²²⁰ CDP2013 5.1e.

out because their use was not counted in the carbon accounting methodologies used for science-based targets.

The group had not closely followed the protracted international debate among practitioners and other parties about scope 2 accounting that had featured doubts about the impact of renewable energy attribute certificates on increased renewable generation capacity. It had only impacted on Ursa only through the resulting changes to the CDP questions and guidance. Indeed, the Interviewee assumed that the purpose of the certificates had been to stimulate more investment in renewable generation when in the case of GOs their purpose was not well-defined in the EU directive that created them (see section 4.2.1).

Reputation was an importance consideration for Ursa in deciding its climate change approach. Sustainability ratings and stock market indices were seen as factors in determining that reputation and were therefore important influences, even to the extent of steering Ursa towards particular mitigation actions. Ursa had to encourage sustainable and responsible development of its own operations and its client firms to maintain its legitimacy.

7.1.6.9 Summary of findings for RQ1

Table 17 Summary of factors affecting Ursa's GHG mitigating activities – by factor

Factor	Finding
Individuals in firm	Personal interest among Ursa personnel in climate change helped to increase the attention paid to the issue within the firm.
International experience	No effect detected.
Available finances and cost-savings	Availability of finance was not encountered as a factor in most GHG mitigation decisions, although cost-savings were the major driver of energy-efficiency.
Non-financial resources and capabilities and technical issues	Level of technical knowledge a likely restriction, particularly at start of development of climate change approach. A lack of technically-appropriate energy saving options steered Ursa towards use of RECI.
Stakeholders	Investors have influenced Ursa's climate change approach with Ursa's performance judged using sustainability ratings and stock market indices. Customer interest in working with suppliers that were proactive on climate change was a further motivation. Employee interest was a driver, albeit not significant.
Other firms	Close attention was paid to how other firms were performing in sustainability ratings and stock market indices, so that the actions that were needed to achieve the desired score could be identified.
Regulation and policy context	Fiscal measures have not been sufficiently high to drive energy efficiency change. GHG emission reporting regulations have been effective at raising the profile of the firm's GHG mitigation efforts among the most senior people in the firm as have international events such as COP21.
Reputation and legitimacy	Reputation was an importance consideration for Ursa in deciding its climate change approach. Sustainability ratings and stock market indices were seen as factors in determining that reputation and were therefore important influences, even to the extent of steering Ursa towards particular mitigation actions. Ursa had to encourage sustainable and responsible development of its own operations and its client firms to maintain its legitimacy.

7.1.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

The Interviewee said the primary motivation for energy efficiency measures was cost reduction, but if a project was not attractive financially, it might still be implemented due to a CSR driver, such as meeting a voluntary emissions reduction target. However, as there would not be any scope 2 emissions associated with RECI, this additional impetus would be lost and hypothetically some energy-efficiency projects may not go ahead.

Turning to RECI use, a non-UK firm that became part of the Ursa group in 2007 had engaged in a Power Purchase Agreement with a hydroelectricity generator, starting in 2004. The contract covered the entire electricity consumption of this firm which was based in one building, although this was less than 10% of the group's total electricity consumption²²¹. The Interviewee wrote *"It was an opportunity to use a green energy at a very good cost, and has since remained at a good cost and as [Ursa] has taken the step of using green energy at this site, we are keen to maintain that."* (Email 23 March 2017).

Regarding the displacement of other GHG mitigation activities, the Interviewee had not detected that the Power Purchase Agreement had had that effect. *"I haven't particularly, mostly just because of the nature of that building. There haven't been too many initiatives that we have been able to look at anyway. It's an historic, listed building at that particular site in [this country], so there haven't been too many initiatives looked at anyway, so but yes, I guess that the theory remains to be tested."* (Call, 24 March 2017)

The Interviewee explained further; *"We have not had a decision that would come that has been tested in that way. There have been energy assessments done at that site, but all of activities were either very straight-forward in terms of very clear financial benefit or far too much investment required, so there wasn't anything in that range where we might have considered it on environmental impact."* (Call, 24 March 2017)

Talking more generally about displacement, the Interviewee said *"It certainly seems very possible. Again, that is only in theory at moment. But certainly, if the project does not have any impact on emissions because they are already zero-rated, then really the financial driver does become the only remaining factor."* (Call, 24 March 2017)

Asked if Ursa might take steps to address this, the Interviewee observed that increasing RECI costs could increase the cost of electricity such that the payback periods of energy efficiency measures would reduce and make them more attractive from a cost-saving perspective. (Call, 24 March 2017)

²²¹ CDP2014 11.2, CDP2015 11.2, CDP2016 11.4.

I looked at Ursa's emissions data, the group has had several targets. All have been intensity targets and include targets normalised by FTE employee and revenue. The longest series of data calculated by the firm is for S1+S2 emissions/unit revenue. However, this would be impacted by financial performance as well as the activity level of the firm. I judged FTE employee to be more closely related to Ursa's activity levels and commonly-used targets. FTE employee numbers were not reliably available. The best available data was average number of employees in a year. I decided not to calculate a series of S1+S2 emissions per employee as the scope 2 approach used was not clear. In addition, up to y/e 2013 there was a lot of estimated data (Interviewee). As the group's main source of emissions was electricity (see section 7.1.4), I calculated a data series using purchased electricity per employee number. This declined from y/e 2009-2015 from 28 MWh/employee to 10 MWh/employee while RECI use was steady (for sources, see section 14.2.7). The PPA varied with the amount of electricity consumed at the supplied site, but this was stable (Interviewee). I have not included a graph as I only have figures for RECI use as a percentage of purchased and consumed electricity for y/e 2014 and 2015 and it was 7% for both.

To summarise, at the site where a PPA has covered 100% of electricity use, there was no evidence to suggest it had displaced electricity efficiency/saving activities. At other sites, RECI had not been used. If RECI use is increased in future, it could drive up the total cost of consumed electricity and reduced the payback period of electricity efficiency/saving projects. However, the Interviewee could foresee a situation where borderline projects do not go ahead because they are not that attractive financially - despite the additional cost of RECI - and the driver of reducing GHG emission reductions is missing due to RECI use.

The results are discussed further in the discussion for RQ2 in chapter 12.

7.2 GEODE

7.2.1 DATA SOURCES

For CDP2006-2009, this firm's response was for CDP's investor signatories only. I have used its public responses from CDP2010-CDP2016, with limited information taken from CDP2017. The group declined an interview as the topic of this research was not considered material within the context of its sustainability strategy. This point was also made in public documents e.g. in the "Further information" section to the governance questions in CDP2011, the group said that it was not a major GHG emitter, so this was not a focus of its sustainability work. However, I considered it a useful case as it has used a high percentage of GOs relative to its electricity purchase and consumption and it was the best comparison to the UK B2B financial institution case.

7.2.2 CASE DESCRIPTION

This case is a German-incorporated business-to-business financial institution. CDP has had it listed as incorporated in Germany from CDP2010-2017. It is a group of firms (CDP2010 0.1, CDP2016 0.1). Geode has had several products related to sustainability.

7.2.3 OVERVIEW OF DATA RELEVANT TO RQ1

Geode's sustainability approach has been influenced by stakeholders and the stakeholders did not consider Geode's own GHG emission among its most significant impacts: a view which fitted with Geode's own. Nonetheless Geode said that it had taken up all the opportunities for significant reductions. Its main emissions sources were data centres and offices. It had moved to highly energy- efficient headquarters. "Green energy" and offsets were the remaining GHG mitigation options. The closely-related start dates of it purchasing RECI and offering related products to its clients suggests that RECI use was motivated by a desire to ensure consistent approach across its activities. Otherwise Geode could be accused of failing to walk the talk. However, Geode cited its own "*convictions*" as one of the drivers of its corporate responsibility position including its actions to reduce its environmental impact.

Table 18 Summary of factors affecting Geode's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors		
GHG mitigating actions in general.	<u>Stakeholders</u> Its climate change approach was not an issue it judged to be a key concern for itself or its stakeholders. Nevertheless, its CSR response was under scrutiny. Therefore, climate change issues needed to be addressed as they were seen as a component of CSR and also a factor in sustainability indices.	<u>Organisational values</u> Geode said its CSR activities were morally motivated.	<u>Reputation</u> Geode's approach to climate change was judged to have a bearing on its reputation and there was heightened awareness of reputational impacts following the global financial crisis. Therefore, the global financial crisis has had a bearing on its climate change approach.
RECI/LCECI use	<u>Reputation</u> I infer that RECI use may have been prompted by a wish to be consistent between its internal operations and products to maintain credibility.		
Energy efficiency/saving	<u>Non-financial resources and capabilities and technical issues</u> Geode considered that it had largely implemented all energy efficiency/saving options available.		
Self-generation of electricity	Has used CHP. Limited data on this activity.		
Refrigerant emissions	Expected to be insignificant within firm's inventory.		
Offset use	Use has been very limited.		

7.2.4 EMISSIONS OVERVIEW

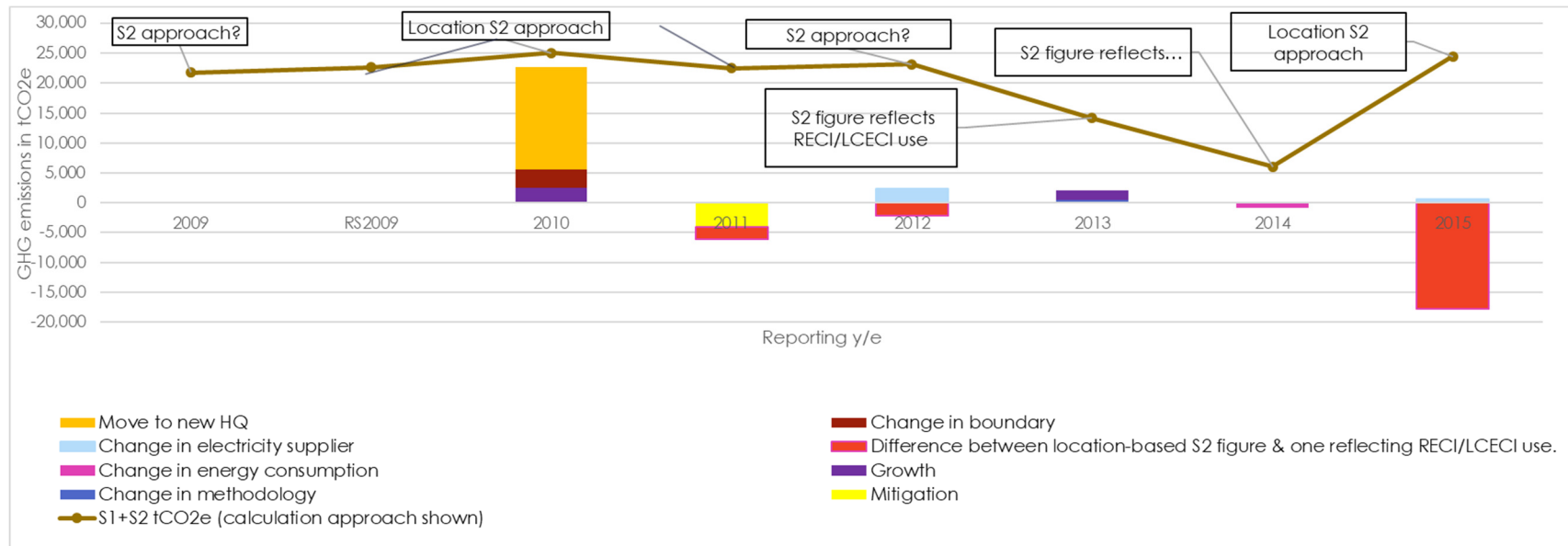
Its main sources of scope 1 and 2 emissions were its offices, IT systems and business travel - with IT the dominant source²²². Although the scope 2 methodology approach has not always been explicit in its CDP responses, probably due to CDP's questions, the effect of the use of RECI can be seen by comparing the S1+S2 figures for y/e 2014 and 2015 in Figure 26Figure 26. Other reasons for change are shown as annotations.

7.2.4.1 Targets

The case has had targets that relate to S1+S2 only, therefore only S1+S2 emissions (not scope 3) are shown in Figure 26. It has had an S1+S2 intensity targets with a denominator of per workplace (CDP2017 3.1b).

²²² CDP2010 15.1, CDP2013 introduction.

Figure 26 Geode's scope 1 and scope 2 emissions



Sources of data: 14.2.8.

7.2.5 ACTIVITIES RELATED TO EMISSIONS MITIGATION

Geode moved to a flagship new office, powered in part by CHP plants, that was expected to save 60% more energy than the legal requirement (2008 Corporate Responsibility report p.20). At the end of 2011 Geode decided to choose a low-carbon electricity supplier for its main data centre which was provided by a specialist data centre operator. The quantities needed for 2012 were bought upfront. Geode estimated the annual emission savings of 2,136 tCO₂e at a cost of 25,071€ and said that the purchase might be repeated annually. The type of RECI was not specified. (CPD2012 3.3b) In CDP2103 3.3b the RECI was specified as GOs and the cost was given as 0 €. It is questionable whether 25,071 € represents the extra cost of procuring RECI or the total cost of the contract. Geode also reported that renewable electricity was included in its supplier's electricity tariff. (CDP2013 11.4).

Overall, the percentage of purchased and consumed electricity reported as renewable rose from 42% to 93% (CDP2013 11.2, 11.4, CDP2016 11.4-11.5). These percentages comprised energy attribute certificates (CDP2013-CDP2016 CC11.4), Guarantees of Origin (CDP2014-CDP2016 CC11.4), publicly supported electricity²²³ (CDP2014-CDP2015 CC11.4), and supplier-specific emission factors not backed by contractual instruments (CDP2013-CDP2016 CC11.4). In CDP2016 Geode reported it was generating several GWh of electricity itself (CC11.5).

In CDP2016 Geode has attributed a 12.6% reduction in S1+S2 emissions due to mitigation activities (CC12.1a). However, cross-referencing with other answers indicates that these were scope 3 reductions and so have been removed from Figure 26 (CDP2016 CC3.3b and CC14.3a). Behavioural change events and IT-related electricity efficiency actions are listed at CDP2016 3.3b, but the resulting emissions reductions have not been quantified. Encouraging employees to save energy and to identify new ideas for energy saving were other mitigating actions taken (CDP2015 CC3.3c).

7.2.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

(RQ1)

This section is short because of the lack of an interview. However, information was drawn from CDP reports and corporate publications.

²²³ These CDP entries refer to EEG electricity which I understood as *Erneuerbare-Energien-Gesetz*, or Renewable Energy Sources Act. A series of German laws of that name created the Feed-in Tariff scheme for renewable electricity.

7.2.6.1 Individuals in firm

No data was found on the influence of particular individuals.

7.2.6.2 International experience

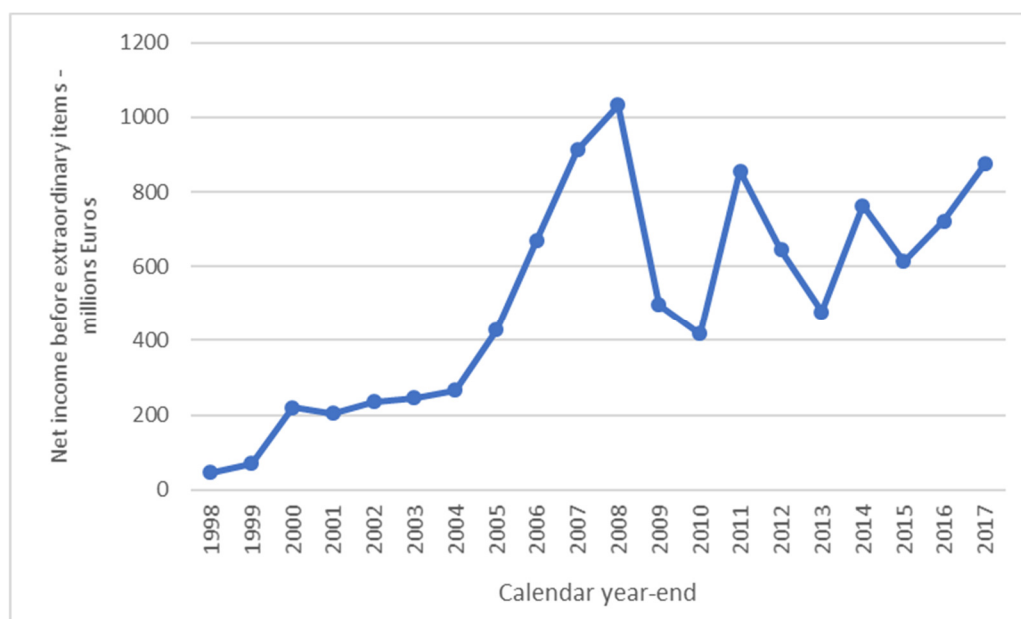
In its 2008 Corporate Responsibility Report (p.4) Geode described itself as a global group, active in 19 locations, with most of its share capital held by investors from outside Germany and with customers and employees from across the world. In CDP2016 CC0.1 it described itself as a major global player with Europe and the USA as its key areas of operation. The firm's international experience did not have a discernible influence on its GHG mitigation options.

No effect detected.

7.2.6.3 Available finances and cost-saving

As can be seen from Figure 27, Geode has not had any years since 1998 where my proxy for available finance - net income before extraordinary items - dipped below zero.

Figure 27 Geode's available finance



Source: Thomson One Reuters Fundamentals accessed 13 April 2018

No references were found to the influence of cost-savings on the group's GHG mitigation choices. Energy costs were less than or equal 5% of total operating costs (CDP2012 12.1, CDP2016 CC11.1).

There was a dedicated budget for the purchase of "green power" and offsets to cover emissions from specific business activities (CDP2012 3.3c). The scope of the budget was expanded to cover energy efficiency measures in CDP2015 and CDP2016 (3.3c). As energy efficiency was included within a

dedicated budget after “green power” and offset expenditure, this suggests that cost-saving through energy efficiency had been a lower priority, but this had changed.

In summary, cost-saving does not come across as a strong driver of GHG mitigating activities.

There is no indication that available finance was a significant constraint on mitigating activities.

7.2.6.4 Non-financial resources and capabilities and technical issues

In CDP2014 Geode explained that its GHG emission sources were largely limited to its data centres and offices. It had undertaken all the measures that would significantly reduce its energy consumption with only small projects remaining. *“Facility Management has worked hard to optimize energy consumption and hence reduce CO₂ emissions. The optimum has been achieved. Further reductions can only be achieved through further purchase of green power or offsets.”* (CC3.3d). The purchase of “green energy” was the only emissions reduction action reported the following year (CDP2015 3.3d, 12.1a).

No evidence was found that availability of resources and capabilities was a factor in the firm’s choice of GHG mitigating actions, but there was a perceived lack of options left to take.

7.2.6.5 Stakeholder influence

Geode entitled the publications containing data relevant to climate change as corporate responsibility reports. As I did not have an interview with Geode, I could not check if its conception of corporate responsibility was aligned with the description of CSR from Crane, Matten, and Spence (2013). However, its publications provide an indication. In its 2008 Corporate Responsibility Report p.4, Geode’s chief executive officer said: *“For us, corporate responsibility is an ongoing obligation to our employees, our environment and society. It is a fixed element of our corporate activities.”*

Although stakeholders are not explicitly referenced in that sentence, Geode has considered that it has stakeholders. Geode factored in stakeholder interests when prioritising areas for action. Stakeholders have been listed as shareholders, employees, suppliers and business partners, investors, *“supervisory authorities”* and politicians, media, NGOs and society (2012 annual report p.55). In its 2016 annual report, Geode’s chief executive said: *“Our responsibility to society is a key aspect in this exercise of determining where we are, and where we are going. To us, aligning our business conduct with the needs of our clients and investors is just as important as considering the interests of those stakeholders that are indirectly affected: our members of staff, the locations where we do business, and the regulatory and political environment.”* Overall, I judged Geode’s conception of corporate responsibility to be close to the description that I was using as my benchmark.

Turning towards the implications of its CSR approach, Geode said, as a major publicly-listed business, it was continuously scrutinised by analysts and institutional investors for its performance on climate change and corporate responsibility and this had led to the establishment of a corporate responsibility unit in 2008,

charged with improving performance on environmental and other issues²²⁴. Geode said that a good reputation for corporate responsibility, including on environmental issues, assisted in attracting and retaining talented staff (CDP2010 8.2a). However, Geode did not consider that climate change was a priority issue with external stakeholders based on meetings, surveys, and external enquiries (2012 corporate report p.57), although Geode did go on to say:

“Although [Geode] is not a manufacturing company and can therefore exert little influence on climate change, it is aware of the significance of the issue: reductions in greenhouse gas emissions and the careful handling of resources are an important part of its commitment to greater sustainability.” (2012 corporate report p.152).

Geode did not consider climate change to be an issue highly relevant to its business model. However, in CDP2014 and CDP2015, Geode repeated the point that it was “...under permanent scrutiny of analysts and institutional investors also with respect to its performance on climate issues and overall corporate responsibility” (CC5.1f).

Geode said that since the global financial crisis stakeholders had increased their insistence on the provision of environmental, social and governance (ESG) information to aid comprehensive assessment and forecasting of business performance. In its 2016 Annual Report (p.34) the group said: *“The importance of so-called ESG information (details concerning environmental, social and governance aspects) has been increasing since the financial crisis of 2008, as part of the comprehensive assessment and medium- to long-term forecasts of entrepreneurial performance. Various stakeholder groups – investors, clients, analysts, and not least regulators – increasingly insist that companies disclose ESG opportunities and risks relevant to their core business, besides traditional key financial indicators. This means that reporting enterprises are required to keep an eye on the impact of their entrepreneurial actions across the entire value chain, and to provide a holistic view of their work.”*

Geode said for investors focussed on sustainability, CSR ratings played an increasingly important role in assessing firms (2012 Annual Report p.155). In CDP2011 it said it had a goal - which it achieved – to improve its position in certain sustainability indices (Further Information, communications section, CDP2011).

The overall impression gained from Geode’s corporate publications is that its climate change approach was not an issue it judged to be a key concern for itself or its external stakeholders. Nevertheless, its CSR generally response was under scrutiny. Therefore, climate change issues

²²⁴ CDP2010 5.2a, 5.6, CDP2011 5.1i.

needed to be addressed as they were seen as a component of CSR and also a factor in sustainability indices.

7.2.6.6 Other firms

No references were found to the influence of other firms.

No data from which to draw conclusions.

7.2.6.7 Regulatory and policy context

Climate change regulation could potentially impact Geode via its goods and services, which I discuss first, before turning to its operations.

Geode has made a “*strategic investment*” in a firm in the field of climate change and energy which it considered would play a key role in contributing to German and European climate change goals²²⁵ by creating and offering products within the framework of Germany’s *Energiewende* as well as EU goals for action on climate change and energy²²⁶. The firm was fully consolidated into the group’s accounts in 2014²²⁷. Geode published a paper in 2015 on the development of *Energiewende* products²²⁸ and it was working on “...*the continuous development of new products and services, providing market solutions to support the long-term transition of Germany’s and Europe’s energy systems towards a higher share of carbon-free, renewable energy sources*”²²⁹.

Geode said “*Obviously risks related to uncertainty surrounding new regulation could potentially affect our existing and future offering of products and services worldwide. However, the current business generated in the broader carbon field is still fairly small compared to the overall operations of [Geode]. Hence, negative impact would be minimal.*” (CDP2011 5.1i, CDP2014 and CDP2015 CC5.1f).

Geode uniquely among the cases study firms made a direct reference to the position of successive German governments on Guarantees of Origin (GOs); Geode has argued that the German government

²²⁵ CDP2014 CC2.2a.

²²⁶ CDP2014 CC1.2a, CDP2015 1.2a, 2.2a.

²²⁷ 2016 Annual Report, p.42.

²²⁸ CDP2016 CC2.3a.

²²⁹ CDP2016 CC1.2a.

should allow the sale of GOs from renewable electricity generators financially supported by German public policy²³⁰.

In terms of regulatory impact on the facilities management of the group, references were restricted to the EU Energy Saving Directive 2007 which was used as a benchmark to show the high energy efficiency of its new offices.

In summary, there has been little impact of regulation on operational emissions and energy efficiency/saving. The regulatory and policy context of Germany (*Energiewende*) and the EU in terms of energy and climate change policy provided the stimulus for product development.

7.2.6.8 Reputation

Geode did not consider its operational emissions were significant (e.g. 2012 corporate report p.152) and the size of its climate change-related business was comparatively small. Nevertheless, it was careful of its reputation and its climate change approach was seen as a component of that; *"We do, however, consider reputation risk an important element to be aware of and therefore aim to increase our performance in all sustainability (Environmental, Social, Governance) criteria."* (CDP2011 5.1i.) A similar point was made in CDP2014 and CDP2015 (both CC5.1f).

Geode made an indirect link between Environmental, Social, Governance performance and the global financial crisis via their impact on Geode's reputation as it went onto say *"... [Geode] usually stands in the focus of public opinion, even if it is not responsible for the behaviour of the financial players on all forms of financial markets. Hence, [Geode] must be very much aware of critical issues related to reputation of the organization and its activities for both climate and corporate responsibility."* (CDP2015 and CDP2014 5.1f.)

In 2012 Geode reported it was planning to extend its product range to include a RECI-related offering which it did in 2013²³¹. From the start dates of it purchasing RECI (end of 2011)²³² and offering related products to its clients, I infer that RECI use may have been prompted by a wish to be consistent between its internal operations and products to maintain credibility.

In summary, Geode's approach to climate change was judged to have a bearing on its reputation and there was heightened awareness of reputational impacts following the global financial crisis. Therefore, the global financial crisis has had a bearing on its climate change approach.

²³⁰ CDP2015 CC2.3a, CDP2016 CC2.3a.

²³¹ 2012 Annual Report p.29, 2013 Annual Report p.139.

²³² CPD2012 3.3b.

7.2.6.9 Organisational values

In its introduction to CDP2011, Geode said that its position on corporate responsibility including its actions to reduce its environmental impact was driven by its own “convictions” as well as a desire to see the firm continue to prosper. It said “[Geode] ...is committed to implementing its corporate responsibility goals, purposefully promoting social activities and operating in an environmentally friendly manner. This is based on our convictions and ensures the competitiveness of the company over the long term. As a result, corporate responsibility is the direct responsibility of the Executive Board and we make a point of taking into account environmental aspects next to requirements of the economy and society when implementing our business objectives.”

Geode stated in CDP2011 that its CSR activities were morally motivated.

Table 19 Summary of factors affecting Geode’s GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	No data was found on the influence of specific individuals.
International experience	No effect detected.
Available finances and cost-savings	Cost-saving does not come across as a strong driver of GHG mitigating activities. No indication that available finance was a significant constraint on the mitigating activities undertaken.
Non-financial resources and capabilities and technical issues	No evidence that technical resources and capabilities were a limiting factor, but there was a perceived shortage of GHG mitigation options.
Stakeholders	Its climate change approach was not judged to be a key concern for itself or its stakeholders. Nevertheless, its CSR response was under scrutiny. Therefore, climate change issues needed to be addressed as they were seen as a component of CSR and also a factor in sustainability indices.
Other firms	No data.
Regulation and policy context	Little impact of regulation on operational emissions and energy efficiency/saving. The regulatory context of <i>Energiewende</i> and EU energy and climate change policy has provided the stimulus for product development.
Organisational values	Geode stated its CSR activities were morally motivated.
Reputation	Geode’s approach to climate change was judged to have a bearing on its reputation and there was heightened awareness of reputational impacts following the global financial crisis. Therefore, the global financial crisis has had a bearing on its climate change approach. I infer that RECI use may have been prompted by a wish to be consistent between its internal operations and products to maintain credibility.

7.2.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

Firstly, I look at the targets that Geode has used to see the most appropriate aggregation of emission sources to consider in looking at the effect of RECI use before turning to look for patterns in relation to the percentage of total electricity consumption covered by RECI.

Geode's targets have concerned S1+S2 emissions. Its intensity targets are denominated by the number of workplaces, presumably to account for a high number of non-employees working in its offices. It had a target of reducing CO₂ emissions per workplace at its headquarters from 2.6 tCO₂/workplace in 2010 to 2.0 tCO₂/workplace in 2013 ²³³. It reported *"The intensity target was even over achieved. While the absolute emissions were reduced, the number of workplaces increased considerably and hence giving a boost to the intensity figures which was reduced to 1.8 tons of CO2 emissions per workplace p.a."*

(CDP2014 CC3.3d) Geode's CDP's headline scope 2 figure in CDP2014 reflects RECI use. Therefore, I would expect the per employee and per workplace figure to reflect RECI use too.

However, I wanted to use intensity metrics using location-based scope 2 figures. These were not available with workplace as the denominator. However, some location-based scope 2 intensity figures -

S1+location-based S2 figures normalised by FTE employee - were found in CDP2010-2013 and I calculated one using data in CDP2016 12.3. This plot is shown in Figure 28 along with electricity/energy MWh per FTE employee and the percentage of consumed electricity covered by RECI. These intensity metrics show a steady decline – especially the energy and electricity metrics – even though in CDP2014 for y/e 2013 Geode said there were no plans for large changes in the emission intensity figure for the foreseeable future as it had exhausted all but minor opportunities for reducing energy consumption (CDP2014 CC3.3d). Further reductions could only be achieved through further purchase of *"green power"* or offsets, although offset use seems to have been very limited.²³⁴

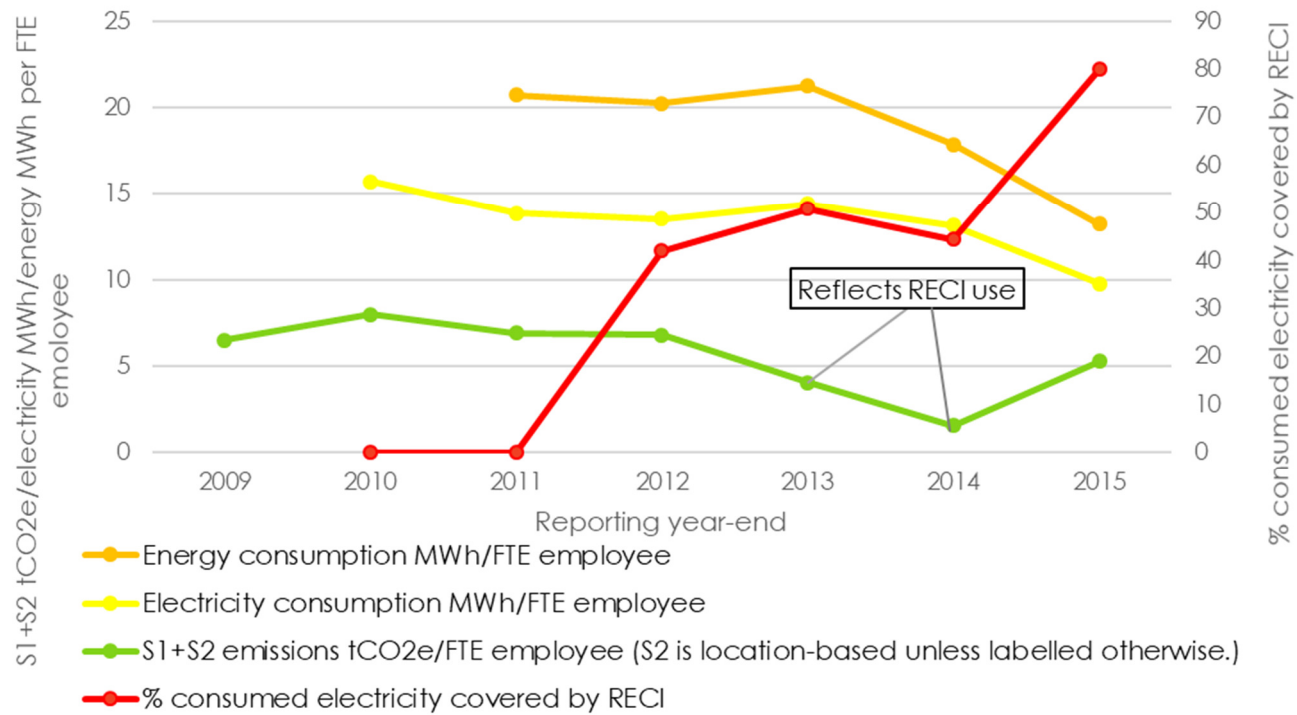
However, Geode said *"...great efforts are made to reduce overall power consumption regardless of the origin of power (i.e. from renewables)."* (CDP2014 CC14.1) The group then details replacement of IT equipment with more energy efficient kit. In CDP2016 CC3.3b it described environmental awareness days for employees and increasing the electricity efficiency of its network computers. Therefore, despite the Geode's earlier statement, this shows that mitigation actions were still being implemented. The declining

²³³ CDP2012 3.1.

²³⁴ Offsets are not shown on the emissions graph as they were used to mitigate less than 1 tCO₂e (CDP2014 CC3.3d).

intensity metrics does not suggest that RECI purchase has displaced emission-mitigating activities, although they may have declined faster in the absence of RECI use.

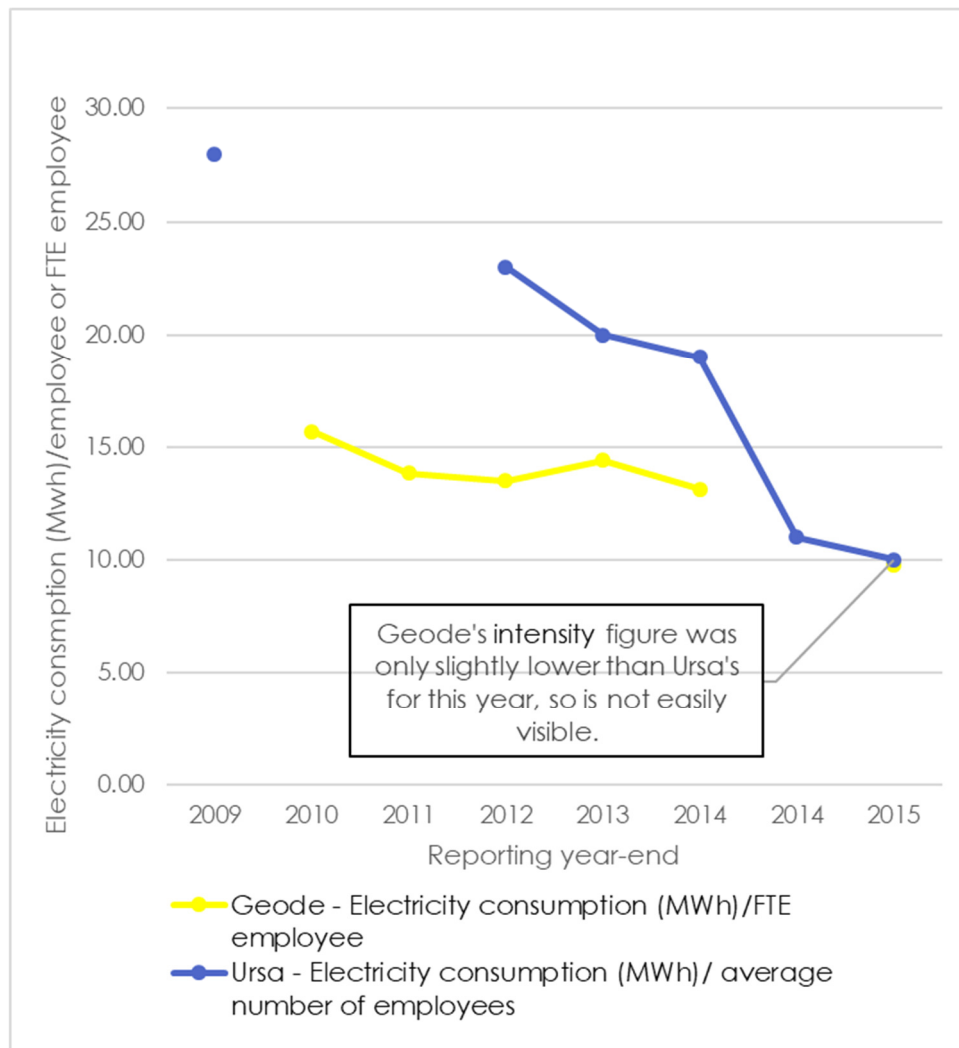
Figure 28 Geode's emissions and electricity/energy intensities and % consumed electricity covered by RECI



Source: See 14.2.8.

Geode's assertion that it was running short of ideas for mitigating actions led me to compare it with Ursa. An emission metric was not used as this would necessitate being sure of the scope 2 approach used and different emissions factors would complicate the comparison. An energy intensity metric was not available for Ursa, so I used only an electricity consumption metric. I had data for Ursa normalised by average employee number (numbers that are clearly FTE employee numbers were not available) and FTE employee for Geode.

Figure 29 Geode and Ursa's electricity consumption intensities



Sources: see 14.2.8. The gap in Geode's line is caused by Ursa having two reporting periods ending in 2014, one in March and the other in December, as it moved to a new year-end for its reporting year.

Geode's claim that it was running short of ideas for mitigating actions is supported by a comparison with Ursa's figures for electricity consumption/average number of employees. Ursa's denominator - the average number of employees over the year - would give a smaller number per unit of MWh compared to Geode's denominator of FTE employee as both full-time and part-time employees would be counted the same. Yet

Geode's intensity figures have been much lower than Ursa's, suggesting that it had implemented more projects earlier. There are no or limited excluded sources from Geode's figures that might account for the lower intensity figures. This indicates that Geode has driven down electricity consumption.

To summarise, Geode has been an increasingly high user of RECI. Nevertheless emission/energy/electricity intensity metrics have declined. Electricity intensity figures have been less than those of its comparison case, suggesting that there have not been electricity efficiency/saving actions in common use that it has not taken. Geode has said that it will not slacken on electricity efficiency/saving irrespective of the origin of the electricity. Overall, the evidence does not suggest that displacement of mitigating activities has occurred, although my data does not allow me to assess if emission/energy/electricity intensity metrics would have declined faster in the absence of RECI use.

The results are discussed further in the discussion for RQ2 in chapter 12.

WHAT FACTORS – EXTERNAL AND INTERNAL – INFLUENCE A FIRM'S CHOICE OF VOLUNTARY GREENHOUSE GAS MITIGATION ACTIVITIES?

Andrea Claire Harte Smith

A thesis submitted in April 2019 in partial fulfilment of the
requirements for the degree of Doctor of Philosophy
SPRU - Science Policy Research Unit - University of Sussex

VOLUME TWO OF TWO VOLUMES

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another
University for the award of any other degree.

Signature:.....

8 THE SUPERMARKET CASE STUDIES

This group of cases comprises two groups incorporated in the UK which have been primarily supermarket retailers with other types of business activities and a German-incorporated supermarket retailer and wholesaler, again with other business activities. CDP first categorised firms according to sector in CDP2007. I have used the CDP2007 categorisation for all three firms. Goshawk was categorised as a multi-line retailer while Upsilon and Umbra were categorised as food and drugs retailing. All three were categorised in food and staples retailing in CDP2016. However, for ease, I have henceforth referred to them as supermarkets. When I formed the case study groups, all three firms met the criteria that I had set for variation in terms of employee numbers and available finances metrics. However, I revised the dates for first use of RECI/LCECI once I had started my reading of corporate publications and interviews. As a result, the difference between Upsilon and Umbra in terms of employee numbers exceeded the criterion I had set to keep the divergence to less than four times' difference. However, at that point in the research, it would have been difficult to have revised the group.

8.1 GOSHAWK

8.1.1 DATA SOURCES

The case study draws on the CDP responses, corporate publications and a face-to-face interview conducted on 21 September 2016 with an expert from the firm in corporate responsibility strategy and reporting and the corporate responsibility director (called Interviewee 1 and Interviewee 2 respectively in the following text). The Interviewee 2 also responded to an email with some follow-up questions on 23 March 2018. CDP responses were accessible to signatory investors only for CDP1 (2003) and CDP3 (2005). The rest were public. The latest CDP response used - CDP2016 - relates to y/e 2015 while the latest corporate publications used contained some data relating to y/e 2016.

8.1.2 CASE DESCRIPTION

Goshawk was a group of firms selling a mix of products, particularly food, to consumers and to other businesses (group webpages September 2016). Its sub-sector was categorised as a multi-line retailer in CDP2007. Its industry group in CDP2016 is food and staples retailing. It has been incorporated in Germany throughout its period of publicly reporting to CDP (CDP4 (2006)-2016).

8.1.3 OVERVIEW OF DATA RELEVANT TO RQ1

Goshawk's use of RECI has been ad-hoc. RECI were seen as an on-going cost with no reputational benefit whereas energy efficiency schemes were win-win measures, offering sustainability benefits and cost-savings. Energy-saving measures were prioritised over other competing initiatives with shorter payback periods. Protection from price volatility and regulatory incentives have been the drivers for installation of renewable energy generation facilities. Regulation has been a key driver in reducing fugitive emissions of refrigerants.

Other drivers of climate change-related action within Goshawk were investors and the CSR ratings organisations targeting an investor audience. A telling point was that part of the board's remuneration rested on the group's performance on the Dow Jones Sustainability Index.

It was only in 2016 that it set itself an absolute target (see section 8.1.4.1). The significance of this is that an intensity target allows for growth in operations; trying to cut absolute emissions in an expanding business is harder. When Goshawk did set itself an absolute target, it was a science-based target²³⁵.

²³⁵ See footnote 54.

The CEO was also influential, believing that action on sustainability was now normative behaviour for firms, but that it also offered business benefits e.g. driving down costs through resource-efficiency and improving the group's reputation.

Table 20 Summary of factors affecting Goshawk's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors			
GHG mitigating actions in general	<u>Regulation and policy context</u> UN Framework Convention on Climate Change had been influential in Goshawk setting a science-based target.	<u>Stakeholders</u> Among stakeholders, investors were the most important driver of climate change-related activity and therefore so were CSR ratings aimed at investors.	<u>Cost-saving</u> Cost-saving – not reputational benefits – was an expected outcome of Goshawk's adoption of science-based targets.	<u>Individuals in the firm</u> CEO and energy procurement team did play an important role in promoting GHG mitigating activities within the firm.
LCECI/RECI use	<u>Cost-saving</u> LCECI/RECI not pursued as a GHG mitigation strategy. Any RECI/LCECI used would have been selected as they were a good deal financially compared to non-RECI/LCECI products.	<u>Reputation</u> One reason why RECI use was rejected was that it was not expected to offer any reputational benefit. LCECI not specifically discussed.		
Energy efficiency/saving	<u>Cost-saving</u> Cost-saving driver meant energy-efficiency/saving was preferred option to LCECI/RECI use.	<u>GHG mitigation target</u> Energy schemes were prioritized over other cost-saving schemes, due to their role in meeting GHG mitigation target. This suggest additional motivation to meeting GHG mitigation target, other than one given of cost-saving.	<u>Individuals in the firm</u> Energy procurement team pushed energy efficiency/saving.	

Self-generation of electricity	<u>Regulatory and policy context</u> Regulatory incentives can alter financial assessment of self-generation projects.	<u>Non-financial resources and capabilities and technical issues</u> Not a significant factor.		
Refrigerant emissions	<u>GHG mitigation target</u> Use of natural coolants was a key element of Goshawk's mitigation target.	<u>Regulatory and policy context</u> Use of natural coolants was also a key part of strategy to meet EU directive on fluorinated gases.	<u>Non-financial resources and capabilities and technical issues</u> Some obstacles in the replacement of fluorinated gases had been encountered.	
Offset use	<u>Cost-saving</u> Rejected in favour of cost-saving options i.e. energy efficiency/saving.	<u>Reputation</u> Rejected as was not expected to offer any reputational benefit.		

8.1.4 EMISSIONS OVERVIEW

Goshawk's first carbon footprint for y/e 2006 included emissions from business travel and paper consumption. The breakdown was: electricity 51%, logistics 21%, refrigerants 9%, heating 8%, paper consumption 8%, business travel 2%. Refrigerant emissions were expected to increase by 15-20% following the replacement of a CFC-based refrigerant R22 as required by EU legislation²³⁶.

Scope 1 emissions were an order of magnitude smaller than scope 2 from y/e 2009-2011, although from y/e 2012 onwards both were in the low millions tCO₂e. As Goshawk has had targets aggregating scope 1, 2 and 3 emissions, I have included scope 3 emissions in this overview. When scope 3 emissions were reported for eight of the 15 scope 3 categories (some were not considered relevant by Goshawk), they were in total roughly double S1+S2. (CDP2010-2015). In contrast to the other cases described so far, emissions from refrigerants were a significant issue.

The Interviewee 1 recommended that I did not use the CDP figures for tracking emissions over time as they were not adjusted to account for update of emission factors, data correction, and portfolio adjustments, and suggested that I used figures from the 2014-2015 carbon report²³⁷. Actually, there is little difference between S1+S2 and the S1+S2+S3 totals based on CDP data and those from the 2014-2015

²³⁶ See section 8.1.6.7, 2007 sustainability report p.43.

²³⁷ Email from Interviewee 1 dated 20 July 2016.

carbon footprint report, although there is some difference around the scale of reasons given for changes in figure. The reasons for year-on-year changes are based on CDP data as there is a longer set of data.

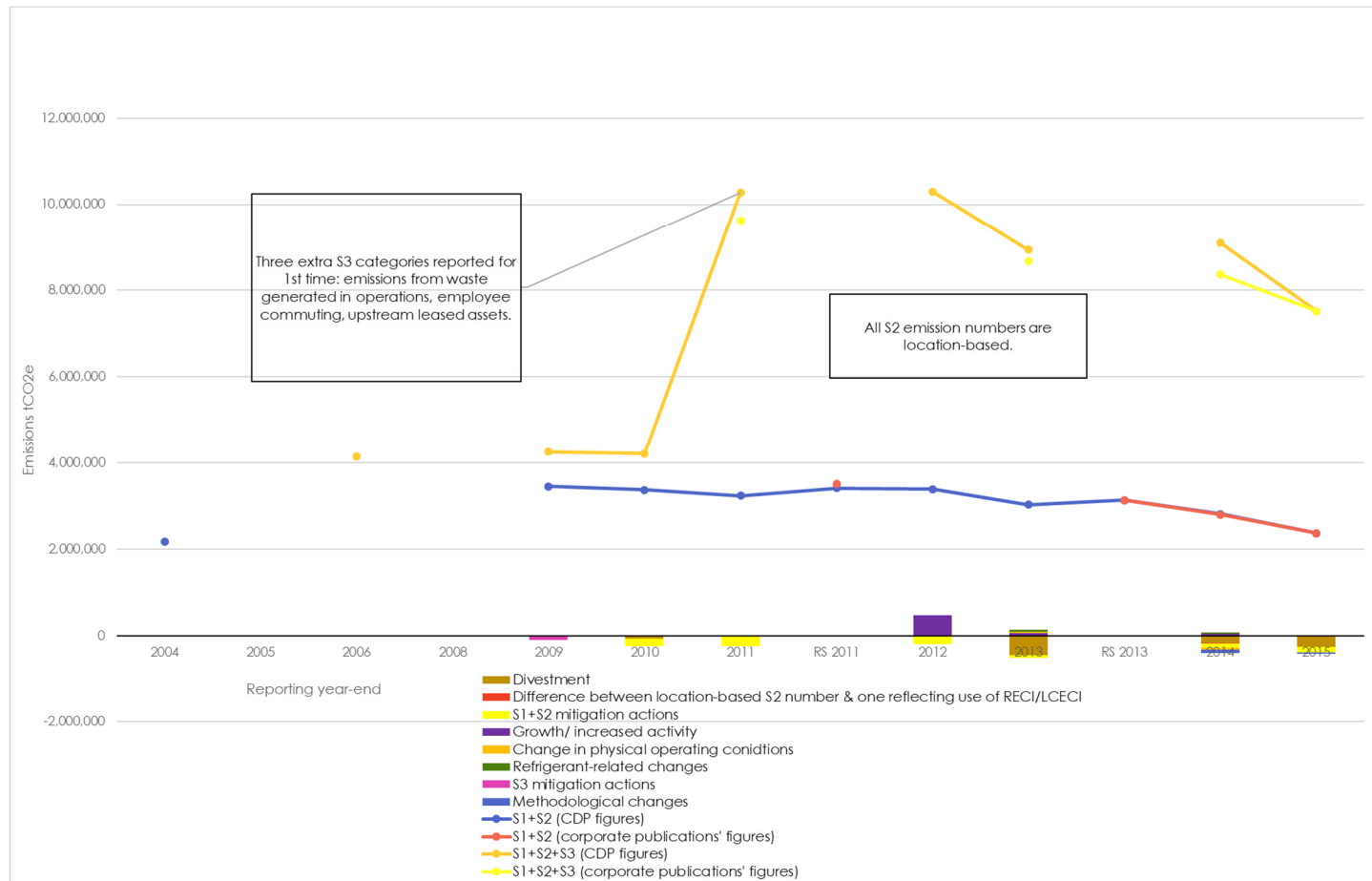
8.1.4.1 Targets

Goshawk has had targets that have included about 40% of emissions within scope 1, scope 2 and selected scope 3 categories, which were normalised by m² selling area²³⁸. The target to reduce them by 20% by 2020 compared to 2011 base year emissions was largely met in 2015. So, in 2016 a new goal was set of a 50% reduction by 2030 compared to 2011²³⁹. In CDP2016, Goshawk's intensity target was also expressed in terms of absolute emissions and was segmented into the three scopes (3.1a). Goshawk said the targets related to scope 1 and location-based scope 2 were science-based targets i.e. what the firm estimated was its share of the GHG emission reductions needed to limit global temperature rise to well below 2°C. This equated to a 64% reduction in scope 1 from a 2011 base year by 2030 and a 56% reduction in scope 2 in the same time-frame. As Goshawk's metric of scope 1, scope 2 and selected scope 3 categories normalised by m² of selling area overarches many business operations and has been consistently used, it is against this emissions metric that its RECI use will later be compared.

²³⁸ CDP2013-2015 3.1b.

²³⁹ Corporate publication y/e 2015 PDF p.2, y/e 2016 corporate responsibility report p.88.

Figure 30 Goshawk's scope 1, scope 2 and reported scope 3 emissions



Sources: See section 14.2.9. This figure is reproduced in accompanying A3 portfolio.

8.1.5 ACTIVITIES RELATED TO EMISSIONS MITIGATION

Goshawk has reported energy efficiency/saving projects, limited use of low-carbon energy contractual instruments, novel energy systems, and steps to reduce the climate change impact of refrigerants.

Beginning with some energy efficiency/saving examples, waste heat from store cooling facilities was captured and used to heat stores²⁴⁰. Steps were undertaken to reduced electricity consumption by refrigeration units which accounted for one-third of electricity consumption e.g. sliding doors on freezers²⁴¹. Subsequently there was more efficient lighting installed and a roll-out of a digital energy metering and control system²⁴². LED lighting was introduced in two subsidiaries²⁴³.

Goshawk reported in CDP2009 (23.8) that it was buying 100% renewable electricity for 250 German stores, but the percentage of low-carbon energy contractual instruments purchased did not exceed 5% of total electricity consumption between y/e 2009-2015²⁴⁴. The term “low-carbon energy contractual instruments” is used because the CDP2013-2015 questionnaires ask information about aggregate use of low-carbon electricity, heat, steam and cooling and the answers do not specify whether the amounts reported are specifically electricity or specifically renewable.

The group had installed used solar heat to both heat and chill the stores of its Mediterranean subsidiaries. Solar-powered air conditioning was trialled²⁴⁵, geothermal heating²⁴⁶, solar water heating²⁴⁷, CHP²⁴⁸, PV panels, further CHP and another geothermally-powered heating/cooling project²⁴⁹.

A further source of significant GHG emission reductions have been reducing refrigerants with high GWPs. Warehouse cooling systems began using ammonia, which does not contribute to global warming or ozone

²⁴⁰ 2004 sustainability report p.48.

²⁴¹ 2007 sustainability report p.44.

²⁴² 2011 sustainability report p.17.

²⁴³ 2012 corporate responsibility report p.31.

²⁴⁴ CDP2010 9.7, 14.4, CDP2011 11.2, 12.2 CDP2012 11.2a, 12.2, CDP2013 11.2, 11.4, CDP2014 11.2, 11.4, CDP2015 11.2, 11.4, CDP2016 CC11.4, 11.5.

²⁴⁵ 2004 corporate responsibility report p.42, 2007 corporate responsibility report p.45.

²⁴⁶ 2010 sustainability report p.6.

²⁴⁷ CDP4 (2006) technology development question.

²⁴⁸ 2011 sustainability report p.5.

²⁴⁹ CDP2016 6.1a.

depletion, in 2002. Goshawk subsequently began trialling carbon dioxide as a replacement for high-GWP coolants, hydrofluorocarbons (HFCs). It committed to phasing out use of global-warming HFC refrigerants in 2010 via the Consumer Goods Forum.²⁵⁰

8.1.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

(RQ1)

8.1.6.1 Individuals in the firm

The Interviewee 1 said that the firm's chief executive officer had been influential on sustainability issues in general. Interviewee 1 said the CEO was convinced that it was no longer sufficient to say that the firm wanted to be a sustainable business, now it had to be sustainable. *"...he just mentioned again that sustainability is not just to say OK we also want to be a sustainable company as it is now you have to. Everybody is doing this. He is really convinced on this. It's an important issue and the company will benefit from it. So, and that's of course makes things easier if your CEO is convinced on a particular topic..."* he said.

The energy procurement team firmly backed an agenda of reducing energy consumption and pushed the topic within Goshawk (Interviewee 1).

In summary, the CEO and energy procurement team played an important role in promoting GHG mitigating activities within the firm.

8.1.6.2 International experience

The group operated in multiple countries during the period under investigation e.g. 24 in 2002 and 32 in 2014²⁵¹. The 2002 Sustainability Report (p.4) says 44.4% of its sales were outside Germany. There was no evidence of this having a bearing on its GHG mitigation activities. In fact, EU legislation on refrigerants with higher GWPs had been influential in the other direction; the group intended to apply it to its non-EU stores too (Interviewee 2).

No evidence detected.

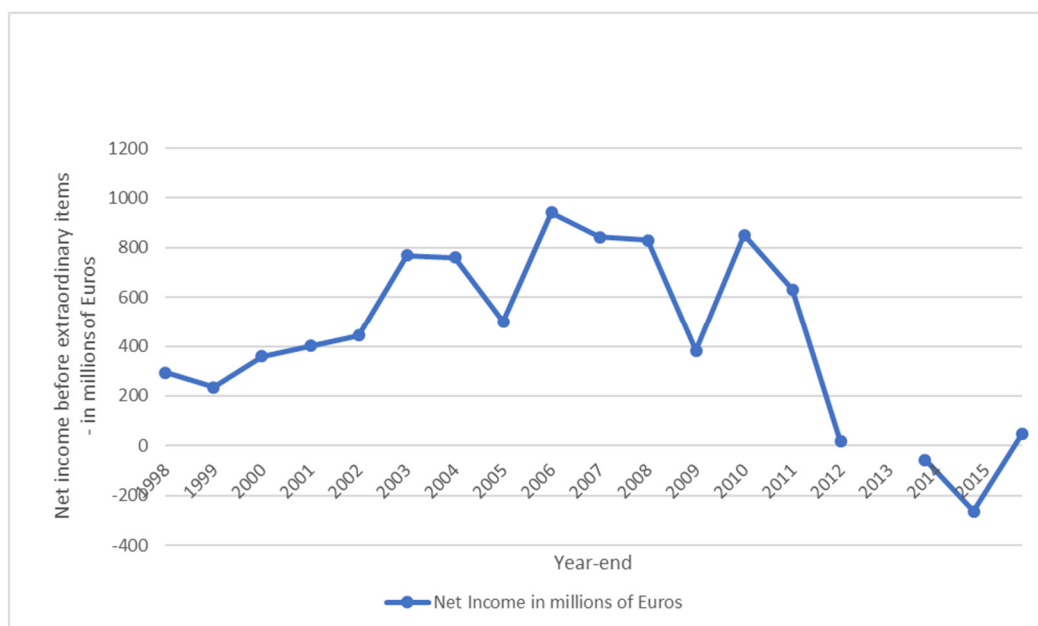
²⁵⁰ See section 8.1.6.7, 2004 sustainability report, 2007 sustainability report pp.46-47, y/e 2014 corporate responsibility report p.37.

²⁵¹ 2002 Sustainability Report, CDP2014 CC0.1.

8.1.6.3 Available finances and cost saving

I asked about the availability of finance was for GHG mitigating measures, but it was not given as a significant limitation on selection of mitigating activities (Interviewee 2). Neither was it raised in documents, although the graph of my available finance proxy - net income before extraordinary items – does show a period of leaner years (see Figure 31).

Figure 31 Goshawk's available finance



Source: Thomson One Reuters Fundamental database accessed 16 April 2018.

There had been a dedicated budget for both energy efficiency and reducing refrigerant emissions. The energy management budget was €24.7 million in 2011²⁵² and considerably less in €14.4 million in 2012, perhaps reflecting this downturn²⁵³. To give a sense of scale, the group reported spending about €300 million a year on electricity and heat/fuel in CDP2010 (3.5), rising to €600 million in CDP2016 (5.1a). It is estimated that switching to lower GWP coolants and natural coolants would cost more than €100 million (CDP2016 5.1a). Energy costs were more than 5% but less than or equal to 10% of total operating costs in y/e 2011 (CDP2012 12.1) and less than or equal to 5% of total operating costs in y/e 2015 (CDP2016 CC11.1).

²⁵² CDP2010 2.2a.

²⁵³ CDP2012 3.3c.

Goshawk was interested in the potential of renewable energy to provide some protection against the price volatility of fossil fuels²⁵⁴, but the Interviewee 2 said this was influenced by financial case which in turn was affected by the tax incentives. For example, in Germany the tax incentive to invest in CHP had been removed and as a result the return on investment fell below their internal requirement.

Turning to the process to access internal budgets, Interviewee 2 said the payback period for energy-efficiency projects was four years and some energy efficiency/saving projects had been approved automatically if they had shorter payback periods (CDP2012 3.3c). In CDP2016 Goshawk reported longer maximum payback periods for energy efficiency projects than for other types of schemes (CC3.3c) and a carbon price of 25 €²⁵⁵ had been applied to improve the financial case for energy-saving measures.²⁵⁶

Cost-saving was a strong driver of its GHG mitigation work. Goshawk had chosen to focus on energy-efficiency/saving that produced on-going financial savings, rather than energy attribute certificates that were an on-going expense. Interviewee 2 said Goshawk had not prioritised publicising its work to improve its sustainability and reputation was not the main driver of its adoption of a science-based target; it was expected there would be cost-savings as a result. However, an earlier explanation of the motivation for its climate change work does give a wider range of motivations.

“We are convinced that our climate change strategy will help to gain advantages over our competitors. The climate change strategy will help to improve the management of costs, to contribute to higher flexibility and to increase our market share and reputation.” (CDP2010 2.2a)

In summary, available finance does not seem to have been a major constraint on energy efficiency/saving measures or steps to phase out use of fluorinated refrigerant gases. The financial evaluation of the self-generation of energy has been more dependent on fiscal incentives. While cost-saving has been the driver of Goshawk’s GHG mitigating efforts, it has prioritised energy-efficiency/saving projects over other projects with cost-saving potential. This has been explained by their role in achieving Goshawk’s GHG mitigation target. However, this suggests an additional motivation to achieve the target – other than saving money – such as reputation and/or organisational values.

²⁵⁴ CDP2012 6.1.

²⁵⁵ Units are not specified but it is presumably per tonne CO₂e.

²⁵⁶ Email dated 23 March 2018 from Interviewee 2.

8.1.6.4 Non-financial resources and capabilities and technical issues

Although Goshawk had a problem with the siting of one of the wind turbines, in general technical knowledge was not a barrier to self-generation of energy; expertise could be sourced externally (Interviewee 2). However, there have been restrictions on its switch to low-GWP refrigerants due to their viability in hotter climes and safety considerations (2012 sustainability report p. 32) and the availability of alternatives and/or legal requirements in particular countries (Interviewee 2).

In summary, some technical and legal obstacles had been encountered regarding low-GWP refrigerants, but in general the availability of non-financial resources and capabilities was not an issue.

8.1.6.5 Stakeholder influence

Goshawk used the term “*corporate social responsibility*”, “...which comprises the responsibility for a proactive protection of the environment in the same way as aspects of personnel and social policy” (CEO statement in 2004 sustainability report), but later adopted “*corporate responsibility*” to avoid a misleading impression that it did not cover environmental concerns. Interviewee 2 confirmed that Goshawk’s view of corporate responsibility was aligned with the benchmark description of CSR that I used from Crane, Matten and Spence (2013). This includes a consideration of stakeholders.

Goshawk counted among its stakeholders: employees, customers, shareholders, and suppliers as well as political, ecological, and cultural interest groups and the public at large (2002 sustainability report p.20). The firm saw managing its business in a socially-responsible fashion as critical to its long-term success and it geared itself towards the concerns of its stakeholders (2007 corporate report p.2). Goshawk’s approach is further exemplified by the following statement from the 2013-2014 sustainability report (p.7):

“In the light of the global challenges we have already described, our company has a responsibility to go beyond legal requirements in reconciling economic goals with society’s requirements and the demands of our customers, staff, investors and partners. At the same time, we have to remain within the boundaries imposed by the environment...”

Among its stakeholders, investors were the most important driver of climate change activity and therefore so were the CSR ratings, aimed an investor audience (Interviewee 1). Goshawk’s performance on the Dow Jones Sustainability Index (DJSI), which is based on assessments by the rating agency RobecoSAM, was a factor in the remuneration paid to its senior executives (2015-2016 corporate responsibility report, p.34). In y/e 2014 it changed its accounting practices in part due to a request to all firms from the DJSI regarding restatements to account for mergers, acquisitions and divestments (Interviewee 1). Goshawk reported a science-based target in CDP2016, the same year in which CDP started to incentivise the setting of science-based targets via its scoring methodology (CDP 2016a and b). However, the

Interviewee 2 was clear that the decision was an internally-motivated one, aided by the impetus of COP21, the UNFCCC meeting in Paris in 2015.

Goshawk's operational emissions were not a pressing issue with customers (Interviewees 1 and 2). In 2016 an analysis of the significance of issues to stakeholders was conducted for the first time²⁵⁷. No issues that directly related to Goshawk's own internal operations were flagged up. The most important issues related to its supply chain or the products sold. Goshawk speculated on the cause of this.

"One reason for this might be that, just like high product quality, measures in this area are now considered a given by external stakeholder groups. However, since we consider these issues to be important, we have decided to continue to report on our goals, measures and progress with respect to the protection of resources and the climate." (2015-2016 corporate responsibility report p.34)

In summary, among its stakeholders, investors were the most important driver of climate change activity and therefore so were the CSR ratings aimed at them.

8.1.6.6 Other firms

Goshawk monitored its competitors' activities but considered itself a front-runner on GHG emission reductions (Interviewee 1). Although Goshawk acted in concert with other members of the Consumer Goods Forum regarding the replacement of fluorinated refrigerant gases with natural coolants, Interviewee 2 emphasised meeting Goshawk's mitigation target and regulation as motivations for this work on coolants.

Goshawk did act with other firms to announce policies to curb emissions from refrigerants but emphasised other drivers behind this action.

8.1.6.7 Regulatory and policy context

The main impacts of climate change-related regulation on Goshawk have been via EU regulations on refrigerants as well as government incentives for generation of renewable electricity and the indirect impact of the outcome of the UNFCCC meeting in Paris in 2015.

The Montreal Protocol to protect the ozone layer led to the EU directive EC 2037/2000 that phased out refrigerants such as chlorofluorocarbons (CFCs). Typically, they were replaced by hydrofluorocarbons

²⁵⁷ CDP2016 CC14.4a, 2015-2016 corporate responsibility report p.1, 31-32.

(HFCs), but these had about double the global warming potential²⁵⁸. Directive EC 517/2014 bans fluorinated greenhouse gases in new equipment, such as supermarket refrigerators, where alternatives exist, and seeks to limit leaks in existing equipment. The directive anticipated the 2016 amendment to the Montreal Protocol to mandate significant reductions of HFC use by 2050.²⁵⁹

In advance of this latest amendment, Goshawk committed to phase out HFCs from 2015, via an announcement by the Consumer Goods Forum, a network of retailers and manufacturers²⁶⁰. This announcement in November 2010 coincided with the UNFCCC's climate negotiations in Cancun, Mexico. The announcement committed members of the Consumer Goods Forum – comprising more than 650 firms - to use only natural cooling agents, e.g. carbon dioxide, in new refrigeration equipment from 2015 where these agents were available to buy and legally permitted. It was made following governments wrestling to decide a phase-out of HFCs (CDP2016 CC2.3c, *ENDS Report* 2010). This commitment was widened by Goshawk to include cooling units that were due to be retrofitted where this was technically feasible (CDP2014 CC2.2a). Interviewee 2 said its cessation of fluorinated refrigerant use was a key move to achieve its GHG mitigation target (email dated 23 March 2018). Goshawk also reported that some countries e.g. Norway, Spain and Denmark had introduced taxes on refrigerants with high GWPs. The programme to switch to use of only natural coolants or those with lower GWPs was costed at an additional 100 million €²⁶¹.

Government incentives had stimulated investment in generation of electricity. There had been a tax incentive in Germany to invest in CHP, but that had been removed and as a result the return on investment fell below the group's internal requirement for CHP in Germany, although a CHP system had just been installed in an overseas store. (Interviewee 2) State subsidies had encouraged the group to trial less common energy systems e.g. a solar-powered chiller (Italy) and geothermally-powered heating and cooling (Germany) (CDP2016 CC6.1a).

The UNFCCC meeting in Paris in 2015 created "*a back wind*" said Interviewee 2 that encouraged Goshawk to set new science-based emissions targets. The Interviewee 2 said that although the financial case for energy-saving measures was strong, the target still needed backing from the top of the firm's hierarchy and the Paris conference was a factor in that coming about.

²⁵⁸ European Council and European Parliament 2000, Goshawk's 2007 sustainability report, p.47. See footnote 2 for an explanation of Global Warming Potentials.

²⁵⁹ European Parliament and European Commission 2014, European Commission 2017.

²⁶⁰ CDP2012 CC2.3a.

²⁶¹ CDP2016 5.1a.

“...because it was an historic event and it generated a moment so it was the right moment to address to the decision boards and to ourselves that we need a new kind of protection target and this one should be ambitious and contribute to the maximum two-degree goal or should be related to this. Because of this moment, it contributes to this very fast decision to come up with this ambitious target.” (Interviewee 2).

In summary, regulation had been a factor in the GHG mitigation activities of Goshawk in terms of use of alternatives to fluorinated gases and self-generation of energy. The policy context of the UNFCCC meeting in Paris created momentum that hastened the firm’s setting of a science-based target.

8.1.6.8 Organisational values

In the 2015-2016 corporate responsibility report (p.34), Goshawk said its own evaluation of the need to protect resources and the climate motivated its decision to continue to report on related metrics, irrespective of the low level of interest from stakeholders.

In summary, Goshawk’s own values influenced its prioritisation of climate change mitigation.

8.1.6.9 Reputation

Reputation was a consideration in Goshawk’s GHG mitigation choices e.g. in its decision not to use RECI. The Interviewee 1 said that colleagues working directly with customers said their use would not lead to a better reputation. RECI use might be considered after energy saving/efficiency options had been exhausted, but there were still many to implement. Offset use was rejected for similar reasons to RECI i.e. they would be an ongoing cost with no reputational advantage. (Interview).

In summary, the expected lack of reputational gain was a consideration in the rejection of the use of RECI and offsets.

Table 21 Summary of factors affecting Goshawk's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	CEO and energy procurement team played an important role in promoting GHG mitigating activities within the firm.
International experience	No evidence detected.
Available finances and cost-savings	Available finance does not seem to have been a major constraint on energy efficiency/saving measures or steps to phase out use of fluorinated refrigerant gases. Self-generation of energy has been more dependent on fiscal incentives. While cost-saving has been the driver of Goshawk's GHG mitigation efforts, there may be another motive(s) to achieving GHG mitigation target – other than saving money - e.g. reputation and/or reputation.
Non-financial resources and capabilities and technical issues	Some technical and legal obstacles had been encountered regarding low-GWP refrigerants, but in general non-financial resources were not an issue.
Stakeholders	Among stakeholders, investors were the most important driver of climate change activity and therefore so were the CSR ratings aimed at them.
Other firms	Goshawk did act with other firms to announce policies to curb emissions from refrigerants but emphasised other drivers behind this measure.
Regulation and policy context	Regulation had been a factor in the GHG mitigation activities of Goshawk in terms of use of alternatives to fluorinated gases and self-generation of energy. The policy context of the UNFCCC in Paris in 2015 created momentum that hastened the firm's setting of a science-based target.
Organisational values	Goshawk's own values influenced its prioritisation of climate change mitigation.
Reputation	Expected lack of reputational gain was a consideration in the rejection of the use of RECI.

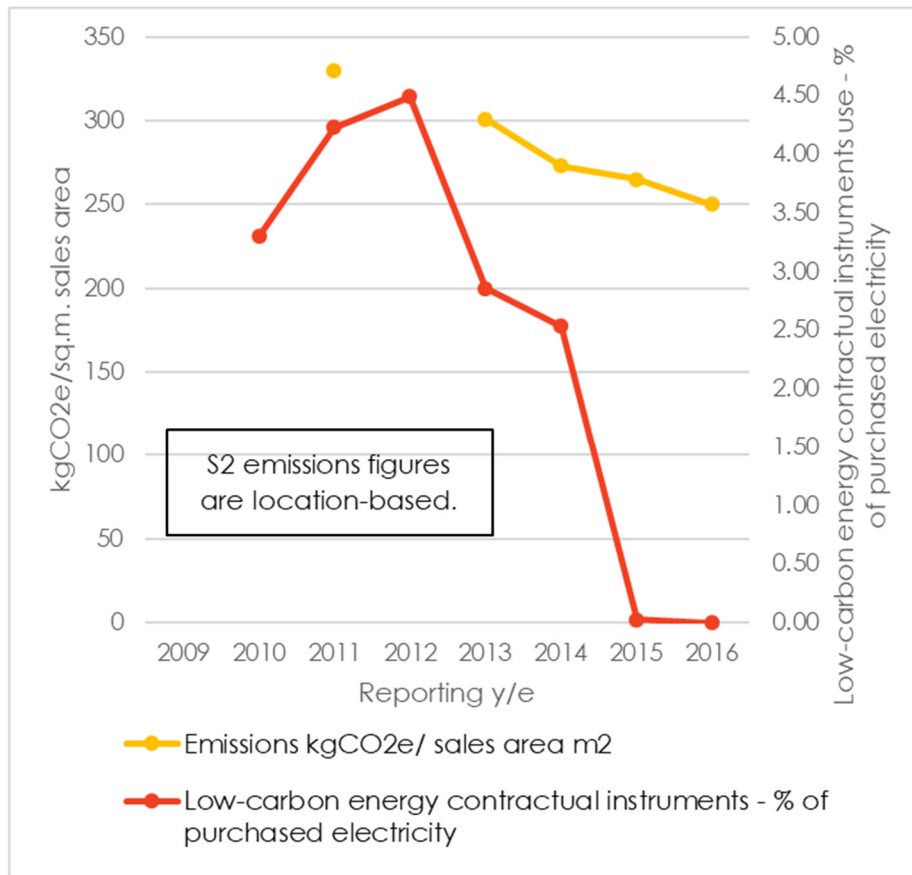
8.1.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES (RQ2)

Goshawk has made limited use of low-carbon energy contractual instruments²⁶². The percentage of electricity covered by LCECI did not rise above 5% between y/e 2009-2015. To compare this with Goshawk's emissions intensity, I looked at Goshawk's main GHG mitigation target which until CDP2016 was an intensity target encompassing scope 1, scope 2 and selected categories of scope 3 emissions per m² of selling area²⁶³. It is therefore against that intensity metric that I considered the effect of Goshawk's use of low-carbon energy contractual instruments.

²⁶² The term "low-carbon energy contractual instruments" is used because in some instances the figures used relate to acquired e.g. bought steam, heat and cooling as well as electricity and have not been specifically labelled renewable. See 14.2.9.

²⁶³ Corporate responsibility report y/e 2016, pp.40-41.

Figure 32 Goshawk's emissions intensity and % consumed electricity covered by low-carbon energy contractual instruments

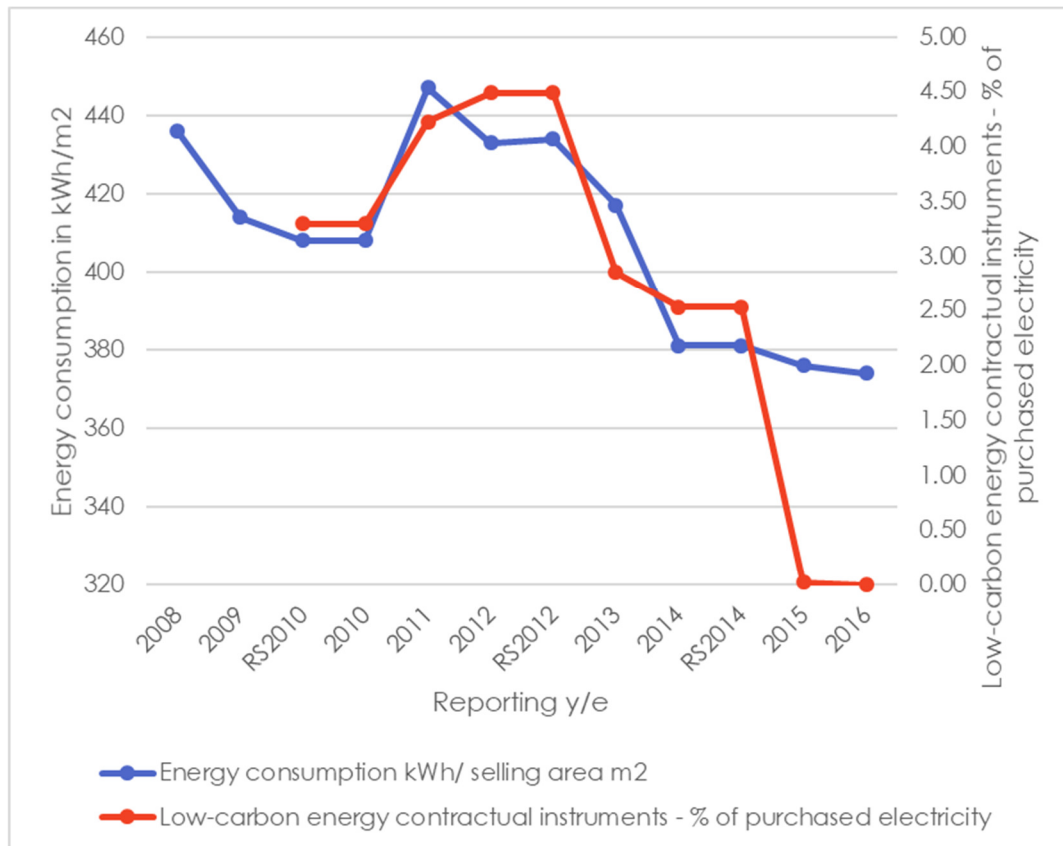


Sources: see section 14.2.9.

This shows emission intensity declining while the LCECI percentage was falling, suggesting a possible relationship. To investigate further, I assembled an energy data series using Goshawk corporate publications²⁶⁴.

²⁶⁴ Goshawk has not published electrical intensity figures.

Figure 33 Goshawk's energy consumption intensity and % consumed electricity covered by low-carbon energy contractual instruments



Sources: see 14.2.9.

This graph reinforces the perception of a connection as there is one extra year of data available for y/e 2010 and this extends the similarity between the shape of the two plots. When shown the graph, Interviewee 2 said that he was not aware of this pattern (email 23 March 2018). Therefore, I can only speculate on whether there is any causal link.

The graphs could be interpreted as LCECI use displacing other GHG mitigating activities. As the shape of the plots are quite well-aligned, those activities would have to have a short-term effect only, which restricts what they could be. Even a behavioural change campaign for employees might have an effect that exceeds the campaign's duration. Another point that argues against an association is that the use of LCECI was so low that it seems unlikely that it could be connected to such large changes in emissions and energy intensity.

To investigate this further, I looked at how much money would have been available for other actions if LCECI had not been bought. Interviewee 2 said LCECI were used where they were the best financial deal. This fits with the answer given with the answer in CDP2015 and CDP2016 (3.3b) that there were no or no significant additional costs associated with buying renewable electricity over non-renewable options. In

CDP2014 Goshawk said the supply of renewable electricity to a store and a warehouse cost 4,000 € (CDP2014 CC3.3b). It is not specified if this was the total cost of the contract or the premium for it being a renewable electricity contract instrument. However, at a group level, there appears to have been little or no expenditure that could have been diverted to other GHG mitigation measures.

Furthermore, at a group-level, staff did not systematically collect data on LCECI use. They did report it in MWh terms if they happened to find out that sites were using LCECI. However, emissions were calculated using a location-based approach (prior to 2016). This was to avoid the extra work of reflecting the nature of the electricity contracts at different sites²⁶⁵ (Interviewee 1). Given the use of location-based scope 2 figures, I would argue there would not be a diminished focus on other GHG mitigating activities as a result of LCECI use.

However, Goshawk's responses show that LCECI use was focussed on specific sites such as the store and warehouse referenced earlier in this section (CDP2014 CC3.3b) or groups of stores (CDP2009 23.8). At the level of these smaller units of the group's hierarchy, low-carbon energy contractual instrument use might be more significant both in financial terms and in terms of employee focus on other GHG mitigating activities. However, this is beyond the scope of this thesis.

To summarise, Goshawk's use of LCECI had not been a part of the group's GHG mitigation strategy. Consequently, the percentage of purchased electricity that they represent has been small at group level. Yet it seems closely related to the energy consumption per unit of selling area. I cannot explain this. Interviewee 2 said LCECI had been chosen only where it has presented the best financial deal and this is supported by documentary evidence that states there were no or low additional costs for selecting low-carbon energy contractual instruments. Therefore, in the context of the group, there were few financial resources that could have been diverted into other mitigating actions from low-carbon energy contractual instruments use. Additionally, scope 2 emission figures were reported using the location approach prior to 2016. This, I would argue, would help to maintain a focus on other GHG mitigating activities. LCECI use was decided at a lower level of the group's hierarchy, so sums as small as 4,000 € could have greater significance in a store or warehouse's budget. Staff working at these operating units may perceive other GHG mitigation actions, such as energy efficiency/saving, differently if they think their unit is powered by 100% zero-carbon electricity. However, this line of investigation was out of the scope of this thesis.

The results are discussed further in the discussion for RQ2 in chapter 11.

²⁶⁵ Although after 2016 group-level staff decided they would calculate a market-based scope 2 based on the contractual instrument use they knew of.

8.2 UPSILON

8.2.1 DATA SOURCES

This case study is based on public responses to CDP (CDP3 (2005)-CDP2016 with some limited data from CDP2017), corporate publications, a face-to-face interview with a sustainability manager (Interviewee 1) on 10 August 2016, with follow-up calls on 2 September 2016 and 11 November 2016 and emails on 23 February 2018 and 12 September 2018. This manager put me in touch with the former Head of Energy (Interviewee 2) at the group who oversaw energy supply and efficiency. This manager had recently left but had extensive experience of working in both Germany and the UK on climate change-related issues and so could contrast the regulatory and policy contexts. The interview was conducted by phone on 12 September 2016.

8.2.2 CASE DESCRIPTION

Upsilon is a retailer that has been incorporated in the UK throughout its period of public responses to CDP (CDP2006-CDP2016). It is a group of firms with most of its revenue coming from the UK²⁶⁶, although it has operated extensively overseas with ten markets in Europe and Asia²⁶⁷. It was categorised as food and drugs retailing in CDP2007 and food and staples retailing in CDP2016 and has been primarily consumer-facing.

8.2.3 OVERVIEW OF DATA RELEVANT TO RQ1

In 2007 one national newspaper journalist commented that UK supermarkets seemed to be competing on their climate change response. By 2008, three had pledged to become carbon neutral. More widely, groups of influential business people were coalescing around the issue of climate change such as the Prince of Wales Corporate Leaders Group on climate change. However, Upsilon waited until the high-profile UNFCCC summit in Copenhagen in 2009 to pledge to become carbon neutral without buying offsets - a zero-carbon business. This goal shaped its later GHG mitigation strategy.

When the target was set by a former CEO, Upsilon was riding high financially. The plan for meeting the target was sketchy and money was spent without much prior research, leading to redundant or poorly-performing purchases. A later review by the energy team found that the key component of the strategy -

²⁶⁶ 2002 annual report p.2, 2015 annual report p.5.

²⁶⁷ 2002 annual report frontispiece p.2), CDP2016 0.1.

for Upsilon to generate renewable electricity itself - would provide at most 6% of consumed electricity. There followed a reduction in available finance, exacerbated by uncertainty over UK government support of renewable generation, which led to plans to invest in self-generation of renewable electricity and energy efficiency being scaled back.

It was replaced by a strategy that did still involve self-generation of electricity but relied on much greater use of RECI. Upsilon committed itself to use 100% renewable electricity by 2030. Self-generation and PPAs with grid-connected renewable electricity generators would cover at least 50% of consumed electricity with Renewable Energy Guarantees of Origin (REGOs)²⁶⁸ accounting for the rest. Upsilon intended to engage with policy-makers to ensure its REGO purchases encouraged further investment in renewable electricity generation.

Interviewee 2 said REGO use had a CSR motivation as any marketing benefit was small. However, avoiding reputational damage from missing the zero-carbon target was a strong driver for their use - even if energy attribute certificates were an ongoing outlay – as energy efficiency measures could not deliver the GHG emission reductions needed to meet Upsilon's targets (Interviewee 1).

Nevertheless, £150 million was allocated to the energy team for energy efficiency and renewable electricity generation in y/e 2016. On refrigerants, Upsilon had worked with retailers via the Consumer Goods Forum to set common goals to reduce fugitive refrigerant emissions. A notable feature of this case was that Upsilon has experimented with novel fuels and methods of generating its own renewable electricity.

The role of CEO came across strongly in this case. It was a former CEO who decided to commit to the series of challenging targets in 2009 – including the zero-carbon goal - and the current CEO who authorised a more detailed plan to achieve them, although the commitment of managers to climate change mitigation led them to work to ensure that Upsilon's actions in this area were effective.

Concern about the reputational implications of meeting the climate change targets came across as a strong driver of mitigation activity. Projects that might not go ahead on cost-saving grounds would do so because they were needed to meet a climate change objective. Both the interviewees identified NGOs as the stakeholder group that primarily cared about Upsilon's climate change work while Interviewee 2 also identified sustainability ratings. Sustainability ratings are often targeted at investors e.g. CDP and Dow Jones Sustainability Index.

²⁶⁸ REGOs are the UK version of GOs (Re-Diss 2012a).

Table 22 Summary of factors affecting Upsilon's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors						
GHG mitigating actions in general	<u>Stakeholders</u> Upsilon believed customers expected it to manage GHG emissions, even if it was not commonly raised by them as an issue. Sustainability ratings and investors were also given as interested parties. Explicit interest comes from NGOs.	<u>Other firms</u> With other firms, Upsilon created a <i>zeit geist</i> in the UK for businesses to act on climate change in the late 2000s. Climate change has been a field in which Upsilon has sought competitive advantage.	<u>Non-financial resources and capabilities and technical issues</u> Making the group profitable had been the current CEO's priority on taking up post, leaving less time for the CEO to attend to other issues.			<u>Individuals in firm</u> Individuals have played a significant role in shaping the GHG mitigation strategy of Upsilon from former and current CEOs to managers.	
Zero carbon target	<u>Reputation</u> Concerns to preserve reputation led to plans to achieve this target.						
LCECI/RECI use	<u>Reputation</u> Difficulties with plans for self-generation of electricity led to a greater reliance on RECI to meet targets in order to preserve reputation.	<u>Organisational values</u> Perception of CSR driver of RECI use.	<u>Accountancy issues</u> Presented a barrier to a high-level of PPA use, but concern was expected to be diminished a couple of years' time.	<u>Other firms</u> Their use of Power Purchase Agreements (PPAs) was seen as validating Upsilon's preference for this contractual instrument.	<u>Individuals in firms</u> PPAs were seen as more effective driver of additional renewable generation capacity.	<u>Cost-saving</u> PPAs with energy attribute certificates supplied with electricity were seen as a better deal financially than certificates bought separately from electricity.	<u>Stakeholders</u> Expert stakeholders – among them NGOs – had informed Upsilon's choice of RECI.

Energy efficiency/saving	<u>Available finance</u> A constriction in available finance had led to plans being scaled back in 2010s.	<u>Cost-saving and reputation/CSR</u> Energy costs were not a major expense and sometimes additional drivers such as CSR or protecting the firm's reputation by meeting GHG mitigation targets were needed for energy efficiency/saving measures to go ahead, even if they do save money.	
Self-generation of electricity	<u>Non-financial resources and capabilities and technical issues</u> Practical difficulties with self-generation lead to greater reliance on RECI to meet targets.	<u>Regulation</u> Uncertainty over financial support from the UK government did not help plans for self-generation. Wanted recognition of self-generated renewables through CRC Energy Efficiency and more incentives for rent-a-roof PVs.	<u>Legal issues</u> Presented a barrier to leasing roofs for PVs.
Refrigerant emissions	<u>Other firms</u> Has collaborated with other firms to take voluntary action on refrigerant emissions.	<u>Non-financial resources and capabilities and technical issues</u> Technical issues had been encountered in finding alternatives to high GWP-refrigerants in some circumstances	
Offset use	<u>Reputation</u> Concerns about negative image of offsets led to rejection of use.		
Low-carbon fuels	<u>Regulation</u> Changes to Renewable Transport Fuels Obligation led to reduced use of biodiesel.		

8.2.4 EMISSIONS OVERVIEW

Figure 34 shows Upsilon's emissions. Until y/e 2016, scope 2 figures were either explicitly location-based or the amount of purchased RECI/LCECI would have a negligible impact even if a market-based approach was used. A market-based figure was reported for y/e 2016 based on supplier-specific emission factors (Interviewee 1).

Scope 2 figures have consistently been larger than scope 1 by between 36% and 140% (CDP3(2005)-CDP2016). Refrigerant gases were a significant source of emissions – 20% of Upsilon's S1+S2+S3 business travel emissions in its 2009 corporate responsibility report (p.8) and 16% in its 2011 corporate responsibility report (p24).

Initially only business travel was reported out of the scope 3 categories. Upsilon started to report six additional scope 3 categories in y/e 2013. After this, the total of S1+location-based S2+S3 was so large that the scope 3 total is shown separately so the factors that cause the emissions to change year-on-year are visible.

8.2.4.1 Targets

Upsilon has had a range of absolute and relative targets e.g. emissions related to the delivery of a case of goods, a pledge to become a zero-carbon business, and targets to slash scope 3 emissions²⁶⁹, made even before the GHG Protocol's guidance for estimating scope 3 was published in 2011 (GHG Protocol 2011). Some of these targets were changed. Upsilon had two property targets: a 50% reduction in emissions from existing buildings and a 50% reduction from new stores compared to similar stores built in 2006 (CDP2009 23). These had to be merged because they were leading to counterproductive behaviour.

"In all our previous property carbon KPIs, there was a distinction between buildings built before or after 1 March 2006. Initially, this was done so that we could show an absolute reduction in our carbon emissions from the stores that we already had when we set our first targets in 2006. Our colleagues and stakeholders tell us this is confusing. This distinction is also leading us to invest in some projects on one set of buildings, for example those built after 2006, just to hit the annual

²⁶⁹ CDP2009 23, CDP2010 9.2-9.6, CDP2011 3.1, CDP2012 3.1, CDP2013 3.1, CDP2016 CC3.1, CDP2017 CC3.1, 2010 corporate responsibility report (page number not given to avoid identifying Upsilon).

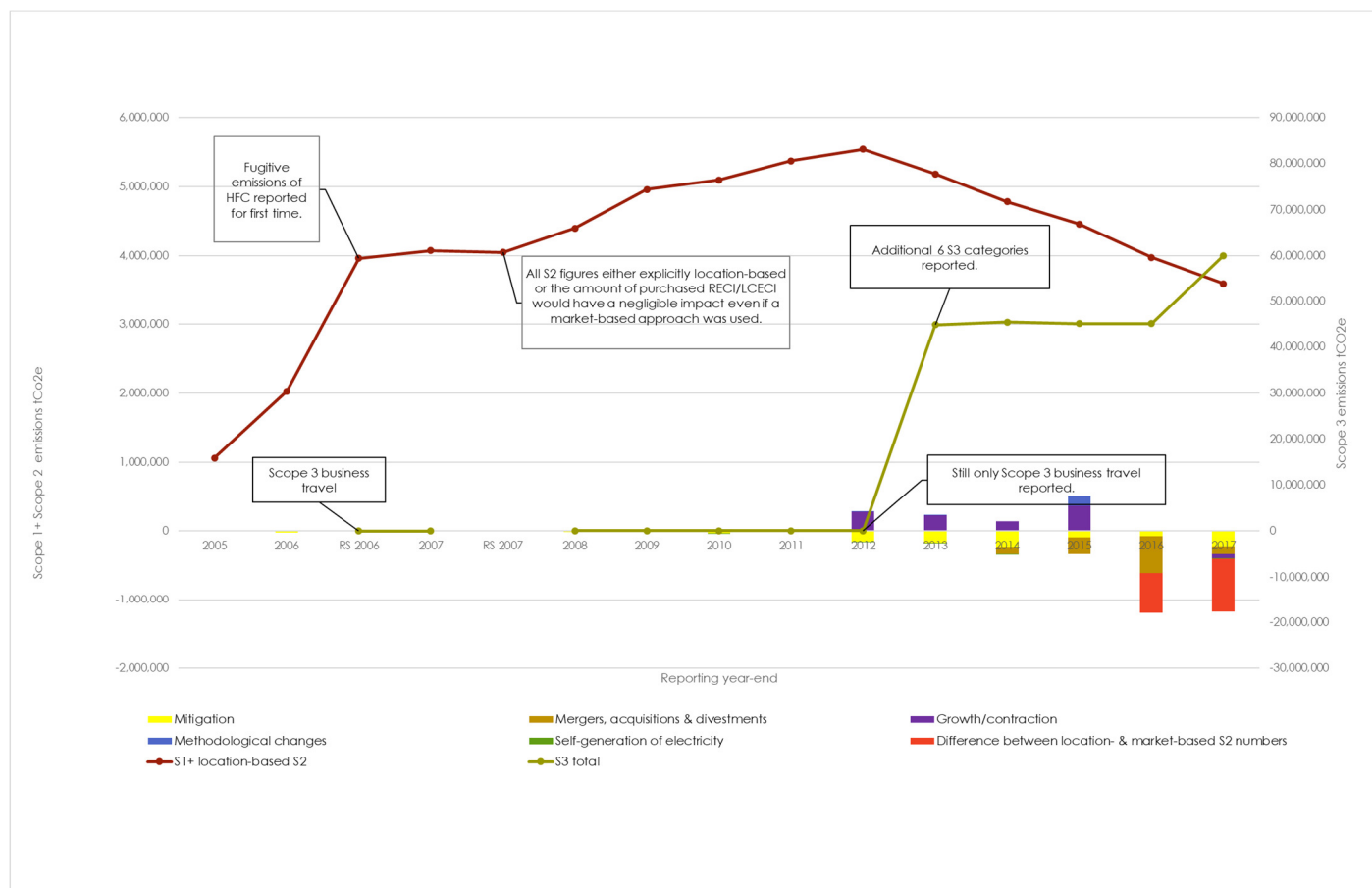
targets when we could actually get greater carbon savings by carrying out more projects on the other set of buildings, the ones built before 2006 in this example.” (CDP2013 3.1b)

There was also a significant change in the breadth of the zero-carbon target, announced in 2009 in the run up to the UNFCCC conference in Copenhagen and due to be achieved by 2050 without the use of offsets²⁷⁰. In CDP2011 it extended across all three scopes (3.1). By CDP2016 the target was specified as relating to scope 1 and market-based scope 2 emissions only (CC3.1). In 2017, Upsilon announced interim targets to becoming a zero-carbon business, including a science-based target that represents Upsilon’s share of the reductions needed to keep warming below 1.5°C. To meet the emission targets, Upsilon set itself a subsidiary target of using 100% renewable electricity across the group by 2030. (Upsilon webpage 2017). Turning to the wide-ranging scope 3 targets that were set, subsequently they have either been more tightly-specified or not mentioned²⁷¹.

²⁷⁰ 2010 corporate responsibility report (page number not given to avoid identifying Upsilon).

²⁷¹ CDP2010 9.2-9.6, CDP2017 CC3.1.

Figure 34 Upsilon's scope 1, scope 2 and reported scope 3 emissions



Sources: see section 14.2.10. This figure is reproduced in the accompanying A3 portfolio.

8.2.5 ACTIVITIES RELATED TO EMISSIONS MITIGATION

This section reviews Upsilon's work on energy efficiency/saving, use of RECI, reducing emissions from refrigerants, self-generation of electricity and use of novel fuels.

Energy-efficiency work included: a store that used 50% less energy than standard and used LED lighting, a programme to reduce energy used for lighting²⁷², giving staff access to real-time energy consumption data, opening more zero-carbon stores with very low energy requirements that are met using biomass waste, improving the fuel economy of drivers, and reducing transport miles by using bigger delivery units²⁷³, opening its first LED-only stores, remote monitoring and management of energy consumption in UK stores, and reducing heat lost through doorways²⁷⁴.

Upsilon was using ammonia, which does not contribute to global warming or ozone depletion, as a coolant in its warehouses and was trialling other low-GWP refrigerants, e.g. carbon dioxide in 2006²⁷⁵. By CDP2016, the refrigerant programme was the biggest GHG mitigation activity reported, 1.5 times larger than the next biggest mitigation activity (CC3.3c). Upsilon has pledged to switch to low-GWP refrigerants, e.g. carbon dioxide, in a commitment made via the Consumer Goods Forum²⁷⁶.

Upsilon was chosen as case based on a report in CDP2008 of 162 MWh of renewable electricity bought – I would infer - via PPAs²⁷⁷. However, this did not prove to be the start of strategic purchases as I will demonstrate in the following text. To meet its 2050 zero-carbon target, announced in 2009, Upsilon intended to generate all its electricity, heat and cooling renewably itself. If there were any emissions it could not eliminate – e.g. in transportation – it intended to generate more electricity than it needed and then pass the excess to the grid. Upsilon was going to estimate the emissions from fossil fuel electricity generation that this activity would displace and deduct this figure from its own emissions to report a net total (2010 corporate responsibility report). This was an accepted practice under the UK government's voluntary accounting guidance of that time (Defra and DECC 2009) and I infer was influenced by the guidance.

²⁷² 2006 corporate responsibility report p.52-53.

²⁷³ 2011 corporate responsibility report p. 26-27. A

²⁷⁴ 2013 corporate responsibility report p.40-41.

²⁷⁵ 2006 corporate responsibility report p.55.

²⁷⁶ CDP 2014-2016 CC2.3c. See the section 8.2.6.7.

²⁷⁷ CDP2008 2(b)(i)(y)(g).

Upsilon started to generate renewable electricity, meeting 1% of its demand, but investment in renewable generation was curtailed due to a reduction in available finance and uncertainty over financial support from the UK government²⁷⁸. A group-wide review of the opportunities for renewable electricity installation by the energy team concluded that at most the group could generate 6% of its consumption (11 November 2016 call - Interviewee 1).

So, the strategy evolved in 2017 to have three components: to improve its energy efficiency and reduce refrigerant emissions, to use renewable electricity, and to engage on climate change policy (Interviewee 1). Upsilon intended to use 100% renewable electricity by 2030. It is a member of RE100, a group for firms that want to increase the supply of renewable electricity by increasing demand, run by The Climate Group and CDP (RE100, 2018). Upsilon's first step was to have REGOs in place for 100% of its electricity consumption in UK and Ireland from 2017. By 2030 it wanted to have more than 50% of its electricity supply coming from a combination of PPAs with renewable electricity generators supplying the grid and on-site generation with the remainder of consumption covered by renewable electricity GOs. This mix was intended to achieve price stability, cost-effectiveness and support for creating additional renewable capacity²⁷⁹.

Upsilon has been a major consumer of electricity, using 0.7-0.8% of total consumption in the UK (Interviewee 2). Interviewee 2 said if Upsilon with other UK big consumers sourced renewable electricity GOs from the UK, they could create a shortage. Interviewee 1 said Upsilon wanted to drive up the price of renewable electricity GOs, so that they reflected the cost of producing renewable electricity. It hoped this would incentivise extra supply and then the price would fall. (Interviewee 1).

"So, I think there's a level of credibility in the REGOs²⁸⁰ where we need to work with the different groups. How can we make the REGO accounting more meaningful? How can we create that market and that drive that more people want them?" (Interviewee 2)

Upsilon had not specified any criteria on its REGO purchase as yet (Interviewee 1).

A further strand of mitigating activities has been the piloting of novel energy technologies:

- A combined cooling, heat, and power plant at one of its overseas operations²⁸¹

²⁷⁸ CDP2015 11.2, Interviewee 1.

²⁷⁹ Upsilon webpage 2017.

²⁸⁰ GOs are called Renewable Energy Guarantees of Origin (REGOs) in the UK (Defra 2013).

²⁸¹ 2009 corporate responsibility report p.9.

- Trialling gas from anaerobic digestion as an energy source²⁸²
- Opening a zero-carbon supermarket with a Combined Heat and Power (CHP) burning biomass waste and excess electricity exported to the grid²⁸³
- An off-grid depot powered by CHP burning food waste²⁸⁴
- Operating a fleet of dual fuel biogas and diesel lorries²⁸⁵
- Installing a ground source heat pump²⁸⁶

8.2.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

(RQ1)

8.2.6.1 Individuals in firm

One of its former CEOs was a prominent advocate for business response to climate change²⁸⁷ and it was during his term in office that the zero-carbon target was set. According to Interviewee 1, the CEO did not know the implications of such a target (11 November 2016 call). The current CEO's support for climate change mitigation was a significant influence in Upsilon's new plan to be zero-carbon (Interviewee 1). Staff members working on sustainability supported action on climate change. They wanted the mitigation targets publicised, so they could use the need to protect Upsilon's reputational as a lever to drive action internally (Interviewee 1).

"My manager is very assertive and enthusiastic. He wants this to be in the public domain, so we have to do it. So, he wants people to be reminded of these targets so gives us more power to go ahead and do things to meet the targets." (Interviewee 1)

There was concern among these sustainability specialist staff members that use of RECI to meet the targets might displace energy efficiency/saving actions as the effect of these actions would not show in scope 2 emission figures. Interviewee 1 said *"Hopefully there won't be any knock-on because we need to*

²⁸² 2009 corporate responsibility report p.13.

²⁸³ 2011 corporate responsibility report p.26.

²⁸⁴ 2011 corporate responsibility report p.26.

²⁸⁵ 2013 corporate publication p.40.

²⁸⁶ 2013 corporate publication p.40.

²⁸⁷ CDP2010 8.3 and a national newspaper article from 2009. The article cannot be referenced further without identifying Upsilon.

make sure there isn't basically". The manager of Interviewee 1 devised a plan to make this outcome less likely.

There was also concern among these staff members about the effectiveness of energy attribute certificates in stimulating extra renewable capacity. Power Purchase Agreements (PPAs) were seen as more effective. Their concern was reflected in Upsilon's strategy to shift its RECI use from energy attribute certificates to PPAs.²⁸⁸

Individuals have played a significant role in shaping the GHG mitigation strategy of Upsilon from former and current CEOs to managers working on sustainability.

8.2.6.2 International experience

Upsilon has operated extensively overseas although most of its sales occurred in the UK throughout the period studied²⁸⁹. The experience of operating in other countries had not influenced what the group has done domestically; influence had been in the other direction. Upsilon tried to mirror the approach taken by UK government and UK industry in its overseas operations. (Interviewee 1).

No discernible effect.

8.2.6.3 Available finance and cost-saving

Upsilon has dedicated budgets for energy efficiency and low-carbon technologies. These grew from £8 million for energy efficiency in 2005 (CDP3) to £60 million in energy-saving and low-carbon technologies in 2008²⁹⁰.

"I think at that point [Upsilon] was cash-rich and so the energy manager at the time decided he would buy loads of these renewables almost a bit like eco-bling. There was no strategy or process or understanding of where they go and all of that kind of stuff. So, they have got issues with some stuff in storage and other stuff not working well. Even biomass as well we are not getting very good returns." (Interviewee 1)

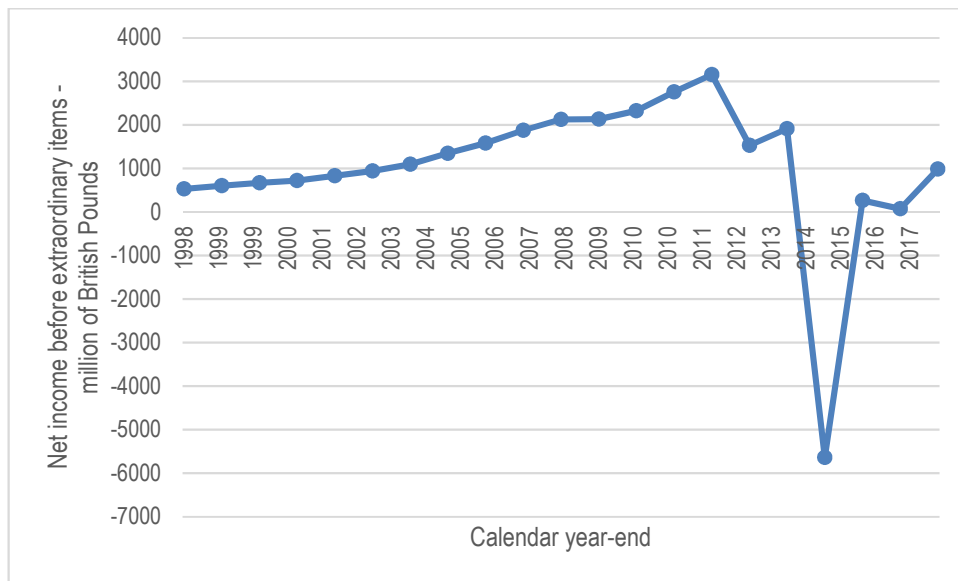
Later during the 2010s available finance was severely restricted at Upsilon – see Figure 35 - and plans to invest in self-generation of renewable electricity and energy efficiency were scaled back²⁹¹.

²⁸⁸ Interview and email dated 12 September 2018 from Interviewee 1, Upsilon webpage 2017.

²⁸⁹ 2002 annual report frontispiece page, p.2, 2015 annual report p.3, CDP2016 0.1.

²⁹⁰ 2009 corporate responsibility report p.7.

²⁹¹ 2015 corporate responsibility report p.5, interview with Interviewee 1, ITV News webpage 8 January 2015.

Figure 35 Upsilon's available finance

Source: Thomson One Reuters Fundamental database accessed 16 April 2018.

Even so £150 million was allocated to the energy team for energy efficiency and renewable electricity generation in y/e 2016 (Interviewee 1). Interviewee 1 said schemes that fell within a three-year payback would be prioritised according to payback period and implemented depending on the availability of internal resources to carry them out. Most had been LED installation (23 February 2018 email from Interviewee 1).

Energy costs (excluding transport fuels) were not a significant outlay. They represented less than 1% of total operating costs in y/e 2008²⁹², and less than or equal to 5% in y/e 2012 and 2016²⁹³. Nonetheless, improvements to energy and fuel efficiency since 2000 had led to reported yearly savings for the group of £150 million in CDP2011 (6.1), £290 million in CDP2013 (6.1b), rising to £280 million in CDP2015 (3.3a). A member of Upsilon's executive team was explicit that CSR activities also had a cost-cutting motivation; *"It's not just about being green for religious reasons, but because it saves money for everyone including business."* (A trade publication in 2012). However, Interviewee 1 said that energy efficiency projects did not always go ahead even if they saved money. Sometimes the additional reason of protecting the firm's reputation was needed to get an energy efficiency project implemented. For example, the energy team's budget had not been before the board before until Interviewee 1's manager had appeared before the board to discuss how the climate change targets would be met. (Interviewee 1). Money would be found for energy attribute certificates - even if they were an ongoing outlay – as energy efficiency measures could

²⁹² CDP2008 2(h)(ii).

²⁹³ CDP2012 12.1, CDP2016 CC11.1.

not deliver the GHG emission reductions needed to meet Upsilon's targets. Power Purchase Agreements direct with generators with the energy attribute certificates supplied with the electricity were seen as a better deal financially than stand-alone energy attribute certificates (Call, 11 November 2016 and 23 February 2018 email – both with Interviewee 1)

"When it is not cost-neutral, we have to have a business case for it and the business case is that it should help us in the future to become zero-carbon easier and make the target. ... if is not financially neutral as long as there is a business case for meeting the targets or doing something that is corporate social responsibility, then we will do it." (Interviewee 1)

In summary, available finance had a major effect on plans for self-generation and a scaling back on energy efficiency/saving actions. Energy costs were not a major expense and sometimes additional drivers such as CSR or protecting the firm's reputation by meeting GHG mitigation targets were needed for energy efficiency/saving measures to go ahead, even if they do save money.

8.2.6.4 Non-financial resources and capabilities and technical issues

Upsilon had encountered technical issues with some electricity self-generation projects in terms getting of the expected output from wind turbines and biomass burners. Interviewee 1 thought the group may even have had wind turbines in storage that it could not use. Another technical issue was the availability of non-HFC refrigeration equipment that would work in hotter conditions and smaller and existing stores (2011 corporate responsibility report, p.26).

A resource that had been in demand was the incumbent CEO's time. The Interviewee 2 said the CEO's priority had had to be on making the group profitable. With that achieved, there was capacity to review a strategy for achieving the targets.

In summary, technical issues had been encountered with renewable electricity self-generation and in finding alternatives to high GWP-refrigerants in some circumstances. Making the group profitable had also been the current CEO's priority on taking up post, leaving less time for the CEO to attend to other issues.

8.2.6.5 Stakeholder influence

Upsilon uses the term *"corporate responsibility"*. However, the Interviewee 1 agreed that it fitted with the description of CSR given by Crane, Matten and Spence (2013). This entails the recognition of stakeholders. Upsilon lists as its stakeholders: customers, employees, investors, suppliers, government, media and non-governmental organisations (2009 annual report p.38). Its corporate documents have statements on its need to focus on stakeholders' expectations, particularly customers'. For example, *"If we fulfil our customers' needs – not just in their homes but in their communities and in broader society – they will repay us with their custom and their loyalty."* (2010 corporate responsibility report, CEO's statement,

p.3)²⁹⁴. While customers generally have not asked what Upsilon has done on climate change action, the firm believed that there was an expectation that it will mitigate its emissions (Interviewee 1).

Investors concerned with Socially Responsible Investment had climate change and energy efficiency among their top issues in the 2006 corporate report (p.13). While the 2009 corporate responsibility report (p.52) identified NGOs as the stakeholder group that specifically wanted action on climate change. This was the impression of the Interviewee 1 (email, 23 February 2018) and Interviewee 2 who said, that rather than the customer, it was the specialised stakeholders such as CDP, Greenpeace and WWF or the sustainability rating agencies that were interested in its climate change approach. The views of NGOs WWF and Greenpeace and the Carbon Trust, a firm specialising in business action on climate change²⁹⁵, had informed Upsilon's choice of RECI. Interviewee 1 said they were concerned about the effect of GO purchase in stimulating extra renewable generation capacity²⁹⁶.

The Interviewee 2 said that RECI purchase had a CSR agenda, which this section has linked with stakeholders; *"I wouldn't see any other driver for it. I think the marketing benefit of buying REGOs is marginal."* This fits with a comment from the Interviewee 1 who said *"...if is not financially neutral as long as there is a business case for meeting the targets or doing something that is corporate socially responsibility, then we will do it."*

It was noticeable that in the 2006 corporate responsibility report, climate change had five pages devoted to it in the 74-page report whereas in the 2016 report the dominant issue was food waste, suggesting a changed assessment of what concerned stakeholders.

In summary, Upsilon believed customers expected it to manage GHG emissions, even if it was not commonly raised by them as an issue. Investors and particularly sustainability ratings and NGOs were given as interested parties. Expert stakeholders – among them NGOs – had informed Upsilon's choice of RECI.

8.2.6.6 Other firms

Competitors tried to outdo one another on climate change action (Interviewee 1). The Interviewee 2 noted that in the late 2000s there was a cohort of CEOs of large, UK-incorporated firms that were outspoken about the need for businesses to act to mitigate climate change. Archival evidence substantiates this observation. In 2005 the Prince of Wales launched the Corporate Leaders' Group *"...to accelerate*

²⁹⁴ Similar point made in 2015 corporate responsibility report p.4.

²⁹⁵ Carbon Trust (n.d.)

²⁹⁶ Email dated 12 September 2018 from Interviewee 1.

progress towards a low carbon, sustainable economy." ("The Prince of Wales's Corporate Leaders Group' n.d.). Two years later the employers' group, the Confederation of British Industry (CBI), had climate change as one of the top agenda items at its annual conference (Birmingham Post 2007). John Willman of *The Financial Times* reported that the first major policy initiative of the new director-general of the CBI, Richard Lambert, was to launch a climate change task force made up of leaders from some of the UK's best-known businesses (Willman 2007).

One journalist saw a competition on this issue in the UK supermarket sector. In 2007 the retail correspondent of a major UK newspaper described the forthcoming announcement of a climate change initiative by Upsilon as ending "*...the busiest week yet for retailers jostling for pole position in the race to save the environment.*" The article said Upsilon's climate change commitments had so far fallen short of the carbon neutral pledge made by another food retailer (newspaper webpage 2007²⁹⁷). By 2008 three retailers had made carbon neutral pledges.²⁹⁸ However, Upsilon waited until October 2009 and the approach of the Copenhagen UNFCCC climate change summit to pledge to become carbon neutral without the use of offsets or a zero-carbon business (2010 corporate responsibility report).

Two years later a member of Upsilon's top management team said that corporate responsibility activities were part of the "*competitive mix*", could cut costs through reducing resource use, improve the group's brand, and were not undertaken for moral reasons alone (a trade publication in 2012²⁹⁹).

With other members of the UK trade organisation, the Consumer Goods Forum, Upsilon pledged to start from 2015 to switch to lower-GWP refrigerants, e.g. carbon dioxide, where they were available and legal. This was the same position as the German branch of the Consumer Goods Forum³⁰⁰ of which Goshawk was a member. Upsilon had been specifying HFC-free small fridges from 2005 (2006 corporate responsibility report p.55).

In deciding how to reach the 2050 zero-carbon target, Upsilon has decided to try to switch to large extent from energy attribute certificates bought separately from electricity to Power Purchase Agreements (PPAs), which are contracts direct with generators and could be specified so that energy attribute certificates are supplied with the electricity. (Upsilon webpage 2017) PPAs have been a little used contractual instrument. However, their use is growing. (RE100 2018) Interviewee 1 said Upsilon's competitors were using PPAs and implied this was seen as validating its decision to do likewise.

²⁹⁷ Article cannot be specified further without identifying Upsilon.

²⁹⁸ Source cannot be specified further without identifying Upsilon.

²⁹⁹ Article cannot be specified further without identifying Upsilon.

³⁰⁰ CDP2012, 2014-2016 CC2.3c.

Upsilon had been part of a *zeit geist* in the UK for businesses to take action on climate change in the late 2000s. Climate change has been a field in which Upsilon has sought competitive advantage. However, it has collaborated with other firms to take voluntary action on refrigerant emissions. Other firms' use of PPAs was seen as supportive of Upsilon's decision to increase their use.

8.2.6.7 Regulatory and policy context

Regulatory changes affected Upsilon, particularly those related to alternative energy sources. Changes to the Renewable Transport Fuels Obligation made the price of biodiesel less favourable and led to a reduction in its use in its distribution fleet³⁰¹. Upsilon objected that there was no exemption from the CRC Energy Efficiency tax for self-generated renewable electricity if the firm was receiving public policy support through the Renewables Obligation scheme³⁰². Upsilon's plans to generate renewable electricity were not aided by uncertainty over financial support from the UK government³⁰³. It lobbied the UK government to improve the financial incentives for it to lease its roofs for PV generation (Interviewee 1).

"Look this is what it is costing us to do the right thing. We need your help to make sure this is actually cost-neutral at least for us because it benefits the community; it benefits us and it should benefit the national targets." (Interviewee 1)

Upsilon also wanted to influence policy to ensure that it is driving new investment in renewables through its REGO purchase (Interviewee 1).

A major strand of emission reduction work was to reduce emissions of fluorinated greenhouse gases. Upsilon joined with other members of the UK's Consumer Goods Forum in 2010 to pledge to phase out HFCs from 2015³⁰⁴. All new stores would use natural refrigerants e.g. carbon dioxide. Existing stores would have the global-warming HFC refrigerants replaced with a lower-GWP alternative and leaks from aged equipment would be minimised until the equipment was replaced. (Email dated 23 February 2018 from Interviewee 1).

³⁰¹ CDP2010 3.3, 3.6.

³⁰² CDP2009 1.1.

³⁰³ CDP2010 3.5, CDP2011-CDP2015 5.1a-b.

³⁰⁴ CDP 2014-2016 CC2.3c.

In October 2009 in the approach to the Copenhagen UNFCCC climate change summit, Upsilon pledged to become a zero-carbon business (2010 corporate responsibility report³⁰⁵).

In summary, uncertainty over financial support from the UK government did not help plans for self-generation. Upsilon wanted recognition of self-generated renewables through CRC Energy Efficiency and more incentives to lease its roofs for PVs. Changes to Renewable Transport Fuels Obligation led to reduced use of biodiesel.

8.2.6.8 Organisational values

There were only limited mentions of organisational values e.g. the Interviewee 2 said that RECI purchase had a CSR agenda; *“I wouldn’t see any other driver for it. I think the marketing benefit of buying REGOs³⁰⁶ is marginal.”* This quote indicates that RECI use may be undertaken for normative reasons, rather than attracting more customers, although there may be other instrumental reasons for engaging in CSR e.g. gaining a good reputation with investors/policy-makers which may increase access to capital/influence on policy. A member of Upsilon’s leadership team suggested that there was a financial driver element to activities that have a societal benefit; *“It’s not just about being green for religious reasons, but because it saves money for everyone including business.”* (Trade publication 2012³⁰⁷) This shows the multiple motivations that can exist for CSR activities.

In summary, there were very limited references to organisational values. There was a CSR driver to RECI use but it was not specified if this was normative or instrumental.

8.2.6.9 Reputation

Protection of reputation was a strong driver of Upsilon’s work to meet ambitious mitigation targets including the aim of being a zero-carbon business by 2050. This concern about reputation was heightened following two waves of negative publicity since 2000³⁰⁸. Interviewee 1 had previously worked for a firm that sold to businesses. Interviewee 1’s impression was that firms selling direct to the consumer had greater reputational pressures. (Interviewee 1). An example of the influence of reputational concerns on the group

³⁰⁵ Page number not specified to avoid identifying Upsilon.

³⁰⁶ In the UK Guarantees of Origin are known as Renewable Energy Guarantees of Origin or REGOs.

³⁰⁷ The publication is not specified to avoid identifying Upsilon.

³⁰⁸ 2010 corporate responsibility report (page number not given to avoid identifying Upsilon), interview and email 23 February 2018 - Sustainability Manager.

was its rejection of the use of offsets because of their negative image in some quarters (call 11 November 2016 - Interviewee 1).

On occasion, the additional driver of protecting the firm's reputation by meeting GHG mitigation targets was needed for energy efficiency/saving measures to go ahead, even if they were expected to save money (see section 8.2.6.3).

Investors and particularly environmental NGOs and sustainability rating agencies were stakeholders identified as particularly interested in Upsilon's climate change approach (see section 8.2.6.5).

In summary, reputation was a strong driver to actions to meet zero-carbon target. Reputational concerns led to rejection of offsets and sometimes cost-saving schemes needed the extra driver of reputational protection to go ahead.

8.2.6.10 Accountancy and legal issues

Upsilon's current climate change strategy was reliant in part on Power Purchase Agreements (PPAs) with renewable electricity generators supplying electricity via the grid. GOs came as part of the contract. However, Interviewee 1 explained that PPAs with renewable electricity generators were generally more expensive than conventional contracts with grid electricity suppliers. They were also long-term contracts and were an unusual item in accountancy terms as depreciation had to be accounted on the electricity consumers' books; hence Upsilon was wary about the use of PPAs, although this concern was expected to be reduced in a couple of years (call, 11 November 2016, Interviewee 1). Interviewee 1 said Upsilon had done a risk assessment and considered that the maximum that could be sourced was 10-15% of total demand. There was legal complexity with the rent-a-roof scheme for PV panels due to the way that Upsilon owns its stores (interview and 23 February 2018 email - Interviewee 1).

In summary, accountancy and legal issues posed barriers high levels of use of PPAs and leasing out roofs for PVs.

Table 23 Summary of factors affecting Upsilon's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	Individuals have played a significant role in shaping the GHG mitigation strategy of Upsilon from former and current CEOs to managers.
International experience	No discernible effect.
Available finances and cost-savings	Available finance had a major effect on plans for self-generation and a scaling back on energy efficiency/saving actions. Energy costs were not a major expense and sometimes additional drivers such as CSR or protecting the firm's reputation by meeting GHG mitigation targets were needed for energy efficiency/saving measures to go ahead, even if they do save money. Power Purchase Agreements (PPAs) with energy attribute certificates supplied with electricity were seen as a better deal financially than certificates bought separately from electricity supply.
Non-financial resources and capabilities and technical issues	Technical issues had been encountered with renewable electricity self-generation and in finding alternatives to high GWP-refrigerants in some circumstances. Making the group profitable had also been the current CEO's priority on taking up post, leaving less time for the CEO to attend to other issues.
Stakeholders	Upsilon believed customers expected it to manage GHG emissions, even if it was not commonly raised by them as an issue. Sustainability ratings and investors were also given as interested parties. Explicit interest comes from NGOs. Expert stakeholders – among them NGOs – had informed Upsilon's choice of RECI.
Other firms	Upsilon had been part of a <i>zeit geist</i> in the UK for firms to act on climate change in the late 2000s. Climate change has been a field in which Upsilon has sought competitive advantage. Has collaborated with other firms to take voluntary action on refrigerant emissions. Other firms' use of PPAs was seen as supportive of Upsilon's decision to increase their use.
Regulatory and policy context	Uncertainty over financial support from the UK government did not help plans for self-generation. Wanted recognition of self-generated renewables through CRC Energy Efficiency and more incentives to lease its roofs for PVs. Changes to Renewable Transport Fuels Obligation led to reduced use of biodiesel.
Organisational values	Very limited references to organisational values. There was a CSR driver for RECI use.
Reputation	Was a strong driver to actions to meet zero-carbon target. Reputational concerns led to rejection of offsets and sometimes cost-saving schemes needed the extra driver of reputational protection to go ahead.
Accountancy and legal issues	Posed barriers to high levels of use of PPAs and leasing out roofs for PVs.

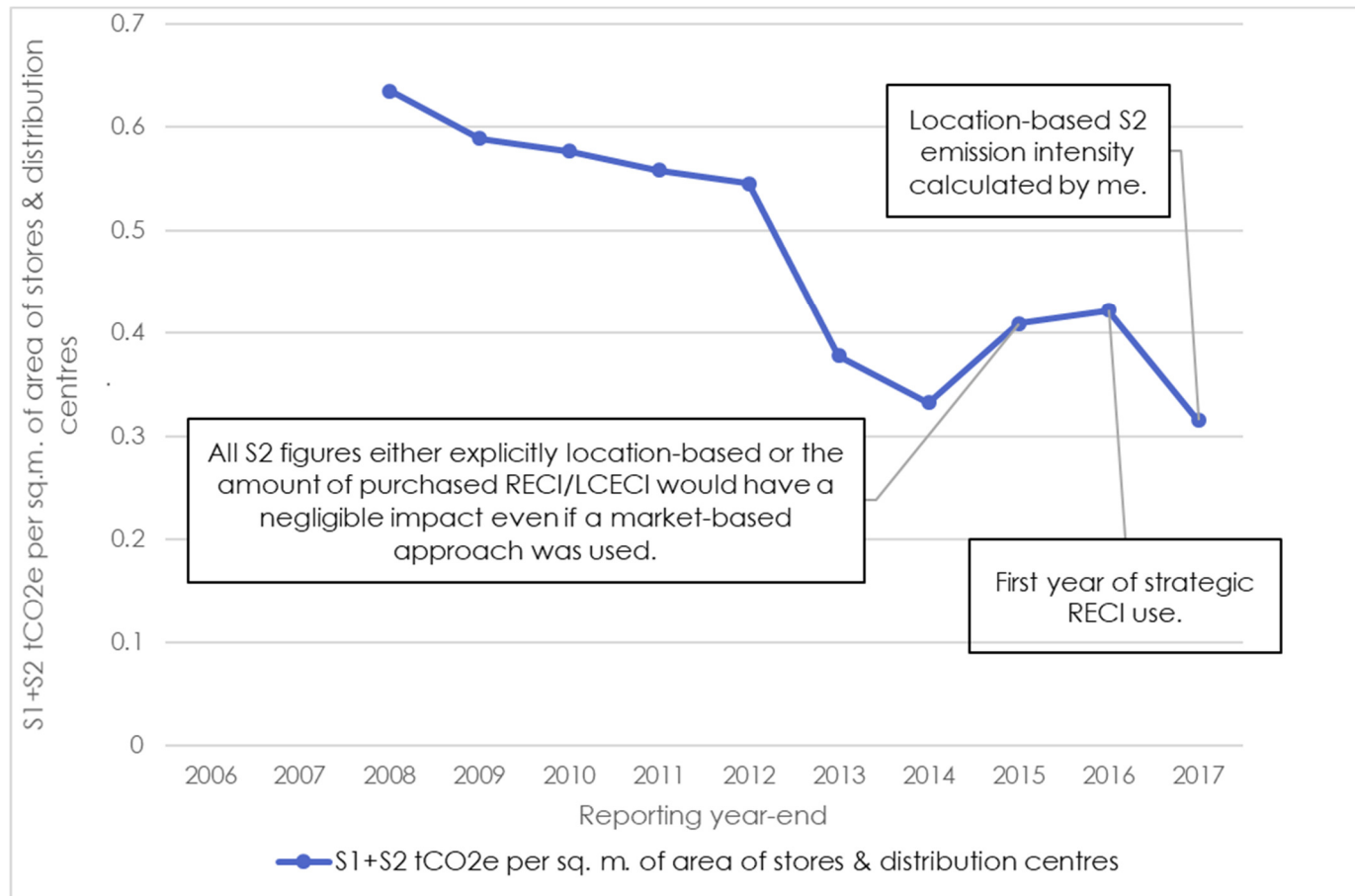
8.2.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

Upsilon began to use RECI strategically and to present a market-based scope 2 figure – as well as a location-based figure- in y/e 2016 after several years of not reporting any RECI purchases. To investigate the effect on other GHG mitigating actions, I looked for changes in emissions intensity, using Upsilon's targets from which to select a metric. As RECI use was recent, I looked at the more recent Upsilon's

targets. Scope 3 emissions were not included in any targets with scope 1 and 2 emissions in CDP2016 except for emissions per case of goods delivered (CC3.1b). So, I used an emission intensity metric which reflected a target based on S1+S2 emissions/ft.² of store and distribution centre area with a due date of 2020 (CDP2013 3.1). I converted all S1+S2 emissions tCO₂e/ft² to emissions/m² to standardise to the units used by the other supermarket cases. Although Upsilon purchased RECI for y/e 2016, it gave a location-based scope 2 figure to report S1+S2 emissions/ft² in CDP2016 (CC12.3) and I was able to calculate a location-based emissions intensity figure for y/e 2017. See Figure 36. I do not have figures for the percentage of consumed electricity covered by RECI.

Figure 36 Upsilon's emissions intensity



Sources: See section 14.2.10.

Figure 36 shows an increase between y/e 2015 and y/e 2016, although Upsilon said it decreased in CDP2016 (CC12.3). Upsilon attributed the reduction to its work on energy efficiency, refrigerant emissions, vehicle fuel use. It said its electricity consumption/ ft² of stores and distribution centres decreased by 1% between y/e 2015 and y/e 2016 due to £30 million of investment in electricity efficiency initiatives (CDP2016 CC12.3).

Upsilon reported a market-based emission intensity figure for y/e 2017 (CDP2017 CC12.3). However, my calculated location-based figure showed a year-on-year decrease. Upsilon said the decrease was due to its continued work on energy and transport fuel use and refrigerant emissions (and the purchase of RECI for most of the change in its market-based intensity figure). So, there has been an increase in location-based emissions intensity and then a decrease since a market-based scope 2 figure was reported, which does not suggest an immediate effect on the firm's focus on other GHG mitigating activities. Furthermore, electricity consumption intensity decreased from y/e 2015 to 2016.

The finding from the quantitative data is supported by comments from the Interviewee 2 who explained that REGO use was “an add-on” that would not be credible without the other measures.

“Looking at what [Upsilon] has done in terms of investment, the big majority of investment was in energy efficiency and then there were smaller projects like a few MW of wind, biofuel, CHP, solar installations, zero-carbon stores and so on which was more trialling technology, trialling concepts, but the big step forward for me was delivered in efficiency...that journey gets us to a certain point. We are making massive progress on that journey, but we will never get to zero. What is the next thing to do and the next thing is to see how we get investment in renewables over our financial hurdles and to source the rest from the market in the most carbon-friendly, environmentally-friendly way. In overall strategy like this it makes sense. If [Upsilon] said it is stop now investing in efficiency and we spend a little premium on buying REGOs. That on its own wouldn't be credible.”
(Interviewee 2)

This view persists with the current staff. The Interviewee 1 expressed concern that the effect of energy efficiency/saving would not show up in market-based scope 2 figures; “Hopefully there won't be any knock-on because we need to make sure there isn't basically”. In a later call Interviewee 1 said the energy team might get a reduced energy efficiency budget if the GHG targets were met through the purchase of energy attribute certificates. However, Interviewee 1's manager had thought of a way of linking the two budgets: the cost of buying energy attribute certificates would be included in the business case for energy efficiency projects. This would reduce their payback period; money saved through energy efficiency would be invested in PPAs, which could have the supply of energy attribute certificates bundled with the supply of electricity. PPAs were seen as more effective in stimulating extra renewable generation capacity and a better deal financially rather than buying energy attribute certificates separately from an electricity supply contract. (Interview and 11 November 2016 call, Interviewee 1).

To summarise, Upsilon only began to use RECI strategically in y/e 2016 to enable it to meet its zero-carbon goal. The evidence does not suggest that RECI use has displaced other mitigating activities in the

two first years of strategic use of RECI and a market-based scope 2 approach, although it is not possible to say whether Upsilon would have decreased its emissions faster if they had not been used. Managers were committed to ensuring that Upsilon's mitigation actions were as effective as possible. A strategy had been developed to ensure that energy efficiency/saving projects were still supported by the reputational driver of meeting GHG emission targets and that the use of PPAs was increased. PPAs were seen as a more effective driver of extra renewable capacity and a better deal financially than energy attribute certificates.

The results are discussed further in the discussion for RQ2 in chapter 11.

8.3 UMBRA

8.3.1 DATA SOURCES

This case study is based on its responses to CDP from CDP1 (2003) to CDP2016 with some limited use of CDP2017. All have been public. I have also used information from corporate publications and a phone interview with the Head of Sustainability – referred to as the Interviewee - on 2 February 2017 who came into post in 2008 and could not discuss Umbra’s environmental management prior to that. This was followed up by written responses on 15 February 2018 and 10 October 2018.

8.3.2 CASE DESCRIPTION

This case is a UK-incorporated group of retail firms with a UK market focus. Most of the group’s revenue came from its supermarket chain (1997 corporate publication p.3). It sold its overseas operations in mid-2000s (2004 corporate report p.7). It was categorised as food and drugs retailing in CDP2007 and food and staples retailing in CDP2016. To the best of my knowledge, it has been wholly consumer-facing with no business-to-business revenue streams.

8.3.3 OVERVIEW OF DATA RELEVANT TO RQ1

The motivation for Umbra to act on climate change was very explicit; it was to act morally, but above all it was to save money and improve its energy security. The Interviewee said that no-one had been pushing Umbra to act as it has done on climate change which would explain why the apparent decline in interest of customers on its climate change activity between the CDP2008 (1(a)(iii)) and 2015 corporate publication (p.5., p.7) had not diminished its activities on this issue. Neither were investors specified as a driving force. Although information on Umbra’s position in sustainability ratings and stock market sustainability indices have been given in its corporate publications, they were not cited as a factor influencing GHG mitigation choices either in the documents or the interview.

The effect of regulation was mixed. Umbra said that Climate Change Levy had led to a marked increase in its energy costs and it entered into a Climate Change Agreement to improve its energy efficiency/savings. Umbra was clear that the costs and administrative burden of the CRC Energy Efficiency scheme was a distraction from its internally-driven mitigation activities.

The Interviewee said the “*compelling*” business case for energy reduction and generation ensured that the necessary capital was available. More government support for renewable technologies would have resulted in more installations. Nonetheless, it had extensive PV arrays.

Umbra has been adventurous in trialling new technologies and has been upfront in pointing out where there have been technical difficulties that have prevented it from expanding their use. The Interviewee

described himself as “*a huge supporter of innovation*”. The Interviewee was also instrumental in Umbra showing an early preference for self-generation of renewable electricity and Power Purchase Agreements (PPAs) over energy attribute certificates and green tariffs.

Umbra seems to have ploughed its own furrow on climate change mitigation. It was an early mover on reducing the GWPs of refrigerants. It did not join other UK food retailers in pledging to become carbon neutral. Neither has it yet joined the rush of firms setting science-based targets³⁰⁹, although it did say in CDP 2017 (3.3a) that it expects it will in the next two years. This fits with the motivations given by the Interviewee: that the driving force to do this amount of work on climate change is coming from within the group and is driven by commercial needs.

³⁰⁹ See footnote 50.

Table 24 Summary of factors affecting Umbra's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors		
GHG mitigating actions in general	<u>Organisational values</u> Improving its sustainability had a clear commercial driver. Umbra wanted to “do the right thing”, but within limits set by the financial costs.	<u>Individuals in firm</u> Interviewee (Head of Sustainability) had two significant influences: a passion for innovation which supported Umbra's use of novel technologies and a concern about greenwashing which led to focus on mitigating operational GHG emissions through action in the UK.	
LCECI/RECI use	<u>Individuals in firm</u> Interviewee wanted Umbra to take credible mitigating action in UK, where its operational emissions were generated. Power Purchase Agreements were preferred over energy attribute certificates as they would be with UK generators and so were seen as more credibly related to Umbra's electricity consumption.		
Energy efficiency/saving	<u>Cost-saving</u> This drove energy efficiency/saving and the CRC Energy Efficiency did little to augment this.		
Self-generation of energy	<u>Regulation</u> This was sensitive to regulatory incentives.	<u>Cost-saving</u> The financial case for self-generation was seen as compelling.	<u>Security of supply</u> Was seen as reducing risk of reductions in power availability.
Refrigerant emissions	<u>Regulation</u> UK government was influential in encouraging a shift to low-GWP refrigerants.	<u>Non-financial resources and capabilities and technical issues</u> Some technical difficulties had been encountered in switching to low-GWP refrigerants.	<u>GHG mitigation</u> This was given as an end in itself but I assume links back to organisational values driver given for GHG mitigating actions in general.
Offset use	<u>Individual in firms</u> Interviewee wanted Umbra to take demonstrable mitigating action in UK, where its operational emissions were generated, so rejected offset use.		
Alternative fuels	<u>Non-financial resources and capabilities and technical issues</u> Some technical difficulties had been encountered with alternative fuels in the early 2000s.		

8.3.4 EMISSIONS OVERVIEW

Umbra uses about 1% of the UK's demand for electricity (Interviewee). Umbra's scope 2 emissions were about three times the size of its scope 1 emissions until y/e 2011 when scope 1 emissions trebled and scope 2 emissions also increased by about 40%³¹⁰. The scope 1 increase appears to have been due to Umbra beginning to report fugitive emissions of refrigerants³¹¹. Scope 2 figures for y/e 2005 and 2016 are explicitly location-based. Other than that, the approach is not certain. However, Umbra has a target specified in CDP2016 (CC3.1a) as location-based which appears to have been first reported in CDP2012 CC3.1a and Umbra's 2012 sustainability report. This suggests that the S2 figures from y/e 2012 were location-based.

The UK grid average emission factor has been used to report S2 emissions from at least some electricity for re-stated y/e 2010 and y/e 2011 and is - I expect - the reason S2 emissions increased between these two years dramatically as the emission factor increased by 25%³¹². Energy use per unit store area was being driven up by extended store opening hours and more refrigerated food (1998 environment report p.18).

8.3.4.1 Targets

Umbra has consistently had intensity targets in emissions/unit area of sales space (CDP4 (2006) - CDP2012). It currently has a target of a 65% reduction in S1+ S2 emissions per unit area of sales space from a 2006 base year to a 2020 target year (CDP2013 - CDP2016 CC3.1b). It has also had intensity targets related to distribution. The first absolute emission reduction target was a 30% reduction in S1+ S2 emissions by 2020 from 2005 base year³¹³. The absolute and intensity targets were reported as location-based in CDP2016 (CC3.1a and CC3.1b) but appear to date back to CDP2012 3.1a and CDP2013 CC3.1b respectively. Umbra has had a target to source 20% of all consumed electricity through PPAs for

³¹⁰ CDP6 (2008) 2(b)(i)(y)(a) and (b), CDP2009 10.1 and 11.1, CDP2010 12.1 and 13.1, CDP2012 8.2a and 8.3a.

³¹¹ CDP2011 7.3 and 8.4a, CDP 2012 7.3 and 8.4.

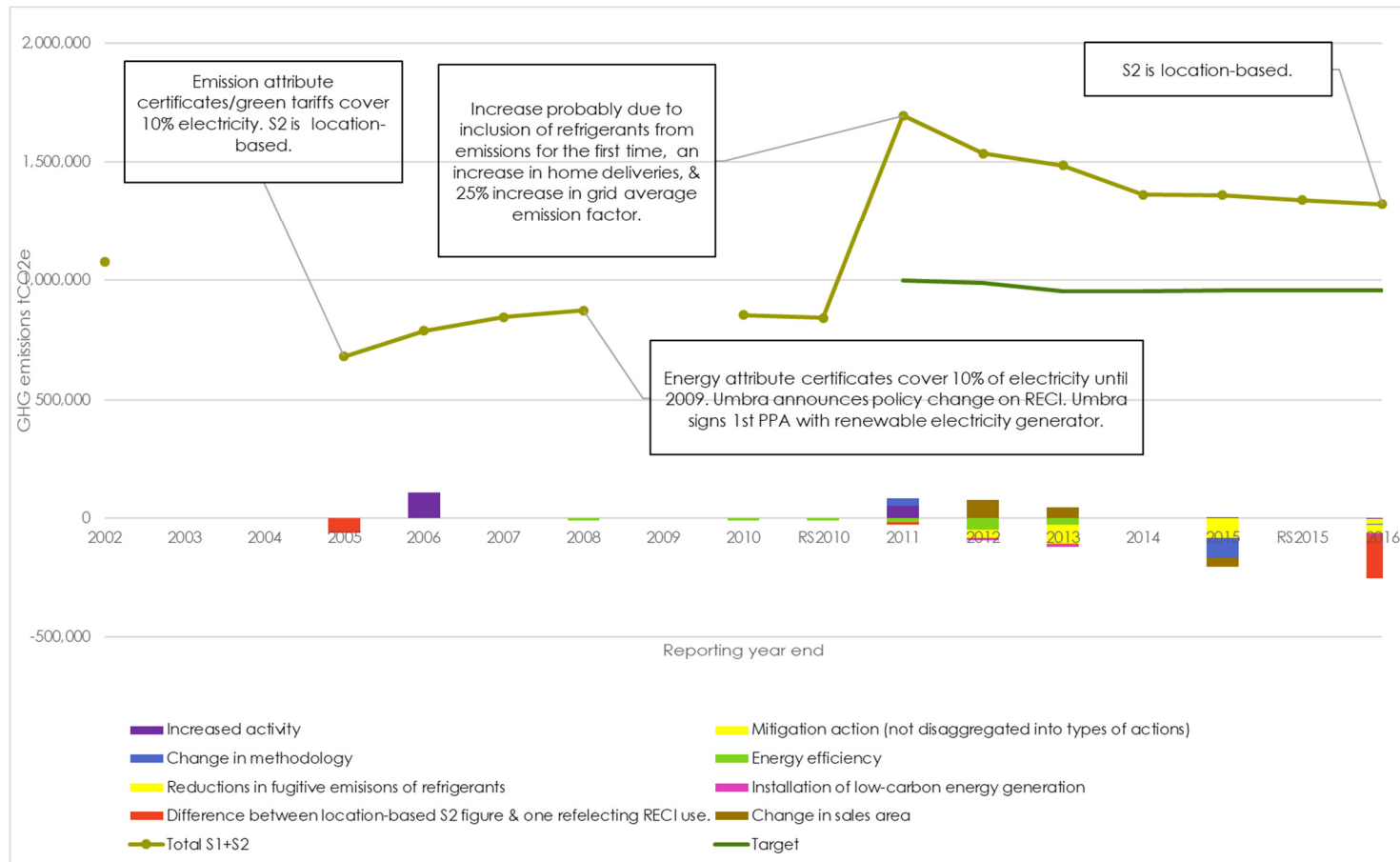
³¹² CDP2011 7.4, CDP2012 7.4.

³¹³ It was first reported in CDP2012 3.1 and the 2012 Umbra sustainability plan. It covered electricity, natural gas, diesel and refrigerant gases used in buildings and fleets. A 2006 base year was given in CDP2016 3.1.

renewable electricity by 2020³¹⁴. It had not set any science-based targets but anticipated doing so in the next two years (CDP2017 CC3.1).

³¹⁴ CDP2012 3.3b, Interviewee.

Figure 37 Umbra's scope 1 and scope 2 emissions



Sources: See section 14.2.11. This figure is reproduced in the accompanying A3 portfolio.

8.3.5 ACTIVITIES RELATED TO EMISSIONS MITIGATION

Energy efficiency/saving actions have been the dominant area of investment and one of the largest areas of investment across the firm's activities in general (Interviewee). Umbra bought RECI but has not used offsets. It has had a consistent programme of trialling novel technologies related to energy generation and was an early mover in pledging to phase-out HFCs, refrigerants with high Global Warming Potentials. These activities are detailed and referenced below.

Umbra was running energy use monitoring and reduction programmes in 1996 (1996 environment report). Since 2007, there had been a rolling programme of testing energy efficiency/saving measures. It developed a menu of 30 possible mitigation measures covering lighting, refrigeration, heating and ventilation that could be incorporated into new stores and refits based on an energy audit. There were also programmes to raise environmental awareness and initiate behavioural change among staff ³¹⁵. In the field of transportation, Umbra implemented measures to reduce fuel consumption e.g. more efficient logistical planning and tests of fuels with environmental advantages e.g. biomethane and hydrogen-fuelled vehicles³¹⁶.

In 2009, Umbra committed to replace hydrofluorocarbons (HFC) in all refrigeration equipment with carbon dioxide by 2030.³¹⁷ The first superstore to do this opened in 2010. In CDP2015 Umbra reported that the refrigerant substitution would lead to emission reduction of 91,600 tCO₂e a year, more than twice the size of the next biggest emission reduction activity (CC3.3b).

Umbra surveyed all its sites for wind generation potential (1998 environment report p.18). Although it has had PV extensively installed on its properties, by 2016 self-generation of electricity was still only supplying 2% of its total power demand, although biomass boilers and ground-source heat pumps were covering 29% of heat demand (corporate webpage 2016). Nevertheless, Umbra had a radical goal: for its supermarkets to be self-reliant for electricity via renewable electricity generation, CHP and electricity storage. (Interviewee).

³¹⁵ Environment reports 1998 p.6, 2002 p.9, 2007 corporate responsibility report p.3, 2009 corporate responsibility report p.18, CDP2012 3.3b.

³¹⁶ 2009 corporate responsibility report p.18.

³¹⁷ 2010 corporate responsibility report p.43, CDP2012 0.1.

Umbra has had many novel mitigation-related projects, most of which cannot be specified as they may identify Umbra. To give a flavour, it has an off-grid supermarket³¹⁸ and a generator fuelled by biomass waste that supplies the national electricity grid when it is under stress while the load on the grid from the store is reduced³¹⁹. It also puts biomethane from anaerobic digestion onto the national gas network. For every unit of natural gas that Umbra takes from the national gas network for its CHP, it will add an equivalent amount of biomethane. (Interviewee).

In terms of RECI use, in 1998 Umbra pledged to raise the percentage of purchased renewable electricity from 1% to 10% by 2010, “(providing the unit cost remains competitive)”³²⁰. The 10% target was achieved early, according to the 2005 corporate responsibility report p.77. Subsequently Umbra said it was going to contract directly with renewable energy generators through a PPA. Information was not found on which RECI Umbra used prior to its switch to this³²¹. However, energy attribute certificates or supplier-specific tariffs have been the only other RECI in typical use (Sotos 2015a, fig. 6.3).

Umbra set itself a target of 20% of its electricity sourced via PPAs with renewable electricity generators by 2020 (CDP2012 3.3b). The Interviewee believed increased use of PPAs would lead to the displacement of fossil fuel electricity generation, whereas GO purchase would not, but this outcome was being thwarted by the UK government’s lack of support for renewable electricity which deterred investment. However, PPAs were also seen as having the disadvantage of requiring parties to commit to long-term contracts in uncertain circumstances. Offsets use was rejected by the interviewee.³²²

8.3.6 FACTORS INFLUENCING A FIRM’S GHG MITIGATION CHOICES

(RQ1)

8.3.6.1 Individuals in firm

The Interviewee was passionate about innovation and particularly that new technology gave Umbra’s stores the opportunity to be self-sufficient in electricity. He said *“I suppose the driving factor for me is around innovation. So, I am a huge supporter of innovation and driving costs and inefficiencies out of*

³¹⁸ Corporate webpage 2016.

³¹⁹ 2011 corporate responsibility report pp.53-54

³²⁰ 1998 environment report, p.9.

³²¹ 1999 environmental report, 2005-2009 corporate responsibility reports, CDP2006-CDP2007.

³²² See sections 8.3.6.1 and 8.3.6.8 for more information.

whether that be PV, whether that be CHP, [section I could not hear]. You know even down to the hydrogen fuel cells, there are... the minute we can get to a sweet spot of being able to get the new technologies to wash their faces and hit the right hurdle rates and right returns on investment, then you know [Umbra] will just literally be in a position we will just literally take every store off-grid."

The Interviewee had another key influence on the mitigation package; a strong concern about greenwashing emerged in the interview. When he became Head of Sustainability in 2008, there was a change in Umbra's approach to RECI. Subsequently Umbra said it was going to contract directly with renewable energy generators. In CDP2008 Umbra said *"With reference to renewables we only plan to extend direct renewables internally controlled or on monitored assets. We will not increase green electricity purchase, as we cannot justify a true additional environmental benefit."* (3(a)(iv)).

The Interviewee explained that PPAs were preferred over energy attribute certificates because they would be with generators in the UK and so were seen as more credibly addressing the GHG impact of Umbra's electricity consumption. The 2009 corporate responsibility report (p.17) said *"This approach is a first in the UK market and has the added benefit of guaranteeing an outlet for renewable energy developers and providing them with collateral for project financing."*

The Interviewee explained further: *"I have made the decision as Head of Sustainability that there is no greenwash in [Umbra] and everything that we do is purposeful. So, a number of things that we've been done: one of them is that I have said that categorically we would do everything within our power onshore in the UK to mitigate our carbon impact and invest appropriately in doing hard, tangible, measurable and auditable activities..."*

Similar concerns related to carbon offsets.

"I don't believe in personally we don't believe in offsetting either so which is very similar. I don't want to say that I am completely carbon-free because I have bought a certificate from an Inner Mongolia wind farm that reduces the electricity that I have used. I am not interested in that. I want to do everything I can physically and demonstrably that will actually have a real physical effect on our climate in the UK through my resources that I am able to employ deploy." (Interviewee).

In summary, the Interviewee (the Head of Sustainability) had two significant influences: a passion for innovation which was reflected in Umbra's use of novel technologies and a concern about greenwashing which led to focus on mitigating its operational GHG emissions through action in the UK.

8.3.6.2 International experience

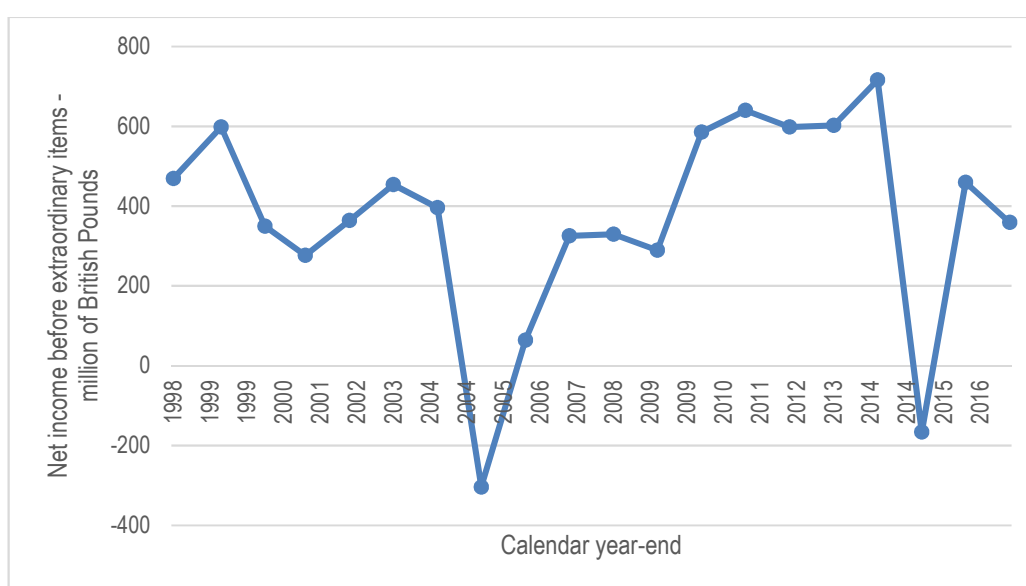
Although there have been international operations within the group, its primary focus has been the domestic market (corporate publications 1996-2016).

No discernible influence.

8.3.6.3 Available finance and cost-saving

A lack of available finance was not raised as a constraint on selection of GHG mitigation options in the interview nor found in the documentary evidence. As can be seen from Figure 38 of net income before extraordinary items, there have been two isolated years in period considered where this metric has fallen below zero, which supports this impression. The Interviewee said the financial business case of sustainability and, in particular, energy reduction and generation was compelling and led to board agreement to maintain the level of investment with its own capital and alternative funding with an external finance partner (15 February 2018 written communication). Its payback period was confidential (Interviewee).

Figure 38 Umbra's available finance



Source: Thomson One Reuters Fundamental database accessed 16 April 2018.

Energy costs represented less than or equal to 5% of total operating costs in the 2010s³²³. In the 2010s dedicated budgets for energy efficiency/saving varied from £15m-£26m³²⁴ while investment in low and zero-carbon energy infrastructure was somewhat less, varying from £3m to £16m³²⁵. In y/e 2016 it also spent £7.6m on refrigeration using low-GWP coolants (CDP2016 3.3c).

³²³ CDP2012 12.1, CDP2015-CDP2016 CC11.1.

³²⁴ CDP2012-CDP2014 3.3c and CDP2016 3.3c.

³²⁵ CDP2014 3.3c, CDP2015 3.3c and CDP2016 3.3c.

Umbra's actions to improve its sustainability had a cost-cutting motivation, according to the Interviewee. He saw the aim of Umbra being self-sufficient in electricity as helping to improve the firm's energy security as well as creating a new income stream. The firm could help to balance the grid in times of stress by reducing demand and generating electricity. He rejected a CSR motivation for Umbra's energy strategy. *"This is a commercial endeavour which happens to be able to do the right thing for the environment at the same time..."* he said, continuing *"It's a plus. ... it is about cost reduction and taxation. Cost reduction in the cost of energy and um opportunity to get ourselves a little bit more flexibility when it comes to energy security by taking control of our own power."*

In y/e 2012 a reduction in UK government support for low-carbon electricity generation technologies curtailed Umbra's plans to install more PV, though it does still have a very significant amount³²⁶. In the early 2000s biodiesel use was investigated but it was not financially attractive at that time³²⁷. The Interviewee said *"...we are an organisation that really does care and wants to do the right thing, but not do the right thing at a massive cost of doing so"*.

In summary, cost-cutting and energy security concerns drove energy efficiency/saving and generation of energy at Umbra. The financial case persuaded the board to invest in significantly both activities, particularly energy efficiency.

8.3.6.4 Non-financial resources and capabilities and technical issues

Umbra had encountered technical difficulties in switching from HFC coolants to low-GWP alternatives. It was hindered by a lack of technical expertise among engineers, but this had been remedied by training courses (2005 corporate responsibility report p.91, CDP2012 3.3b). Umbra was interested in switching from diesel/petrol to alternative fuels with environmental benefits. In early 2000s, it encountered technical issues with Compressed Natural Gas (2002 corporate responsibility report p.21) and with Liquefied Petroleum Gas (2005 corporate responsibility report p.91).

The Interviewee said that the firm continued with its push on sustainability because it had had some high-returning investments. He said *"...I have an innovation think-tank that is constantly trawling the world for the next best innovation technology to deploy umm in our property portfolio. ...We continuously monitor, evaluate what is going on elsewhere in the world, not just in the UK."* This passion seems to be reflected in a notably high level of novel technologies trialled at Umbra.

³²⁶ CDP2012 5.1a-b, Interviewee.

³²⁷ 2002 corporate responsibility report p.21.

In summary, some technical difficulties had been encountered with alternative fuels in the early 2000s and switching to low-GWP refrigerants, but the firm continued to trial novel approaches.

8.3.6.5 Stakeholder influence

The Interviewee was clear that Umbra's mitigating activities did not have a corporate responsibility or CSR motivation; benefit for the environment was a beneficial by-product of activities with a commercial motivation. Although corporate publications described who Umbra considered its stakeholders to be and how they have influenced its environmental management³²⁸, two points were clear. Firstly, the Interviewee was explicit that stakeholders were not driving the firm on its GHG mitigating activities and, secondly, there appears to have been declining interest in this among its stakeholders anyway. In the next paragraphs, I expand on these points in reverse order before returning to the financial imperative behind GHG mitigation.

In the 2000s, stakeholders including customers and employees wanted Umbra to manage its environment impacts³²⁹.

"Although it will never replace the importance of providing the right product at the right price, environmental issues are increasingly a factor affecting brand relationships and differentiation. Managing our environmental impact is also important to colleagues and to our ability to recruit and retain the best people." (2007 corporate responsibility report p.33)

Umbra could foresee loss of custom if it did not maintain its reputation on environmental issues as consumers were becoming more concerned about these issues. This would also have impacted on investor confidence³³⁰. However, climate change did not place in the top five issues in the six bi-annual surveys of customers leading to the 2015 corporate report on customer attitudes. A further survey found customers ranked issues according to what affected the customers and their families first, next their communities and then the wider world (2015 corporate report p.5, p.7).

Furthermore, asked if Umbra's GHG mitigating activities were stakeholder-driven, the Interviewee said *"No, this is not. Nobody is pushing us to do this. I mean actually we are actually in the opposite. I think we*

³²⁸ Umbra described its stakeholders as its customers, colleagues, suppliers and investors as well as regulators, NGOs, trade unions, trade associations and the media. Stakeholder engagement has helped Umbra to understand issues and shape its strategy (2002 corporate responsibility report p.10, 2005 corporate responsibility report p.7). CSR issues were prioritised in terms of those most important for its customers, employees and communities in which Umbra operated (2005 corporate responsibility report p.5).

³²⁹ 2001 environmental report p.11, CDP2008 response 1(a)(iii).

³³⁰ CDP2012 5.1f, CDP2015 CC5.1c.

have got a bit of a leading-edge position where we are seen as pushing boundaries that will hopefully other organisations will see make sense and [words I could not make out] help their business become more sustainable and then help UK plc you know over these issues that we have got with the availability of energy.”

In summary, stakeholder interest encouraged Umbra’s environmental management the 2000s, but more recently its GHG mitigating activities were driven by commercial reasons with environmental benefits as welcome consequences.

8.3.6.6 Other firms

Umbra has monitored other organisations’ activities on climate change but considered that it led the field. The Interviewee shared what Umbra was doing publicly to influence others, so they could consider replicating its approach.

No discernible influence of other firms on Umbra.

8.3.6.7 Regulatory and policy context

In this section, I will consider regulations and policies related first to energy efficiency/saving, then generation of renewable energy and finally refrigerants.

Umbra participated in an early, voluntary energy efficiency programme run by the UK government in the 1996 (1996 environment report p.26). It later entered into a Climate Change Agreement for its in-store bakeries, which accounted for 10% of its stores’ emissions. The agreement reduced the Climate Change Levy applied to fuel and electricity used in return for meeting energy efficiency targets. However, the levy still cost the group a “*notable*” £6 million p.a. according to the 2005 environment report (p.87, p.90). Although Umbra supported a stable and predictable carbon tax³³¹, it opposed the CRC Energy Efficiency scheme, which it said would “...*add considerable administrative burden and divert spending away from carbon reduction technology*”³³². Three years hence, Umbra was categorical that the scheme had not incentivised energy efficiency beyond the existing driver of reducing operational costs³³³. Compliance with the Energy Savings Opportunities Scheme (ESOS), which is the UK government’s transposition of Article

³³¹ CDP2013, 2015, 2016 2.3a.

³³² CDP2013 2.3a, Interviewee.

³³³ CDP2015 3.3a.

8 of the EU Energy Efficiency Directive (2012/27/EU)³³⁴, was achieved through work that was already underway³³⁵.

Turning to the generation of renewable energy, Umbra, encouraged by UK government incentives, invested in low-carbon energy generation³³⁶. Later Umbra reduced its use of low-carbon electricity generation technologies because it needed more public policy support to hit the firm's internally-required return on investment³³⁷.

The UK government asked firms to consider using an alternative to high-Global Warming Potential HFCs, which were replacing the ozone-depleting refrigerants HCFCs. In response, Umbra began trialling alternative refrigerants (2000 environment report p.14). In 2009, Umbra pledged to replace HFC refrigerants with carbon dioxide by 2030 (2010 corporate responsibility report p.43). This was undertaken for GHG reduction and regulatory reasons (CDP2015 3.3a).

When the Interviewee took over as Head of Sustainability in 2008, he rejected use of energy attribute certificates due to concerns about their credibility and scepticism whether their purchase stimulated extra investment in renewable electricity generation. This coincided with a change to Defra guidance published in 2008 that recommended that a location-based scope 2 approach was used for electricity consumption even if it was covered by Levy Exemption Certificates (LECs) (Defra 2008). Then in 2009 there was further Defra guidance tightening the circumstances in which firms could claim an emission reduction for buying renewable electricity from the grid (Defra and DECC 2009). However, the Interviewee said his decision was unrelated.

In summary, regulations and policies have had limited positive impact on Umbra's energy efficiency/saving. Regulatory incentives on generation of renewable energy had a discernible influence on investment in self-generation and the regulatory context in the UK encouraged a shift to low-GWP refrigerants.

8.3.6.8 Organisational values

The Interviewee was clear that Umbra was morally driven but could not be proactive if it would be against the firm's commercial interests. In talking about Umbra's support for renewable electricity generation investment, the Interviewee continued *"Ultimately you know we are an organisation trusted to do the right*

³³⁴ GOV.UK (2018)

³³⁵ CDP2016 3.3c.

³³⁶ CDP2013, 2015, 2016 CC2.3a.

³³⁷ CDP2012 5.1a-b, Interviewee.

thing by our customers every single day. I am 47-years-old and it is very difficult to get it out of your system, out of your blood, because it is in our DNA and ultimately we believe sustainability is a critical factor for us as a business, and our communities and the world, so we take it extremely seriously, but the important thing is that we see it as a real commercial imperative. So, sustainability is an absolute commercial imperative. It is not about leading from an environmental perspective. It is doing it from a commercial perspective and that is the right thing to do..."

The Interviewee said "...we are an organisation that really does care and wants to do the right thing, but not do the right thing at a massive cost of doing so".

In summary, Umbra wanted to "do the right thing", but within limits set by the financial costs.

Table 25 Summary of factors affecting Umbra's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	Interviewee (Head of Sustainability) wanted Umbra to take credible mitigating action in UK, where its operational emissions were generated.
International experience	No discernible influence.
Available finances and cost-savings	Cost-cutting and energy security concerns drove energy efficiency/saving and generation of energy at Umbra. Financial case persuaded the board to invest significantly in both activities, particularly energy efficiency/saving.
Non-financial resources and capabilities and technical issues	Some technical difficulties had been encountered in the early 2000s with alternative fuels and switching to low-GWP refrigerants, but the firm continued to trial novel approaches.
Stakeholders	Stakeholder interest encouraged Umbra's environmental management in 2000s, but more recently its GHG mitigating activities were driven by commercial reasons with environmental benefits as welcome consequences.
Other firms	No discernible influence.
Regulation and policy context	Energy efficiency regulations and policies have had limited positive impact. Regulatory incentives on generation of renewable energy had a discernible influence on investment in self-generation and the regulatory context in the UK encouraged a shift to low-GWP refrigerants
Organisational values	Umbra wanted to " <i>do the right thing</i> ", but within limits set by the financial costs. Improving its sustainability had a clear commercial driver.

8.3.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES (RQ2)

To re-cap on Umbra's RECI use, it increased from 1% of total electricity consumption in 1999 to plateau at 10% from 2005-2009. Details of the RECI used were not given but I assume they were energy attribute certificates or supplier-specific tariffs (see section 8.3.5). Umbra announced it was switching to PPA use in 2008³³⁸ and in 2011 set a target for this: 20% of its electricity sourced via PPAs with renewable electricity generators by 2020 (CDP2012 3.3b). Umbra had reached 17% in y/e 2016 (CDP2016 CC11.4).

To investigate the effect of RECI use as a percentage of total electricity consumption, I compared it with a metric commonly used by Umbra for its targets - emissions per unit area of sales space³³⁹. I drew on Umbra's corporate publications as I could put together a long set of data from 1992-2016, details of which are given in section 14.2.11. The data is shown in Figure 39 which uses location-based scope 2 figures. The emission sources included within the data-series do evolve. As shown by the labels on the graph,

³³⁸ CDP2008 3(a)(iv).

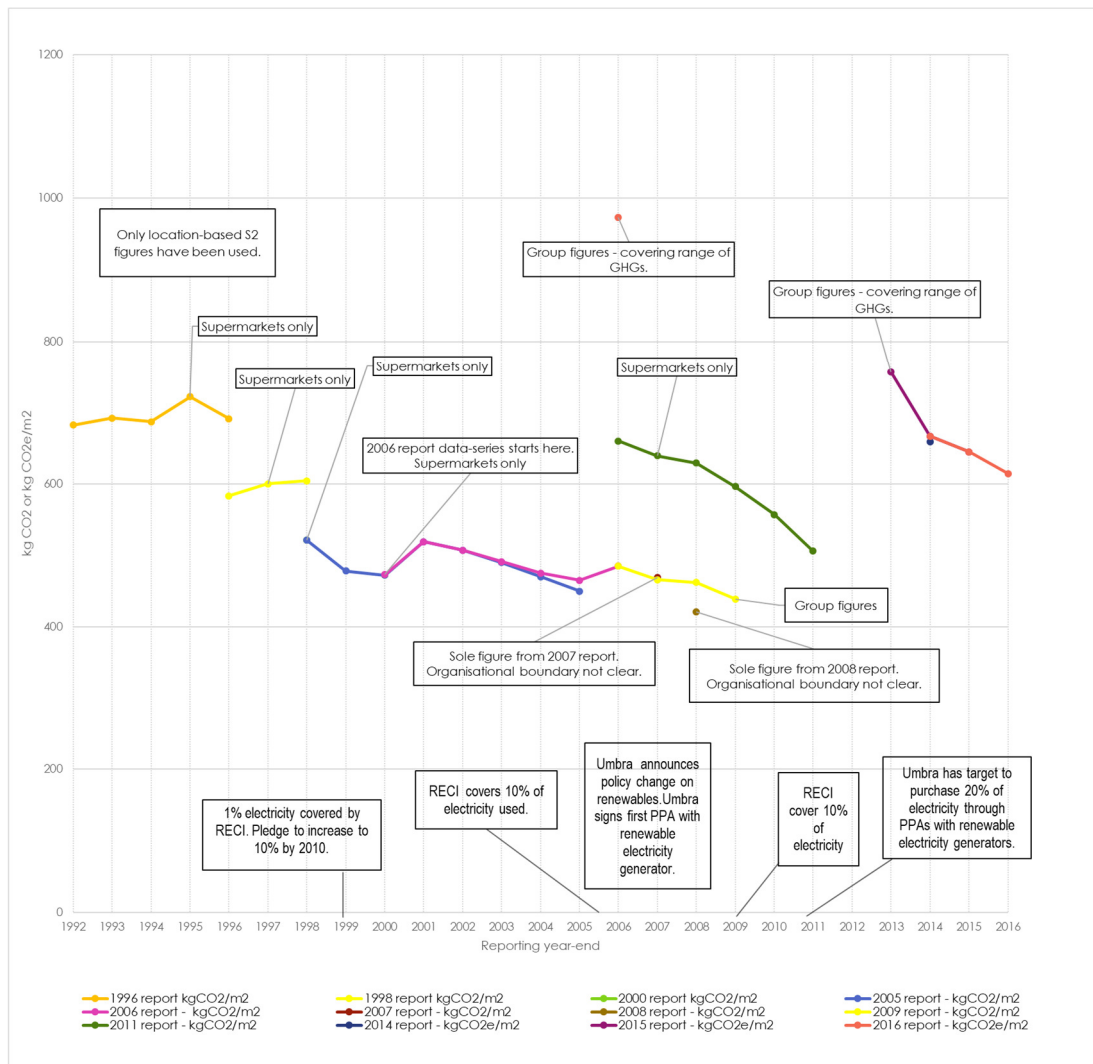
³³⁹ CDP4 (2006), CD2010 9 and 9.6, CDP2011-CDP2016 3.1.

earlier data-series included data from supermarkets only. Later data-series covered the whole group while the organisational boundary for the 2007 and 2008 reports is unclear. There is also a change in units over time. As shown in the legend, from the 2014 report onwards, the unit changed from kgCO_2/m^2 to $\text{kgCO}_2\text{e}/\text{m}^2$, indicating that more GHGs than just CO_2 were being reported. The reductions from one data-series to the next (1996 to 1998, 1998 to 2005) series could be due to restatements due to methodological changes e.g. changes in emission factors.

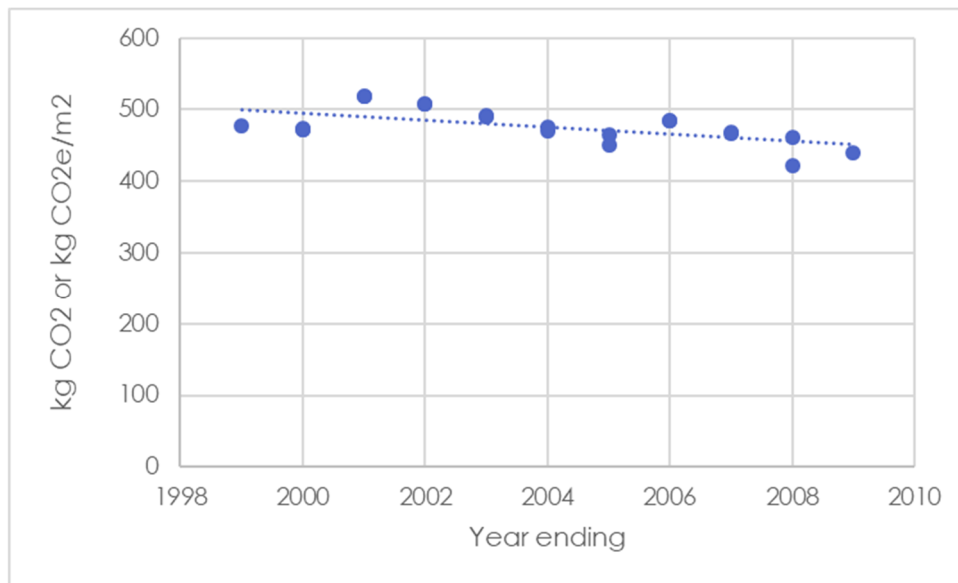
I look first at the period (y/e 1999-2009) when Umbra increased its RECI use from 1% in y/e 1999 to 10% in y/e 2005, maintaining this to y/e 2009. This is a period of declining intensity which is shown more clearly in Figure 40. This does not suggest displacement. I cannot account for the high emissions intensity of the data from the 2011 publication. I think the increase in emission intensity for y/e 2014-2016 relative to y/e 2009 data-series is at least in part due to inclusion of fugitive emissions of refrigerants³⁴⁰. The figure for y/e 2006 has been re-stated in the new units of $\text{kgCO}_2\text{e}/\text{m}^2$, that encompass all GHGs. However, within these data-series, the decline in intensity over time is apparent. Again, this does not suggest displacement.

³⁴⁰ The data sources (annual reports 2014 p.49, 2015 p.52, 2016 p.60) specify that the figures are expressed in $\text{kg CO}_2\text{e}$ i.e. kilogrammes of carbon dioxide equivalent. Previous figures e.g. 2011 corporate responsibility report p.54 were expressed in kg CO_2 i.e. they just represented carbon dioxide emissions. There was a large increase in scope 1 emissions reported in the CDP dataset for this period too. From CDP2011 8.2a to CDP2012 8.2a, scope 1 emissions increased by 271%, which I think is due to the inclusion of refrigerant emissions. CDP2011 8.4a says refrigerant emissions are excluded, whereas there are no exclusions listed in CDP2012 8.4a. Sources of emission factors for refrigerants HFCs are not listed in CDP2011 7.4 but are listed in CDP2012 7.4. This might account for the increase in emissions in the 2011 corporate responsibility report (p.54). However, the figures in this report are given in kgCO_2 , so evidence is mixed.

Figure 39 Umbra's scope 1 and scope 2 emissions intensity



Sources: see section 14.2.11. This figure is reproduced in the accompanying A3 portfolio.

Figure 40 Scatterplot and trendline of Umbra's emission intensity figures from 1999-2009

Sources: See section 14.2.11.

In terms of further available information, I did not have the sales area data to create data-series for electricity/energy consumption/m² and the Interviewee could not discuss Umbra's GHG mitigation-related activities pre-2008 when he took up his role.

Regarding financial resources that might be diverted to other GHG mitigating projects if RECI were not used, Umbra has reported cost data for a renewable electricity PPA. This was reported in aggregate with biomethane purchase. However, the incremental cost of these purchases was reported as nil, so no financial resources were being diverted from other GHG mitigating actions.

To summarise, in the first phase of RECI use (y/e 1999-2009), emission intensities were declining while use of energy attribute certificates and renewable electricity tariffs was rising or plateauing. Emission intensities were also falling in the period when PPA use was increasing. This does not indicate displacement of focus. The only cost data that I had for RECI use showed a nil cost for increasing the size of the PPA and biomethane contracts that Umbra had. Therefore, based on this admittedly slim piece of data, there were no financial resources being diverted. Regarding other GHG mitigating activities, cost-saving was a strong driver for energy efficiency/saving while phasing out high-GWP refrigerants was undertaken for regulatory reason and to reduce GHG emissions. This was given as an end in itself but I assume links back to organizational values (moral) driver given for GHG mitigating actions in general. Therefore, there is no evidence that RECI use has displaced mitigating activities. Whether Umbra might have reduced its emission intensity faster without RECI use cannot be assessed from the available data.

The results are discussed further in the discussion for RQ2 in chapter 11.

9 THE INTEGRATED TELECOMMUNICATION SERVICES CASE STUDIES

Both firms in this group reported to CDP that they used RECI in CDP2007 or earlier. CDP began categorising firms in 2007, so this is the earliest classification available. They were both classified as Integrated Telecommunication Services in CDP2007. This was also the classification in CDP2015. For ease, these firms are subsequently referred to as telecoms.

9.1 GRAVADLAX

9.1.1 DATA SOURCES

Sources of data have been the firm's responses to CDP1 (2003) - CDP2017, which have all been public, corporate publications, and a call with a senior expert in corporate responsibility from the firm on 24 March 2017, referenced as the Interviewee below.

9.1.2 CASE DESCRIPTION

Gravadlax is an international telecommunications group with both domestic and business customers (group description webpage 2017). It has been incorporated in Germany since it began responding to CDP in 2003.

9.1.3 OVERVIEW OF DATA RELEVANT TO RQ1

Gravadlax wanted to become a leader on climate change issues. The initial driver was a senior individual who had been morally-motivated and this goal had been maintained by the firm after the person had left the firm because it was considered the morally correct path to take.

The firm was affected by regulation and anticipated further impacts. However, possible EU regulation to curb the growing energy use of ICT had been staved off by energy efficiency improvements and there were higher priority regulatory issues. More broadly, the firm saw regulation as incentivising the use of products – such as its own – that could lead to net emissions reductions. However, it recognised had to curb its own scope 1 and 2 emissions if it was not to risk reputational damage. Energy efficiency also had a cost-saving driver.

Figure 42 Gravadlax's electricity consumption" shows the firm using increasing amounts of RECI. It bought energy attribute certificates, but from outside of Germany which I infer was a consequence of the German government's policy of automatically allocating GOs from publicly-supported generation to German consumers.

Subsequently there was an ambition to make the group carbon-neutral, but this was halted by the concerns raised about the financial, environmental and reputational impacts of using RECI. The perceived

position of the GHG Protocol at that time on scope 2 accounting in tandem with criticism from German NGOs led the firm to stop using RECI for its German consumption. Outside of Germany, in the absence of the NGO criticism, RECI use continued and some subsidiaries went on to claim carbon neutrality. This decision was strengthened because competitors in certain countries were competing on their perceived environmental performance. These contrasting national positions show the impact of being an international group.

In 2015 the GHG Protocol's scope 2 guidance (Sotos 2015a) was published and it was later reflected in the CDP questionnaire. The guidance explicitly allows RECI to be reflected in emission figures, providing certain criteria are met. This led to a renewed interest in RECI use at a group level. The Interviewee said that this had already driven a search for low-carbon electricity suppliers.

Table 26 Summary of factors affecting Gravadlax's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors				
GHG mitigating actions in general	<u>Organisational values</u> Moral considerations had been the main driver of the firm's climate change approach.		<u>Individuals in firm</u> A senior manager in the firm was instrumental in getting Gravadlax to focus on climate change.		
LCECI/RECI use	<u>Organisational values</u> RECI use had a corporate responsibility motivation.	<u>Regulation and policy context</u> Carbon neutrality targets set by national governments were encouraging RECI use. German government policy on GOs had not deterred their use by Gravadlax, although, I infer, it led to the firm sourcing GOs from outside Germany.	<u>Stakeholders</u> NGOs had influenced Gravadlax's use of RECI. Customers' view of Gravadlax's reputation on environmental issues e.g. RECI use was more important for some subsidiaries.	<u>Other firms</u> Competitors were a significant influence regarding RECI use and environmental performance generally.	<u>Available finance</u> Although an on-going expense, RECI costs could be covered by the cost-savings of just one of several other mitigating projects and led to considerable reported GHG emission savings.
Energy efficiency/saving	<u>Available finance and cost savings</u> This had a cost-saving driver but had to compete for investment required against other projects related to network expansion and improvement.				
Self-generation of electricity	<u>Organisational values</u> This had a corporate responsibility driver, alongside cost-saving motivations.	<u>Available finance and cost savings</u> This had a cost-saving driver but had to compete for investment against other projects related to network expansion to fulfil increasing demand for bandwidth and speed of transmission.		<u>Non-financial resources and capabilities and technical issues</u> Technical difficulties impeded more extensive self-generation of renewable electricity.	
Refrigerants	Insignificant source of emissions.				
Offset use	<u>Regulatory context and other firms</u> Two subsidiaries outside Germany had made carbon neutrality claims which would necessitate the use of offsets. Carbon neutrality claims were driven by national goals set by regulators or attainment of a competitive advantage over other firms.				

9.1.4 EMISSIONS OVERVIEW

Figure 41 gives an overview of Gravadlax's emissions. Gravadlax's scope 2 emissions – when RECI are not factored in - primarily arise from electricity consumption and were an order of magnitude greater than its scope 1 emissions³⁴¹. Scope 3 business travel is shown in Figure 41 as these emissions are included within the firm's latest targets. One of the labels in Figure 41 highlights that Gravadlax was using full lifecycle emission factors for electricity which I take to mean that it was reporting emissions from scope 2 and the scope 3 categories aggregated together. Gravadlax estimated that these emission factors were about a third higher than other emission factors commonly in use e.g. the International Energy Agency and GHG Protocol (CDP2008 2(a)(iii)).

9.1.4.1 Targets

The earliest targets reported to CDP were energy targets (CDP2 (2004), CDP3 (2005) emission reduction strategy question). From CDP2011-CDP2016, its target for its German firm covered scopes 1 and 2 and scope 3 business travel. In 2013 it also set a target that covered much of the wider group and applied to almost 80% of its emission sources for scopes 1 and 2 and scope 3 business travel³⁴². As the data in Figure 41 is intended to be for the whole group, I have not shown either target, but have shown the categories of emissions that they covered. Gravadlax also set relative targets e.g. carbon dioxide emissions per distance travelled for its fleet vehicles and an energy target - Power Usage Effectiveness (PUE) for its telecommunications network. In addition, it had key performance indicators for S1+S2 carbon dioxide emissions and energy consumption³⁴³. In CDP2016 the group confirmed that it would be setting a science-based target³⁴⁴.

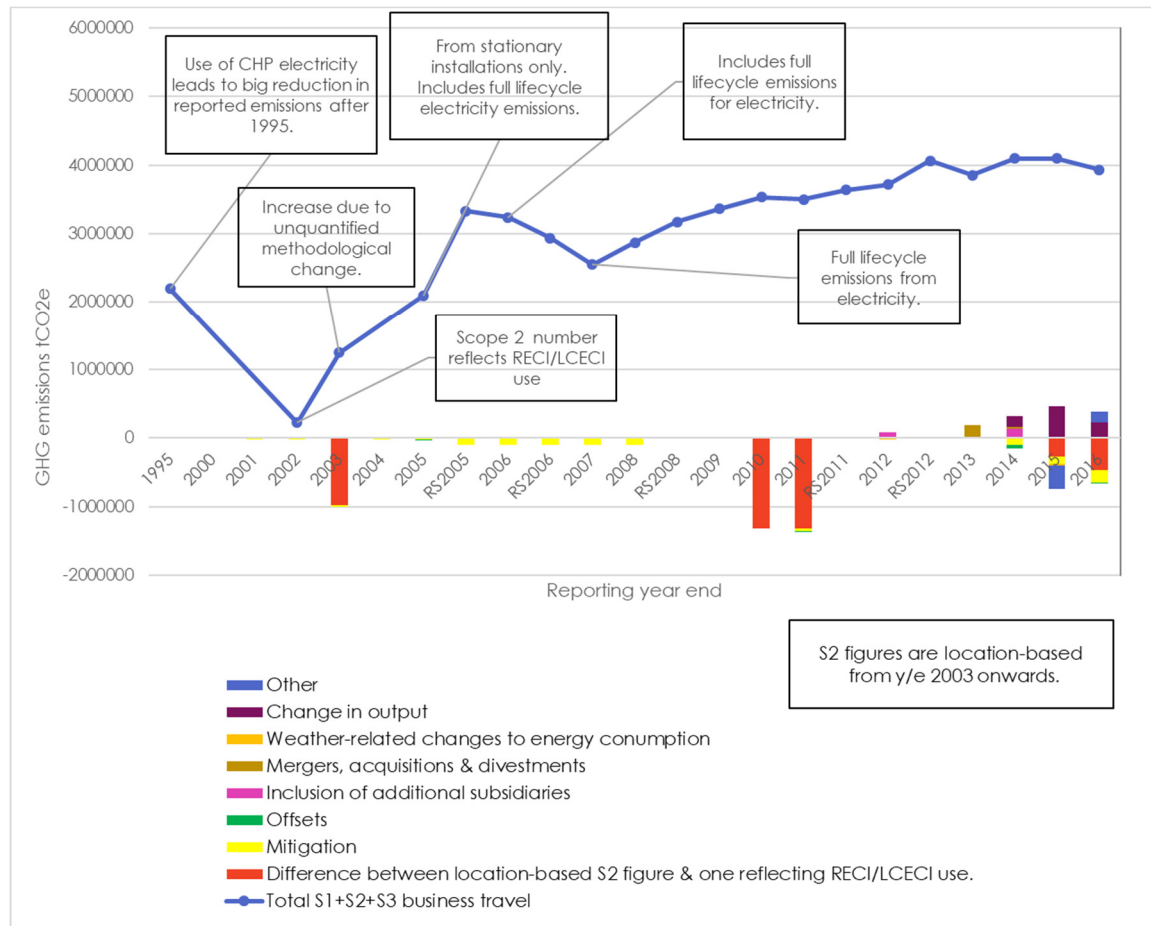
³⁴¹ CDP1 (2003) – CDP2016, 2016 corporate responsibility report p.169.

³⁴² A 20% reduction from a 2008 base year by 2020. The target did not apply to a subsidiary which was to be sold. (CDP2014 3.1a, email dated 4 November 2018 from the Interviewee)

³⁴³ CDP2013 3.3c, 2015 corporate responsibility report p.30, CDP2016 CC2.1c, 2016 corporate responsibility report p.169.

³⁴⁴ See footnote 50.

Figure 41 Gravادلax's scope 1, scope 2 and selected scope 3 emissions



Sources: see section 14.2.12. This figure is reproduced in the accompanying A3 portfolio.

9.1.5 ACTIVITIES RELATED TO CLIMATE CHANGE MITIGATION

Gravadlax has described a range of energy efficiency/saving measures. This is a sample: replacement of inefficient electrical equipment, improved heat control of telecommunications systems³⁴⁵, using waste heat from telecommunications equipment³⁴⁶, reducing the number of vehicles in its fleet and switching to smaller, more efficient vehicles, promoting more efficient driver styles, shutting down redundant equipment, sharing base stations with competitors³⁴⁷, using fresh air instead of air conditioning to cool ICT equipment³⁴⁸, electrical load management³⁴⁹. Some of the group has implemented ISO 50001, an energy management standard (International Organization for Standardization (ISO) 2018b, Lazarate 2016)³⁵⁰. It has also reduced emissions of global warming refrigerants³⁵¹.

In y/e 2015 the group's electricity consumption remained stable and decreased in Germany. The group's network was expanding and handling increasing amounts of data, but this had been counteracted by energy efficiency improvements. It expected its energy consumption to increase in one country where it was particularly increasing its activities, but to decrease overall. (2015 corporate responsibility report p.20, 30, 124)

In terms of use of low-carbon electricity, heat, steam and cooling, the firm reported to CDP3 (2005) (energy intensity question) that in 2003 50% of its electricity came from CHP and 6% from renewable electricity sources, although it is not explicit, the implication is that this was purchased electricity, not self-generated. Use of CHP electricity resulted in a big drop in reported GHG emissions between 1995 and the early 2000s³⁵². However, Gravadlax has had projects to generate energy itself e.g. the installation of ten CHP plants reported in 2011³⁵³ and renewable electricity generation capacity reported in 2015³⁵⁴.

³⁴⁵ CDP3 (2005) emission reduction strategy questions.

³⁴⁶ CDP2011 3.3a.

³⁴⁷ CDP2013 3.3b.

³⁴⁸ CDP2014 3.3b.

³⁴⁹ CDP2015 CC3.3b.

³⁵⁰ CDP2014-CDP2016 3.3b, 3.3c, email dated 4 November 2018 from the Interviewee.

³⁵¹ Interviewee.

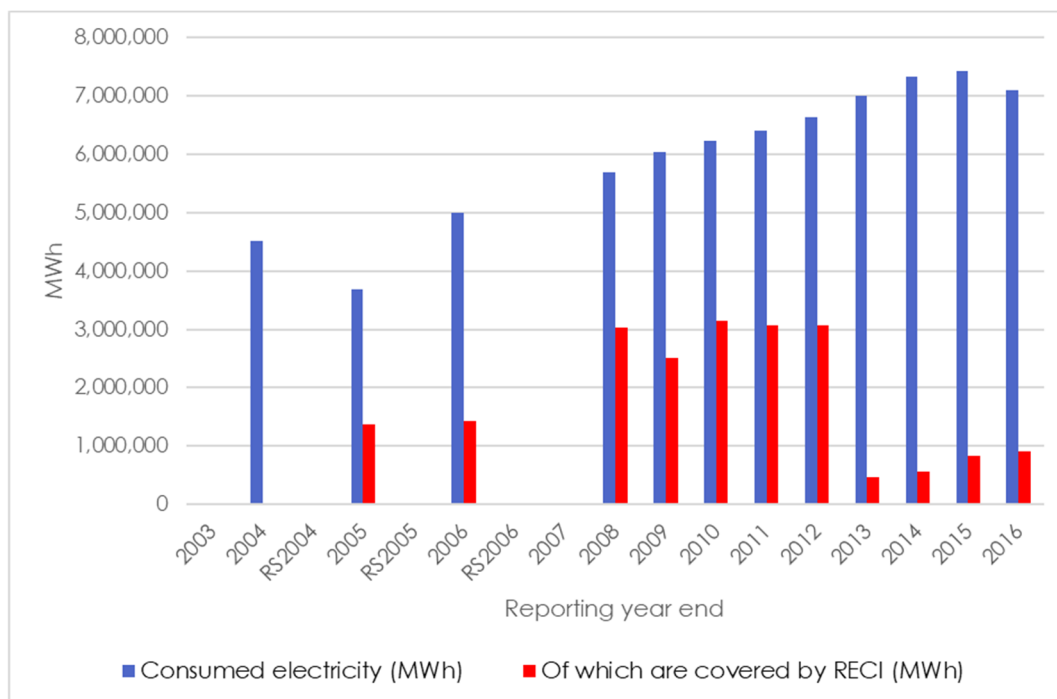
³⁵² 2015 corporate responsibility report p.150. I could not find out more about contracts for electricity from CHP generation from documents and the Interviewee.

³⁵³ CDP2011 3.3a.

³⁵⁴ CDP2015 CC3.3b.

Gravadlax had 32 CHP units by 2016³⁵⁵. It also investigated hydrogen fuel cell technology³⁵⁶ and use of biogas to generate electricity³⁵⁷. However, Gravadlax also used significant quantities of RECI. RECI use developed as shown in Figure 42.

Figure 42 Gravadlax's electricity consumption



Sources: see section 14.2.12.

By y/e 2007, the group reported the purchase of RECs³⁵⁸ at about four times the amount of renewable electricity in the grid average. This reduced its reported scope 2 emissions in Germany by 23% while in the UK the combined use of renewable electricity and low-carbon electricity from CHP lead to a reported

³⁵⁵ 2016 corporate responsibility report p.133.

³⁵⁶ CDP2009 23.8

³⁵⁷ CDP2011 3.3a

³⁵⁸ The Renewable Energy Certificate is a voluntary certificate. It was created by market-players and was a forerunner of the GO but is still in use. (RECS International 2012). Either a GO or a REC can be issued electronically under European Energy Certificate System, a voluntary mechanism to standardize certification of electricity, but only one may be issued per unit of electricity. (Association of Issuing Bodies 2017).

reduction of 40%. By y/e 2008 the firm said 100% of its electricity in Germany came from renewable sources and comprised renewable electricity from publicly-supported electricity³⁵⁹ and RECs³⁶⁰.

The Interviewee explained that the firm started to use RECs because it wanted to be a leader in climate change and there had been an ambition to make Gravadlax carbon neutral. Within the corporate reports and CDP response, I found references to offsetting emissions from products in their use phase (the firm's scope 3 emissions)³⁶¹ and of specific activities³⁶².

In 2013 Gravadlax stopped buying RECs for its German electricity causing its scope 2 emissions to double³⁶³. The Interviewee gave three reasons for stopping. Firstly, supply of certificates significantly exceeded demand and so did not stimulate extra investment on renewable generation³⁶⁴ and therefore did not have an environmental benefit. Secondly, Gravadlax used emission factors that did not reflect RECI purchase as GHG Protocol scope 2 guidance was still being developed in 2013. Thirdly, the use of certificates prompted accusations of greenwashing by NGOs. However, some European subsidiaries reflected the purchase of certificates in their emission figures. Four firms within the group already covered 100% of their electricity consumption with RECI. Two have claimed carbon-neutral status³⁶⁵.

The board approved a new group-wide GHG emissions target in December 2013³⁶⁶. Gravadlax has not reflected RECI use in its reports on progress towards the target (Interviewee). However, a subsequent GHG mitigation strategy assigns an important role for renewable electricity with a target for national firms within the group to use 10% more renewable electricity than is in the grid average³⁶⁷. The Interviewee said *“Generally, we motivated companies within the group [Gravadlax] buy more electricity from renewable sources by setting this target and overall we achieved this target. In Germany the situation from our*

³⁵⁹ The German government requires that electricity bills show the percentage of electricity supplied to German consumers that comes from publicly-supported generators. This is shown as the *Erneuerbare-Energien-Gesetz* (EEG) or Renewable Energy Sources Act component. (Marty 2017)

³⁶⁰ CDP2009 23.8.

³⁶¹ 2008 corporate report p.35.

³⁶² CDP2007 1(b)(iv).

³⁶³ 2013 corporate responsibility report p.16.

³⁶⁴ The Interviewee said since then the price of certificates has risen significantly (email, 12 November 2018).

³⁶⁵ 2015 corporate responsibility report p.125-126.

³⁶⁶ CDP2014 CC3.1.

³⁶⁷ 2015 corporate responsibility report (p.17, pp.124-126).

perspective, as Corporate Responsibility Department, this is not satisfying of course. But you see in a company there is always lots of different interests, so you have to have internal discussions and at the end of the day you come to certain commitment..." The Interviewee said that the inclusion of renewable electricity within the strategy reflected the publication of the GHG Protocol's scope 2 guidance (Sotos 2015a) and increased interest from business and domestic customers in renewable electricity. Although the use of RECI was still not reflected in the group-wide target, in CDP2017 Gravadlax did report that its target for Germany reflected the use of RECI (CC3.1a)³⁶⁸.

No requirements in terms of age or type of generation had been placed on RECI. The Interviewee said Gravadlax knew that purchase of the renewable energy certificates had more effect if they were from new power plants, but this would make it harder for firms in the group to shift to RECI use, so it was thought best to shift to RECI and then increase the quality. Asked whether the group had seen a change in the impact of purchasing the certificates the Interviewee said: *"Honestly, currently not. But if you foresee that the stronger regulations in respect of climate change will be necessary, that some countries already introduce stronger regulations with respect to climate change, I think this will be the case."* The Interviewee cited Sweden's goal to be a carbon-neutral country by 2045 as an example.

9.1.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

9.1.6.1 Individuals in firm

The Interviewee said that it was the firm's leadership that had the ambition for the firm to be a climate change leader. A senior manager particularly had strong links with people working on climate change science and mitigation and motivated others within the group to act on climate change, although this continued after this person left the firm.

A senior manager in the firm was instrumental in getting Gravadlax to focus on climate change.

³⁶⁸ Interviewee said via email on 4 November 2018 that a market-based approach had been applied to the German target's 2008 base year as well, resulting in much lower base year emissions, as in 2008 electricity consumption in Germany was fully covered by RECs.

9.1.6.2 International experience

The group was widely-represented internationally, although the US and domestic markets have been the most significant sources of revenue³⁶⁹. The Interviewee said the nature of the telecommunications industry was such that the national regulations and context were more important than global political institutions.

This is illustrated by Gravadlax's approach to RECI use in different countries. While the German part of the firm stopped using RECI, some subsidiaries in Europe continued. Four firms within the group covered 100% of their electricity consumption with RECI. Two claimed carbon-neutral status³⁷⁰. The Interviewee said this reflected their national circumstances e.g. a national goal of carbon neutrality or where there was greater competition among telecommunication providers on sustainability issues.

Gravadlax did adjust its GHG mitigation strategies to the circumstances of the country in which it was operating, but the transmission of sustainability practices from overseas subsidiaries to the rest of the group was not detected.

9.1.6.3 Available finances and cost-saving

My proxy for available finance - net income before extraordinary items - dipped below zero for only two years in the period considered. Nonetheless available finance was a constraint on more expensive mitigation activities. Gravadlax would like to have installed more capacity to generate electricity renewably itself, but this required considerable initial investment and had to compete with numerous calls on capital for network improvement and expansion (Interviewee).

As the firm has consumed about 0.5% of total German electricity consumption, it could not buy the quantity of energy attribute certificates it wanted from German sources without driving up prices considerably. So, the firm mainly bought RECs from Austria and Norway which are connected to the same grid as Germany (Interviewee). The firm was spending 900,000-1,000,000 Euros a year on these certificates³⁷¹. Gravadlax has said that the certificates have been financed by implementing energy saving and optimized energy procurement. The Interviewee did not say whether this was an ongoing policy. He said energy saving and optimized energy procurement were unrelated to RECI use.³⁷²

³⁶⁹ Corporate webpage based on 2016 annual report, email dated 4 November 2018 from Interviewee.

³⁷⁰ 2015 corporate responsibility report p.125-126.

³⁷¹ CDP2012 3.3b, CDP2013 3.3b.

³⁷² CDP4 (2006), CDP2009 23.8, CDP2010 9.9, email dated 3 November 2018 from Interviewee.

Figure 43 Gravadlax's available finance

Source: Thomson Reuters Fundamentals accessed 13 April 2018.

Cost-saving was the driver of energy efficiency measures. However, energy costs did not represent a large slice of operating costs, consistently reported at below 5%³⁷³. Gravadlax invested money into energy efficiency measures depending on available capital and sufficient return on investment³⁷⁴. The firm said that its 2015 climate change strategy in which renewable electricity played a key role had already led to increased use of RECI, adding *“Higher investments into energy efficiency measures may also be taken into consideration, but is expected to require much more money”* (CDP2016 CC5.1a).

Self-generation of renewable electricity had dual motivations: corporate responsibility and financial benefits. The internally-set payback criterion for energy efficiency/self-generation was three years. As there were many projects across the board that met this criterion, there had to be exceptional reasons for projects with longer paybacks to go ahead. (Interviewee). However, some voluntary measures i.e. not

³⁷³ Energy costs represented 0.56% of total sales (CDP3 energy costs question). Expressed another way, they represented 1% of total operating costs (CDP2007 2(h)) and 0.7% in CDP2008 2(h)(ii), less than or equal to 5% of operating costs (CDP2012 12.1, CDP2013 11.1, CDP2016 CC11.1). This does not necessarily mean that energy costs as a percentage of operating costs has risen. In CDP2012-2016 responding firms were asked to choose a band of percentages that represented their operating costs. “Less than or equal to 5%” was the lowest band available.

³⁷⁴ CDP2012 3.3c, CDP2013 3.3c, CDP2014 3.3c, CDP2015 CC3.3c, CDP2016 CC3.3c.

required by regulation did go ahead that exceeded the three-year payback period. (CDP2012-2016 3.3b, interviewee).

In summary, there were many calls on capital with Gravadlax which was engaged in network expansion and improvement. This did limit the investment available for energy efficiency and self-generation of renewables.

9.1.6.4 Non-financial resources and capabilities and technical issues

The Interviewee said there was significant technical knowledge internally³⁷⁵. In interview, he discussed the hope that the firm might be able to generate more electricity renewably itself. This was an attractive option as it was not open to the criticisms that had been levelled against energy attribute certificates. However, the firm encountered practical difficulties that reduced the number of buildings where solar panels could be installed e.g. load-bearing capacity of the roof and orientation to the sun. In addition, solar panels initially required considerable investment and had to compete with other calls on the firm's capital related to the development of its business. (Interviewee)

The availability of non-financial resources and capabilities was not a constraint on the firm's choice of GHG mitigating actions. Technical difficulties impeded more extensive self-generation of renewable electricity.

9.1.6.5 Stakeholders

Gravadlax used the term *"corporate responsibility"*. The Interviewee explained what this meant with reference to CSR. *"We see that our concept is a broader approach than Corporate Social Responsibility because we consider all three dimensions of sustainability: the social dimension, the ecological dimension, and also the economic dimension. Also, CSR is often practised and used in a way that beside the business you do something good, but this is not our approach to do something on top of the business. We see sustainability as something related also to the business and so, of course, we do somethings for good also, but the main sustainability approach is to have a sustainable business model and to have positive social and ecological effects by our products and services."*

In common with the description that I have used of CSR, Gravadlax did consider that it has stakeholders. It gave a comprehensive list: analysts, investors and their representatives, politicians and regulators, suppliers, employees, potential employees and employee representatives, commerce and business groups, research and education organisations, sub-national level government, NGOs and interest groups,

³⁷⁵ Email dated 3 November 2018 from Interviewee.

media organisations, customers, potential customers and consumer groups (2011 corporate responsibility report PDF p.57). This approach is echoed in 2015 corporate responsibility report (p.37), which adds corporate responsibility rating agencies to its list of stakeholders (p.5).

Climate change had been the top environmental issue in the firm's materiality analysis which cross-referenced relevance of an issue for the firm against its relevance for external stakeholders (2011 corporate responsibility report PDF p.2, 2013 corporate responsibility report p.42). The Interviewee said RECI use had a corporate responsibility motivation.

In terms of the specific influence of stakeholders on the firm's climate change approach, there is a clear example with RECI. The firm stopped buying them for its German electricity consumption in 2013 because German NGOs had criticised their use and the firm considered that the position of the GHG Protocol on RECI at that time meant that the opportunity to reflect them in emission figures was very limited. The Interviewee said *"If you try to do something good and there is no recognition and you get criticised and you pay money for it and then it was decided the best what we can do is increase energy efficiency. We should focus on that and not spend money on a certificate which brings us criticism and no benefit at all."*

The Interviewee explained that there had been a view among some in Germany that RECI and offsets were like Medieval indulgences.

"So, in the mid ages, if you have not always been a very good Catholic and want to get into heaven, you had to buy some certificates and similar to this the recognition in many parts of the German population is. I don't share this view. Because OK, if you just buy the certificates but do not change your behaviour and your energy consumption, OK, then the critic may be OK. But if you compensate the emissions that you unavoidably have, then this is a good instrument to achieve carbon neutrality. For the climate, it is not important whether the carbon emissions are reduced on your site or somewhere else." (Interviewee)

The publication of the GHG Protocol's scope 2 guidance (Sotos 2015a) and the reflection of its approach in the CDP questionnaire had influenced electricity procurement in 2016, said the Interviewee; Gravadlax was looking for less carbon-intensive electricity suppliers.

Investors were an important constituency. Gravadlax noted that investors motivated by sustainability concerns comprised 20% of its shareholders (Interviewee). A negative reputation with respect to sustainability may increase the cost of capital. Reputational risks were managed through the firm becoming an industry leader with respect to sustainability and Gravadlax sought inclusion in investor-orientated sustainability indices. (CDP2015 5.1f) The executive officer and environment/sustainability officers had monetary rewards linked to achievement of targets related to socially responsible investment and the listing of the group in CSR ratings which included climate change issues (CDP2016 CC1.2a).

When the firm decided to become a climate change leader, the Interviewee said there had been a little interest in the issue among business customers and none from domestic consumers. Now there were some business customers interested in reducing the environmental impact of their supply chain and at

least 15% of its domestic consumers were motivated by sustainability concerns. The firm expected this to rise and this was a consideration. In Austria, sustainability-related activities were an area of competition among telecommunication firms (Interviewee).

The firm highlighted the reputational risk of not acting on its own scope 1 and 2 emissions and losing customer trust in CDP2016 CC5.1c. I asked if the telecoms sector was concerned about any possible perception of it being an energy-hungry sector and this was driving carbon neutrality targets, the Interviewee said *“Some are concerned about the energy hunger of ICT, but also the proportion of emissions coming from ICT is not growing that much and the overall energy consumption from ICT in developed countries - Germany and Sweden - is more decreasing than increasing, but yeah, at the end of the day, this may be one reason and one argument, but what is more important our technologies can do to bring down energy consumption and carbon emission in other sectors, the so-called enablement potential...”*

The Interviewee cited the Smarter 2030 study, published by the Global e-Sustainability Initiative, a group of major ICT firms and organisations globally, that found that the enablement potential was 20% of global emissions in 2030. But the Interviewee added *“But the enabling story is only credible if you do your own homework and bring down your own emissions. Because otherwise it looks like you do just finger-pointing on the others. So, I help you bring down your emissions, but don’t care my emissions. They are not that high. This is the wrong approach.”*

A poor reputation on sustainability would also affect the ability to attract and retain employees. (CDP2015 5.1f).

NGOs influenced Gravadlax’s use of RECI. Firstly, German NGOs’ criticism of RECI as a mitigation method dissuaded Gravadlax from using RECI within Germany. This was compounded by the earlier position of the global NGO, the GHG Protocol, on scope 2 accounting. However, when the GHG Protocol amended its guidance in 2015, this encouraged Gravadlax to reconsider RECI procurement. Investors were another important constituency. They were not encouraging specific actions, but the CSR ratings aimed at them have done so and were important influences. Customers’ view of Gravadlax’s reputation on environmental issues was more important for some subsidiaries than others.

9.1.6.6 Other firms

Competitors influenced what the firm did in relation to using RECI. In Austria firms sought to attract custom through their reputation for environmental performance, including using RECI, motivating Gravadlax to continue with their use in absence of the NGO criticism that occurred in Germany. The Interviewee confirmed that in general there was significant tracking of competitors’ activities. (Interviewee)

Competitors were a significant influence regarding RECI use and environmental performance generally.

9.1.6.7 Regulatory and policy context

Gravadlax wanted to buy Renewable Energy Certificates (RECs) but could not source the quantity it wanted at the price it wanted within Germany. Therefore, it bought RECs from outside Germany (Interviewee). Despite the significant renewable generation taking place in Germany, I would attribute the lack of availability and hence price of German RECs to the German government's policy of automatically allocating GOs from publicly-supported electricity generation to consumers, labelled as EEG-supported electricity on their bills, rather than issuing them to generators for them to sell to electricity suppliers or direct to consumers³⁷⁶. The Interviewee did not reference this policy, but later said the regulation may have an indirect impact via the price of GOs (email dated 12 November 2018 from Interviewee).

The Interviewee drew attention to carbon neutrality targets being set by EU countries which he considered would encourage use of RECI by Gravadlax and other firms: *"...there is this certain tendency now. You have the decisions in the Sweden. Sweden has a carbon tax of 131 Euros and they want to be carbon neutral as a country in 2045. So, they want to bring down their energy consumption by 85% or something like that..."*. Turning to other regulations and the policy context affecting Gravadlax's own operational emissions, as opposed to those associated with use of its products, the firm said it had been affected by a German energy/fuel tax and German planning regulations related to the environment. Looking forward, Gravadlax said new international agreements on climate change may increase energy and offset costs. It also said that as the energy consumption of ICT was growing – ICT emissions were comparable to those from aviation – and the EU may regulate to reduce consumption. However, it considered the likelihood of this was reduced due to other regulatory priorities and energy efficiency improvements in ICT. Other possible regulatory impacts were integration in the EU emissions trading scheme and environmental standards for buildings. (CDP2013 5.1a, CDP2015 CC5.1a). Some of the group has implemented ISO 50001, an energy management standard (International Organization for Standardization (ISO) 2018b, Lazarate 2016),³⁷⁷ that is a mode of compliance with Article 8 of the EU Energy Efficiency Directive³⁷⁸.

³⁷⁶ The German government issues GOs renewably-generated electricity and then automatically allocates GOs from publicly-supported facilities to German's electricity consumers. The unit of electricity would not be available to have a REC created and allocated to it. (Marty 2017)

³⁷⁷ CDP2014-CDP2016 3.3b, 3.3c.

³⁷⁸ Directive 2012/27/EU (European Parliament and European Commission 2012).

The firm promised in 2010 to help the German government implement an “*ambitious energy concept*” including an emissions reduction target to be achieved in part by decentralised renewable generation using smart grid technology³⁷⁹. Gravadlax said it could support the *Energiewende* in CDP2013 and CDP2015 (2.3a).

In CDP2017, Gravadlax described use of RECI as means of reducing the risk that the EU emissions trading scheme (EU ETS) would extend to encompass its operations as it would reduce the firm’s reported GHG emissions (3.1a).

In summary, carbon neutrality targets set by national governments encouraged RECI use, which was also seen as a defensive strategy to avoid further regulation. The policy of the German government on GOs has not deterred Gravadlax from RECI use, although, I infer, it is likely to have led to the firm sourcing RECI from outside Germany. Otherwise regulation has had limited impact on the operational (scope 1 and scope 2) GHG emissions mitigation strategy of Gravadlax.

9.1.6.8 Organisational values

Asked whether the action of the senior manager described in section 9.1.6.1 had been driven by morals or the aim of winning business through an improved reputation, the Interviewee said that the main driver had been moral.

“Of course, we also look to have a good reputation by being a leader with respect to climate change. But with respect to customers, so honestly with respect to B2C customers, that does not play any role. There is not such demand from private customers. In B2B, it is a little different but not at times. So now we see that demand for services with low- or no-carbon based on green or renewable energies is increasing with respect to business customers because some of the most advanced companies try now to green their supply chain after they have greened their own energy consumption. It is not the majority but we see that this kind of interest is increasing.”
(Interviewee)

In summary, moral considerations had been the main driver of the firm’s climate change approach.

³⁷⁹ 2011 corporate responsibility report, PDF p.251.

9.1.6.9 Summary of findings for RQ1

Table 27 Summary of factors affecting Gravadlax's GHG mitigating activities – presented by factor

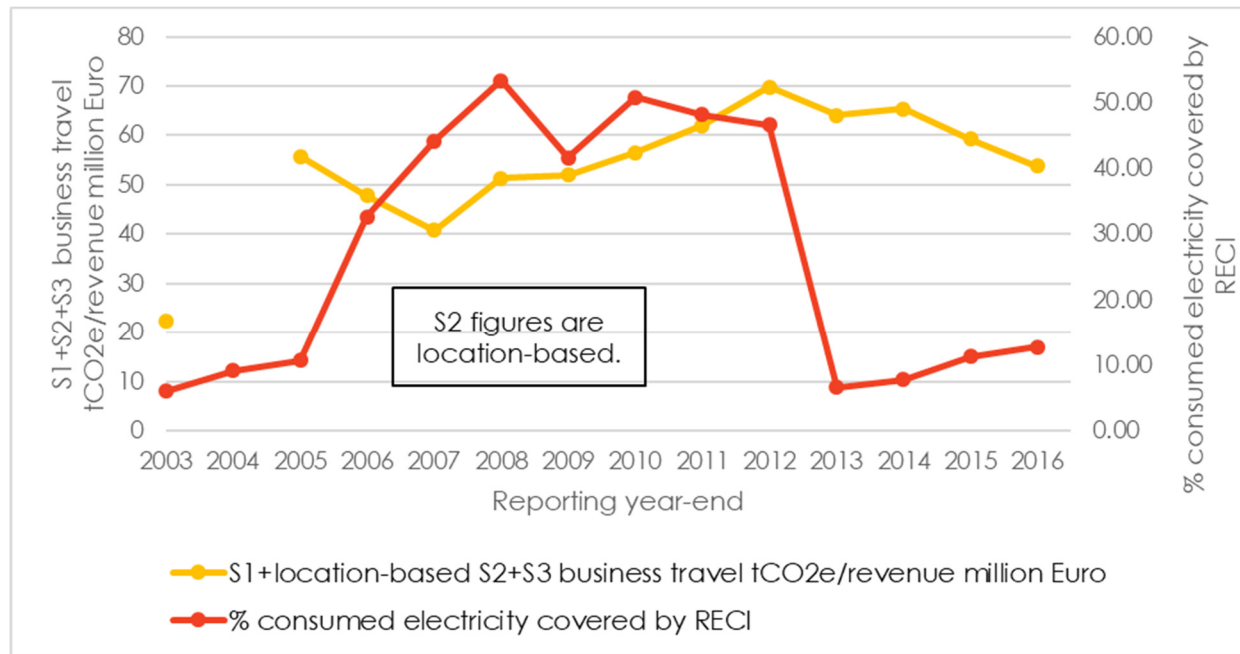
Factor	Finding
Individuals in firm	A senior manager in the firm was instrumental in getting Gravadlax to focus on climate change.
International experience	Gravadlax did adjust its GHG mitigation strategies to the circumstances of the country in which it was operating, but the transmission of sustainability practices from overseas subsidiaries to the rest of the group was not detected.
Available finances and cost-savings	There were many calls on capital with Gravadlax which was engaged in network expansion and improvement. This did limit the investment available for energy efficiency and self-generation of renewables.
Non-financial resources and capabilities and technical issues	Technical difficulties impeded more extensive self-generation of renewable electricity.
Stakeholders	NGOs had influenced Gravadlax's use of RECI. Investors were an important consideration as were CSR rating agencies aimed at an investor audience. Customers' view of Gravadlax's reputation on environmental issues e.g. RECI use was more important for some subsidiaries than others.
Other firms	Competitors were a significant influence regarding RECI use and carbon neutrality claims.
Regulation and policy context	Carbon neutrality targets set by national governments encouraged RECI use, which was also seen as a defensive strategy to avoid further regulation. German government policy on GOs had not deterred Gravadlax from RECI use, although, I infer, it had led to the firm sourcing RECI from outside Germany. Otherwise regulation has had limited impact on the operational (scope 1 and scope 2) GHG emissions mitigation strategy of Gravadlax.
Organisational values	Moral considerations had been the main driver of the firm's climate change approach. RECI use had a corporate responsibility motivation. Self-generation of electricity had a corporate responsibility driver, alongside cost-saving motivations.

9.1.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES (RQ2)

I investigated any link between emissions and RECI use using emission intensity metrics. Gravadlax's absolute emissions targets have covered scope 1+scope 2+scope 3 business travel, so I used this set of emissions as the numerator. Gravadlax has said that the most appropriate denominator for its scope 1+scope 2 emissions would be tCO₂ per transmitted gigabyte but it did not use it yet³⁸⁰, so I used the denominator for Gravadlax's chosen energy intensity metric - revenue in billions € - to normalise emissions and plotted this against the RECI percentage (see Figure 44).

³⁸⁰ CDP2010 (18.1b) and CDP2012 (13.4). Note units in tCO₂, not tCO₂e.

Figure 44 Gravadolax's emissions intensity and % consumed electricity covered by RECI



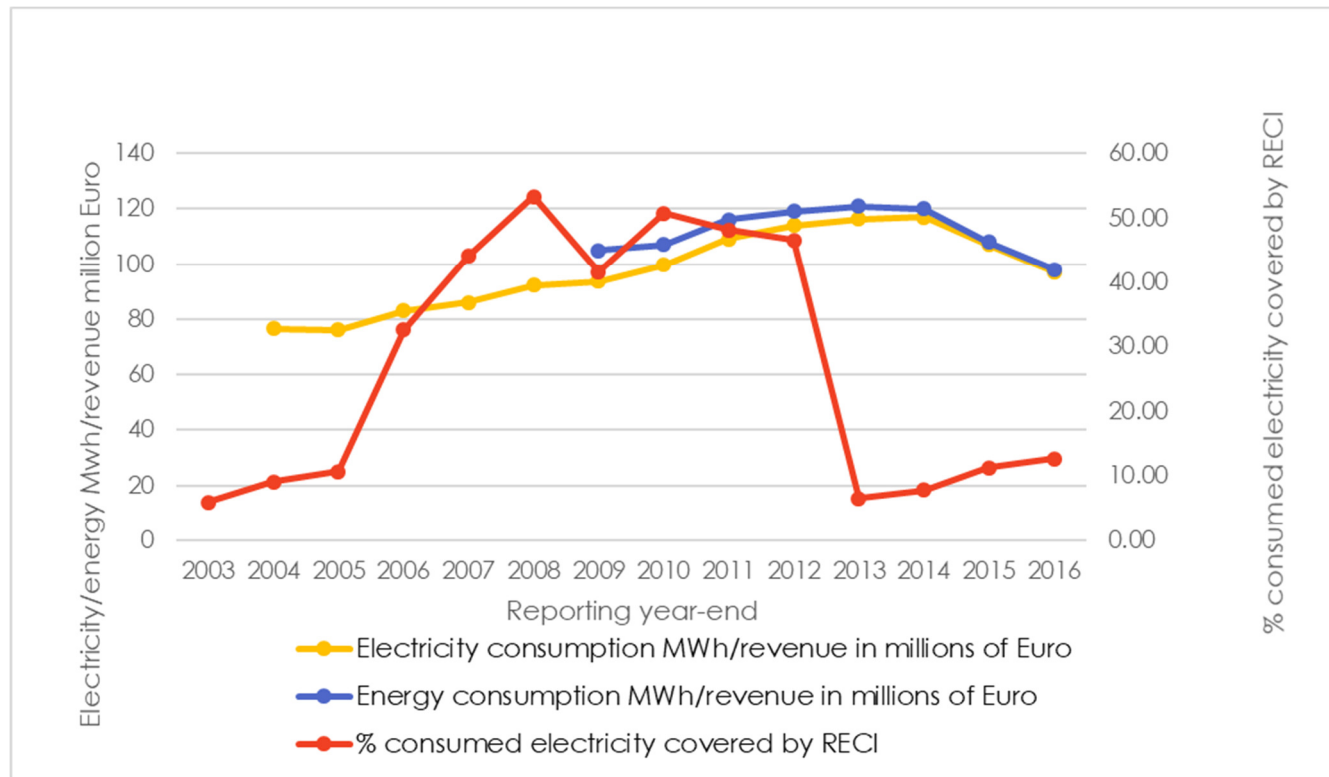
Sources: see section 14.2.12. Offset use is not reflected in the emission figures.

Emission intensity has an overall upwards trend until 2013 which was year in which Gravadlax stopped buying RECI to cover its German electricity consumption. After 2013 the RECI percentage crept up while emission intensity began to decline markedly. Does this suggest that money that had been spent on RECI up to 2013 was being spent instead on other mitigating projects post-2013?

To investigate further, I calculated electricity consumption normalised by revenue. The method used to calculate this data series was validated by similarity with Gravadlax's chosen energy metric: energy consumption in thousands of MWh/ revenue in billions €. Although the word "*energy*" is used, contextual information suggests that it is specifically electricity reported in the corporate publications (see section 14.2.12 for references). Figures for y/e for 2009-2016³⁸¹ sourced from corporate responsibility reports were close to my calculated data-series. However, my data-series had the advantage of being longer. Both sets of figures are shown in Figure 45.

³⁸¹ 2012 report p.237, 2015 report p.147, 2016 report p.162.

Figure 45 Gravadlax's electricity/energy consumption intensity and % consumed electricity covered by RECI



Sources: see section 14.2.12.

Electricity consumption per unit revenue and the percentage of consumed electricity covered by RECI both rise to y/e 2008 when the RECI percentage plateaus. There was a decline in electricity intensity two years after Gravadlax stopped buying RECI in 2013 to cover electricity use in Germany. Like the emission intensity figures, these electrical intensity figures suggest that displacement may have been taking place.³⁸²

Countering this inference, the 2015 corporate responsibility report highlighted that performance on electricity consumption had been particularly successful in Germany; *“As revenues increased, electricity consumption throughout the group remained stable, and actually fell in Germany, in 2015. In view of the lightning rise in worldwide data traffic and the continuing network build-out, this stable trend is a success and has only been possible due to the progress we have made in energy efficiency.”* (p.30). The firm also has published data on an energy consumption (CDP2016 CC2.1c), keeping action on energy use in the public eye. Furthermore, the Interviewee was clear that the firm’s use of RECI did not affect its work on energy efficiency because this was driven by financial savings. Asked about whether RECI use displaced work to reduce fugitive emissions of refrigerants i.e. actions that would not lead to cost-savings, the Interviewee said these emissions were relatively small – less than a percentage of its total emissions – and were unaffected by cessation in use of RECI.

I pressed the Interviewee again on RECI use displacing other GHG mitigation actions, given the firm had spent 900,000 € and 1,000,000 € a year on certificates that could have gone into energy efficiency/saving programmes and with an estimated annual emission saving of 1,700,000 and 1,400,000 tCO₂e respectively³⁸³. The Interviewee said this sum was not significant in a group energy bill of 1 billion € a year i.e. a thousandth of the group energy bill. In CDP2016 (5.1a), referring to its 2015 climate change strategy which had already led to a greater use of RECI, Gravadlax said *“Higher investments into energy efficiency measures may also be taken into consideration, but is expected to require much more money”*.

So, what would the cost of RECI buy in terms of other GHG mitigation projects? The next biggest estimated savings after RECI use was from a project to switch off redundant equipment in the transition to a new type of network. The investment required for this work is given as 3,700,000 €, saving an estimated 18,222 tCO₂e annually (CDP2013 3.3b). In CDP2014 (CC3.3b), the investment required is given as

³⁸² I decided against plotting the RECI against an energy intensity metric that explicitly included fuel use. Given Gravadlax’s focus on electricity – rather than energy - consumption and inclusion of scope 1 emissions in the emission intensity metric, I did not think calculating energy intensities to compare with the RECI percentage would yield additional insight.

³⁸³ CDP2012 3.3b, CDP2013 3.3b.

13,600,000 €, saving an estimated 12,723 tCO₂e annually³⁸⁴. The next biggest estimated emissions reduction was due to electricity load management. The annual cost of RECI would pay for this twice over, but this would only equate to an annual emission saving of 23,240 tCO₂e, less than 1% of S1+S2 emissions reported in CDP2017, the same year in which this mitigation project was recorded. It is clear from these figures that changes in emission intensity seen in Figure 44 are unlikely to have been related to the purchase or not of RECI. It would not produce the reductions on the scale seen. I do not have data on the annual energy savings from energy efficiency/saving projects to make a similar assessment using different units.

Conversely while RECI use does involve ongoing annual costs, any one of several energy efficiency schemes listed in CDP2013-2017 (3.3b) could pay for it. Switching off redundant equipment was estimated to save 5,100,000 € p.a. (CDP2013 3.3b). Electricity load management was estimated to save 3,500,000 € p.a. (CDP2017 CC3.3b). At one stage, RECI purchase had been financed by implementing energy-saving and optimized energy procurement (CDP4 (2006), CDP2009 23.8, CDP2010 9.9), but this does not appear to be ongoing.

To summarise, the graphs of S1+S2+S3 business travel emissions and electricity consumption normalised by revenue suggest that displacement may have been occurring. However, declines in intensities following the cessation of RECI sourcing in 2013 could be accounted for by the work the firm has done on electricity efficiency/saving described by the firm in its 2015 corporate responsibility report. The Interviewee was clear that displacement of focus was not occurring and energy efficiency/saving projects were driven by cost-savings. Furthermore, if the annual cost of RECI was diverted to other emission mitigation projects, it would not produce the scale of changes shown in Figure 44, based on estimated emission savings of mitigating projects reported to CDP2013-2017 CC3.3b.

The results are discussed further in the discussion for RQ2 in chapter 11.

³⁸⁴ An investment amount was not given in CDP2015-2017 CC3.3c although the project is listed.

9.2 UPWIND

9.2.1 DATA SOURCES

Sources of data for this firm were corporate publications, CDP responses from CDP1 (2003) - CDP2016 with limited use of CDP2017, which were all public, and a phone interview with an Environmental Reporting Manager (the Interviewee) on 24 May 2017 with some subsequent calls following up outstanding questions (11 August 2017, 13 October 2017) and an email (17 October 2017) containing information supplied by the manager's colleagues. I also conducted a phone interview on 12 September 2016 with a former manager at the firm from 2008-2014 who had worked both on energy efficiency and energy procurement. When the draft chapter was sent to Upwind for feedback, the Head of Environmental Sustainability reviewed the document and added some comments to those of the Interviewee contained in an email dated 26 October 2018.

9.2.2 CASE DESCRIPTION

This UK-incorporated firm supplies communication goods and services to domestic, business and public sector customers. It grew from a wholly domestic business in the early 1990s to one where 16% of its total energy consumption was outside of the UK, although this has since declined³⁸⁵. It is a group of firms³⁸⁶. Upwind consumed about 0.7% of the total electricity consumption in the UK, mostly in powering the firm's networks and data centres³⁸⁷. It has an extensive vehicle fleet³⁸⁸ and leases most of its property in the UK³⁸⁹.

9.2.3 OVERVIEW OF DATA RELEVANT TO RQ1

Upwind has been a major purchaser of low-carbon electricity contractual instruments (LCECI) and renewable electricity contractual instruments (RECI). It has also sought to generate a substantial amount of its own electricity. There have multiple drivers for these actions.

³⁸⁵ 1996 annual review, 2010 corporate report PDF pp.6-7, 2012 corporate report PDF p.13, 2014 corporate report p.38, CDP2015 CC0.1, Head of Environmental Sustainability.

³⁸⁶ 2010 corporate publication PDF p.3, 2016 corporate publication p.52.

³⁸⁷ CDP2008 1(a)(iii), 2012 corporate report PDF p.57, CDP2013 5.1a.

³⁸⁸ 2014 corporate report p.32.

³⁸⁹ 2014 corporate report p.27, Interviewee.

The Interviewee said he thought purchase of RECI and LCECI began before the introduction of the Climate Change Levy (CCL) in 2001, This was a tax on fossil fuel energy. However, in 2004 Upwind set itself a target to buy 10% of its electricity from renewable sources, indicating RECI/LCECI use was not high at that time. The CCL made it cost-neutral for Upwind to use RECI³⁹⁰.

By 2007 Upwind reported that almost all its UK electricity consumption was either renewable or CHP electricity. In that year Upwind turned its attention to generating electricity itself. It announced a major project to meet 25% of its own consumption through its own wind turbines. Addressing a short supply of renewable electricity in the UK and meeting the expectations of staff and customers for sustainable business practices were among the drivers. In 2013 the firm decided not to continue with this goal due to planning permission difficulties and uncertainty about regulatory incentives. Upwind turned to Power Purchase Agreements (PPAs) with renewable electricity generators as well as purchasing other RECI. It said that long-term PPAs reduced exposure to rising prices and “...creates visible long-term demand”. The Climate Change Levy exemption for renewable electricity began to be phased out in 2015. However, the Interviewee said that all its new electricity supply contracts would still be for renewable electricity. RECI/LCECI use has been instrumental in Upwind achieving its GHG mitigation targets.

The Interviewee said energy efficiency/saving is driven by cost reduction. The longer pay-back period allowed for energy efficiency/saving projects compared to other types of business improvements suggests other motivations too. There has been an internal driver. The former energy efficiency and procurement manager at Upwind talked about a generation of CEOs in the UK in the mid-2000s including top management at Upwind who led on climate change. Upwind has said it had a moral duty to act on climate change as it is a large electricity consumer. Employees were also motivated by a positive reputation on climate change. However, external stakeholders, particularly investors, have pushed climate change up the firm's agenda. Business customers have also been interested to a limited extent.

Upwind does have to overcome some difficulties in its GHG mitigation activities as it leases most of its premises. This creates two problems. Firstly, payback periods may exceed the term of the lease. Secondly, the firm must get the owner's permission to install equipment such as PVs.

³⁹⁰ I do not have equivalent data for LCECI.

Table 28 Summary of factors affecting Upwind's GHG mitigating activities – presented by mitigating activity

Mitigating action	Influencing factors		
GHG mitigating actions in general	<u>Stakeholders</u> Investors and sustainability ratings have been among key drivers of Upwind's climate change approach. CDP had had a direct influence on Upwind's focus of its GHG mitigation activities. There has been some business customer interest in Upwind's climate change approach.	<u>Organisational values</u> Upwind has said it had a moral duty to act on climate change due to the amount of electricity it has consumed.	<u>Individuals in firm</u> A former CEO was instrumental in Upwind's ambitious climate change approach. This was perpetuated by the subsequent CEO.
LCECI/RECI use	<u>Regulatory and policy context</u> Upwind's use of RECI was facilitated by Climate Change Levy exemption for renewably-generated electricity.	<u>Cost-saving</u> PPAs reduced exposure to rising prices.	<u>GHG mitigation targets</u> Upwind said a target was achieved primarily through an electricity contract which was backed by renewable energy attribute certificates.
Energy efficiency/saving	<u>Available non-financial resources</u> Opportunities for energy efficiency/saving had ebb and flowed with changes to telecoms technology.	<u>Cost-saving</u> This drove energy efficiency/saving.	
Self-generation of electricity	<u>Cost-saving</u> Inadequate financial returns were a factor in Upwind dropping its plans to generate 25% of its electricity itself using wind. Self-generation of renewable electricity would have offered protection against rising electricity prices and energy security. Smaller PV schemes did still go ahead.	<u>Regulatory and policy context</u> Planning constraints were among the factors in Upwind dropping its plans to generate 25% of its electricity renewably itself. Another factor was uncertain regulatory incentives for renewable electricity generation.	<u>Available non-financial resources</u> It was difficult to get permission to install renewable electricity generation equipment.
Refrigerant emissions	<u>Regulatory and policy context</u> Upwind was switching to water-based cooling, which ensured compliance with EU directive on coolants with high Global Warming Potentials.		
Offset use	<u>Organisational values</u> Use rejected because of doubts about their benefits.		

9.2.4 EMISSIONS OVERVIEW

Its location-based scope 2 emissions have been an order of magnitude greater than its scope 1 emissions (including emissions from vehicles)³⁹¹. While its scope 1 emissions have been an order of magnitude greater than its scope 3 business travel emissions³⁹². Fugitive emissions of refrigerants were not significant³⁹³.

9.2.4.1 Targets

Data on targets is presented because they frequently aggregate emissions from different scopes and my assumption is that reductions in one scope may compensate for a lack of reductions in another. Looking at targets also serves to identify appropriate emission intensity metrics to use.

An absolute target that has been relevant for most of the period studied was reported in CDP2008 for Upwind's UK emissions: to reduce its emissions by 80% below 1996 levels by December 2016³⁹⁴. CDP2016 (3.1a) specified it as a S1+S2 (market-based) +S3 (upstream). CDP2015 specified scope 3 emissions included business travel, homeworking, and transmission and distribution losses associated with electricity use³⁹⁵. This aggregation was used for emissions data for y/e 2011-2016 in Figure 46. Figure 46 shows the importance of RECI/LCECI use for meeting the target that used a market-based scope 2 approach.

In CDP2008 Upwind specified a new intensity target based on a financial accounting metric. The target of an 80% reduction from a y/e 1997 baseline by 2020 was designed to reflect Upwind's assessment of its contribution to avoiding climatic catastrophe while allowing for the business growth which was occurring outside of the UK³⁹⁶. This target included the same emissions sources as given in CDP2015 CC3.1a for the absolute target. It used a market-based scope 2 approach³⁹⁷. The firm said that the Science-Based

³⁹¹ See the section on Upsilon's quantitative data 14.2.10.

³⁹² 2010 corporate report PDF p.5.

³⁹³ Interviewee.

³⁹⁴ CDP2008 3(a)(iii) and CDP2009 9.2. The base year was given as 1997 in CDP2011-2012 3.1, CDP2014-2016 CC3.1a) and this has been used in Figure 46.

³⁹⁵ CDP2015 CC3.1a specified that the scope 3 categories also included emissions from other sources, which I have assessed as minor.

³⁹⁶ CDP2008 3(b)(i), 2009 sustainability report PDF p.9.

³⁹⁷ 2012 corporate responsibility report PDF. P.55.

Target initiative³⁹⁸ had confirmed that the relative emissions target “...is aligned to the level of decarbonisation required by climate science.”³⁹⁹ It met the target four years early in 2016⁴⁰⁰. In 2017 Upwind set a new intensity S1+market-based S2 target considered to be its share of the global GHG emission reduction needed to limit temperature rise to 1.5 degree, the most ambitious aim of the Paris Accord, which was the outcome of UNFCCC’s COP21 meeting in 2015⁴⁰¹.

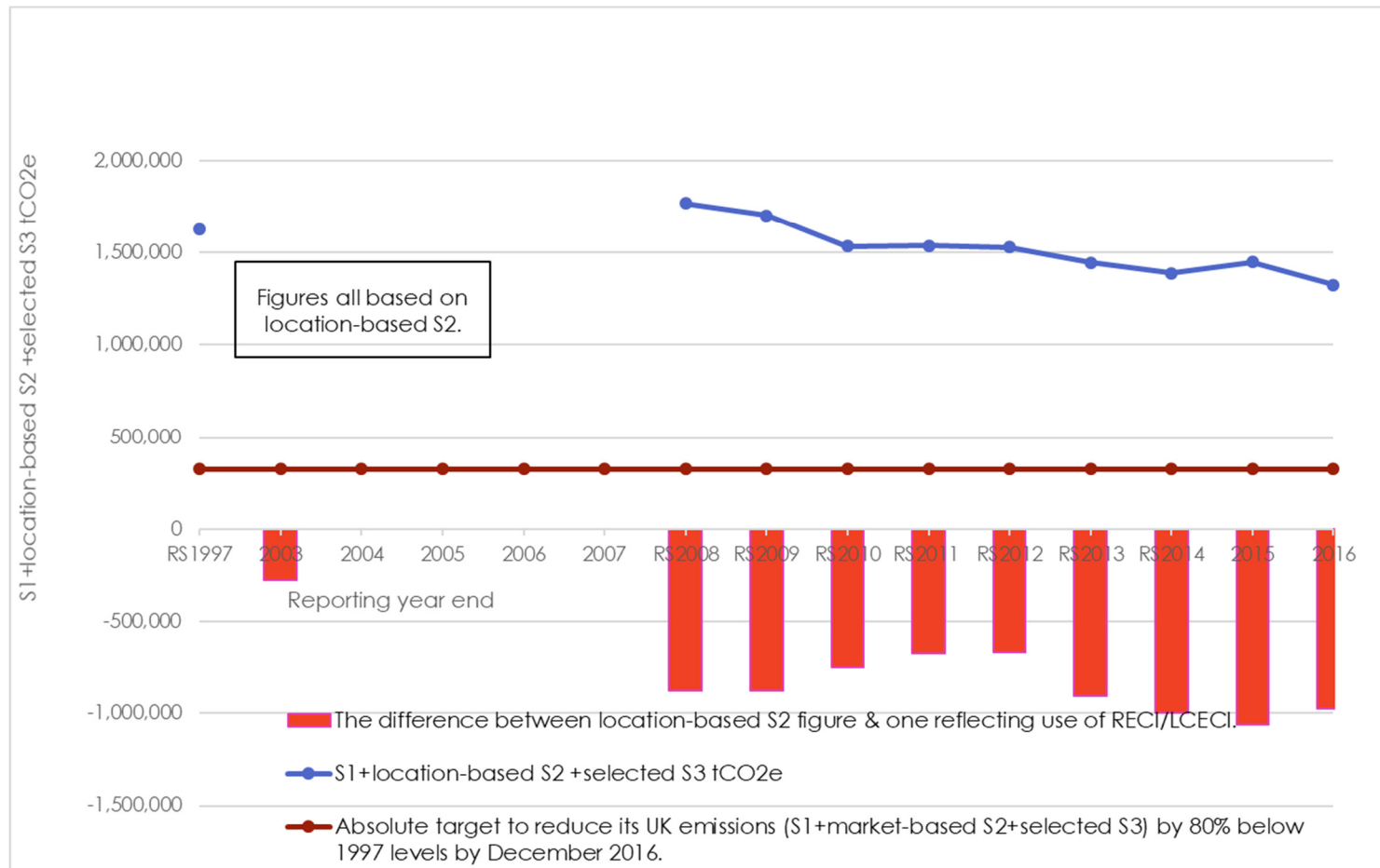
³⁹⁸ Science Based Targets initiative n.d.a.

³⁹⁹ CDP2015 3.1b.

⁴⁰⁰ CDP2016 CC3.1e.

⁴⁰¹ CDP2017 CC3.1b.

Figure 46 Upwind's scope 1, scope 2 and selected scope 3 emissions



Sources: See section 14.2.13.

9.2.5 ACTIONS RELATED TO CLIMATE CHANGE MITIGATION

The firm began its emission reduction programme in the 1990s. By CDP2 (2004) Upwind reported reducing energy-related emissions by 60% from 1991 and transport-related emissions by 35% from 1992 levels. However, it warned that expansion of its network and broadband roll-out would increase its energy use. In light of this, it had decided to cap its carbon dioxide emissions (further specification not given) at 25% below 1996 by 2010⁴⁰².

Also, in CDP2 (2004), Upwind reported a target to buy 10% of its electricity from renewable sources by 2010. The Interviewee said it was part of the firm's climate change strategy. However, the firm had an early awareness of some of the debate about RECI use, referencing "...*doubts about the validity of green supply offerings...*" and discussing an option for increasing the likelihood that RECI stimulated additional renewable capacity (CDP2 (2004)⁴⁰³).

Upwind has been a major user of electricity from CHP (see Figure 47) since at least y/e 2003. I assume it was buying CHP electricity, rather than generating its own as from CDP2010 use of CHP GOs begins to be cited and the quantities are similar to those reported for CHP use prior to that⁴⁰⁴. CHP LEC use is reported in CDP2011 (5.1a). More information begins to be given about renewable electricity in CDP2010 too. GO and LECs were used in y/e 2010, 2012 and 2016, LECs and the European Energy Certification Scheme⁴⁰⁵ in y/e 2011, LECs in y/e 2013 and 2015, and LECs and GOs in y/e 2016.⁴⁰⁶

In 2005, Upwind reported it had entered into a major contract to meet most of its electricity supply via renewable and low-carbon generation methods. It does not specify the contractual instrument. However, the quantity involved and the juxtaposition of this announcement with a subsequent one in 2007 about sourcing a significant quantity of its electricity from on-site or adjacent renewable installations suggests the

⁴⁰² CDP2 (2004) – strategy and targets questions.

⁴⁰³ CDP2 (2004) question on targets.

⁴⁰⁴ CDP2010 14.5, CDP2011 11.2a, CDP2012 11.2a

⁴⁰⁵ See footnote 358.

⁴⁰⁶ CDP2010 14.5, CDP2011 11.2a, CDP2012 11.2a, CDP2013 CC5.1a, CDP2015 CC5.1a, CDP2016 CC11.4.

announcement must have related to grid-sourced electricity⁴⁰⁷. It reported in CDP2007 that almost all its UK electricity consumption was from renewable and CHP electricity⁴⁰⁸.

By CDP2007 the firm reported that it had already reduced emissions by 60% from its 1996 level by 2006⁴⁰⁹. Following its achievement of its target, a new target was set for its UK emissions: to reduce its absolute emissions by 80% below 1996 levels by December 2016⁴¹⁰.

In October 2007 Upwind announced up to £250 million of investment for the construction of wind turbines on-site or on adjacent premises to supply a quarter of its⁴¹¹ current electricity consumption by 2016.

Upwind also had a dedicated budget for energy efficiency. The firm's emission reduction strategy had the following hierarchy: to improve energy efficiency, generate renewable energy onsite, buy low-carbon energy⁴¹². The reasons given for this huge investment in renewable generation were a shortage of renewable electricity available to buy and reputational advantages with customers and staff⁴¹³.

In 2012 the firm dropped the self-generation ambition due to difficulty in getting planning permissions and uncertainty over regulatory incentives⁴¹⁴. The following year Levy Exemption Certificates ceased to be issued for electricity from certain types of CHP, although they could still be redeemed until 2018 (Bellingham 2013). Upwind's use of CHP ceased that year (see Figure 47).

The 80% absolute emissions reduction target was attained in y/e 2013 and maintained through to the latest year of emissions data examined - y/e 2016⁴¹⁵. Upwind said the target was achieved primarily through an electricity contract which was backed by Levy Exemption Certificates and GOs⁴¹⁶. It saw the contract as incentivising renewable energy generation. The Interviewee said: "*... the more people that are*

⁴⁰⁷ CDP3 (2005) – risks and opportunities question.

⁴⁰⁸ CDP2007 3(a)(vi).

⁴⁰⁹ CDP2007 3(a)(vi) What emission sources this covered is not specified.

⁴¹⁰ See section 9.2.4.1.

⁴¹¹ Presumably UK consumption.

⁴¹² CDP2008 3(a)(iv) and (v), CDP2009 23.8.

⁴¹³ 2009 sustainability report PDF p.15, national newspaper webpage 2007, which cannot be specified further to avoid identifying Upwind.

⁴¹⁴ CDP2013 5.1a.

⁴¹⁵ See 14.2.13 and sources for Figure 46.

⁴¹⁶ CDP2015 CC3.1a. CDP2015 5.1a says the electricity was backed by LECS. The former manager said GOs were also used. CDP2016 CC11.4 says all UK electricity consumption was backed by GO and LECs and EU electricity consumption was backed by GOs.

demanding renewables, the more the electricity companies are thinking we had better create more renewables because...without that demand there is no driver to do it almost, I don't think, or very little drivers to do that".

The levy exemption for renewable electricity began to be phased out in 2015 (HM Revenue and Customs 2015a, Ofgem 2016a, Bellingham 2013). Although the fiscal advantage was to end, Upwind committed to only entering into contracts for renewable electricity supply. It has been at the forefront of the debate on consumer influence on electricity generation and scope 2 accounting⁴¹⁷. By y/e 2016 95% of Upwind's global consumption was covered by RECI⁴¹⁸.

In addition to trying to reduce its emissions through its electricity supply arrangements, Upwind has worked with employees to reduce emissions through energy saving campaigns, responding to their suggestions for mitigation actions and making energy use data accessible to employees⁴¹⁹. It has also experimented with the use of electric and bio-diesel vehicles and worked on data centre efficiency and switching off unused equipment⁴²⁰.

The firm set a goal to help its customers through its services to cut their emissions by three times its own "end-to-end" emissions – to be "*net positive*". End-to-end emissions included Upwind's supply chain, its own operations – using a market-based scope 2 approach - and the energy use and end-of-life disposal of its products. The ratio in the 2013 base year was 1.02 to 1. By y/e 2016 the ratio had risen to 1.6 to 1⁴²¹. In a 2014 corporate report (p.28), it said "*This is not only necessary for society to live within the planet's resources, but also opens up new markets and business opportunities for Upwind.*"

⁴¹⁷ CDP2012 3.3b, 2012 corporate report, CDP2013 2.3c.

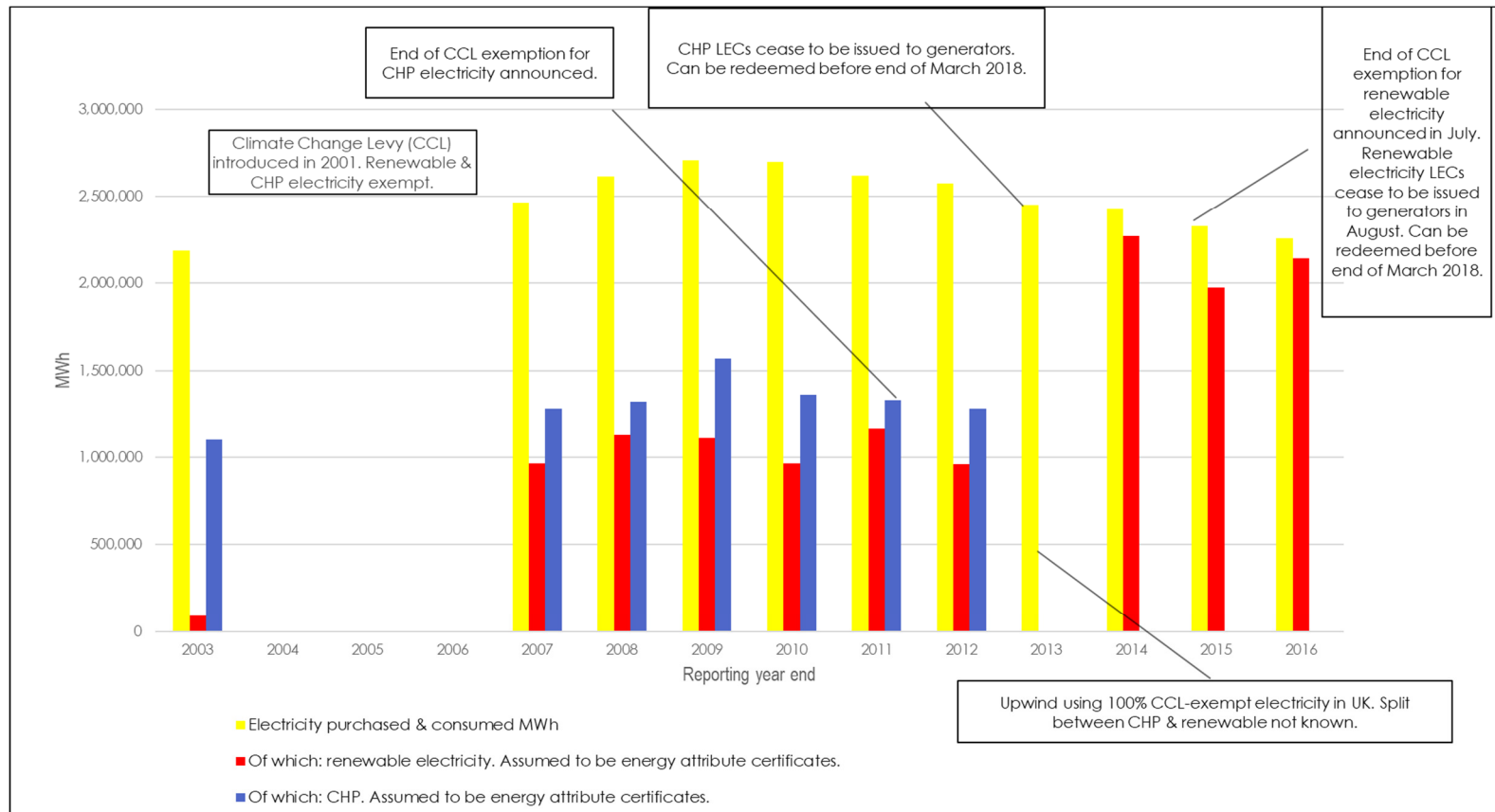
⁴¹⁸ CDP2016 CC3.1e.

⁴¹⁹ 2009 sustainability report PDF pp.9-21, CDP2011-CDP2012 3.3, 2012 corporate social responsibility report PDF p.57-58, 2014 corporate social responsibility report p.36, 39, CDP2014 3.3b, CDP2015 3.3b.

⁴²⁰ 2009 sustainability report PDF p.12.

⁴²¹ CDP2016 CC3.1b and CC3.1e, Interviewee, Upwind's methodology document p.4.

Figure 47 Upwind's electricity consumption



Sources: See section 14.2.13. Sources for regulatory changes were Bellingham (2013), HM Revenue and Customs (2015a and 2015b). This figure is reproduced in the accompanying A3 portfolio.

9.2.6 FACTORS INFLUENCING A FIRM'S GHG MITIGATION CHOICES

9.2.6.1 Individuals in firm

A former CEO had taken a leadership role in relation to climate change (2008 corporate report – chairman's report). The former manager who is from Germany contrasted the approach of the Upwind CEO in the late 2000s with that of German firms. The German firms identified products that they thought would assist with the transition to a low-carbon economy. In contrast, the former manager, who moved to the UK to work for Upwind in 2008, found a CEO personally committed to addressing climate change and was very impressed with the 80% emission intensity target that Upwind had set itself. The former manager noted that there were a lot of large firms setting these ambitious targets, driven by a generation of CEOs who showed leadership on climate change.

"... I was very impressed with voluntary targets because in [former employer in Germany], I perceived we were very careful with committing to something in public. To prepare ourselves for legislative changes coming from Europe we lobbied for the right changes, but coming out with something as an own commitment, it wasn't there. It was more development of technology e.g. [product] were at that time a big thing for [former employer]. They asked government to support with [complementary] infrastructure, but it wasn't done in a way that we commit to produce so many [products] in 2020. It was much more we want to go that journey, that roadmap but we need the government to do things to make that happen. When I moved to the UK, I found a lot of corporates had very ambitious targets driven by a certain generation of CEOs..." (Interview, former manager)⁴²²

The Head of Environmental Sustainability said under the vigorous and visionary leadership of the subsequent CEO, Upwind went on to set an ambitious intensity target covering scopes 1 and 2, considered to be in line with the Paris Accord's aim of limiting global temperature rise to 1.5 degree⁴²³, and an absolute target, covering scope 3 supply chain emissions, both stated to be approved by the Science-Based Target initiative⁴²⁴.

The Interviewee did not talk about particular individuals but said that board-level support drove GHG mitigation performance.

In summary, CEOs have been key drivers of Upwind's climate change approach.

⁴²² Words in the square brackets have been removed to avoid identifying the firm.

⁴²³ The Paris Accord was the agreement reached at the UNFCCC's meeting in COP21 in Paris in 2015 (United Nations Framework Convention on Climate Change Secretariat. n.d).

⁴²⁴ CDP2017 CC3.1a and CC3.1b, Head of Environmental Sustainability who reviewed the draft of this chapter. Science Based Targets initiative. n.d.a.

9.2.6.2 International experience

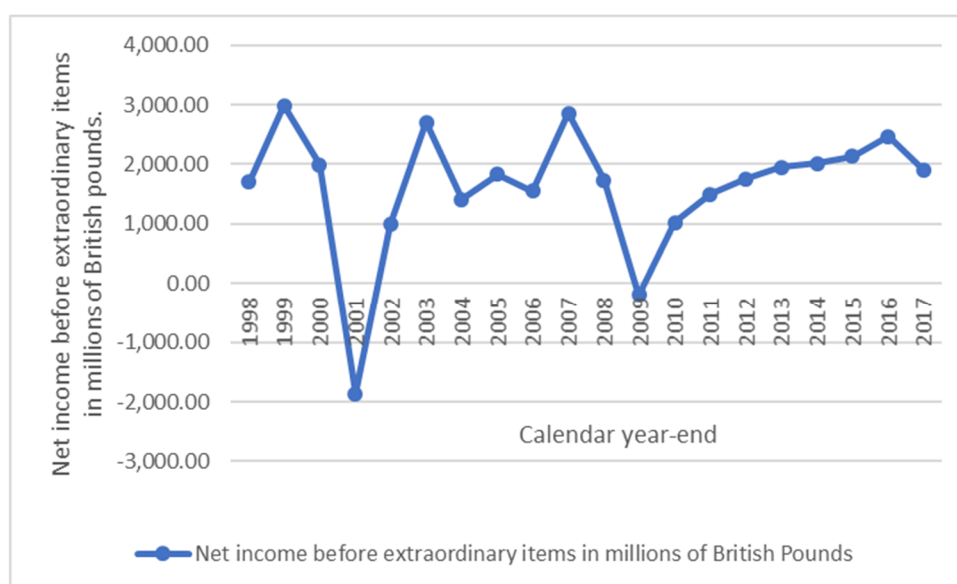
As previously stated, the firm was a UK-focussed business in the early 1990s, but by y/e 2016 it had customers in 180 countries (2016 corporate report p.6). Nonetheless the Interviewee said that the UK context was its strongest influence and no influences from overseas could be detected permeating through the group.

No influence detected.

9.2.6.3 Available finances and cost-saving

Upwind supported the Confederation of British Industry in recommending to the UK government that reducing the cost of finance would improve energy efficiency (CDP2013 2.3c). However, available finances were not raised as a constraining factor in the selection of GHG mitigating actions in publications or the interviews and, as Figure 48 shows, my proxy for available finance only fell below zero for two years in the period under consideration.

Figure 48 Upwind's available finances



Sources: Thomson Reuters Fundamentals accessed 13 April 2018

Turning to cost-savings, Upwind has been a significant electricity user. It consumed about 0.7% of the total electricity consumption in the UK⁴²⁵. Nevertheless, energy costs, including electricity and fuels,

⁴²⁵ CDP2008 1(a)(iii), 2012 corporate report PDF p.62, CDP2013 5.1a.

represented just 1.07% of total operating costs in CDP2008⁴²⁶ and less than or equal to 5% in CDP2012⁴²⁷ and CDP2016⁴²⁸. The Interviewee said that energy efficiency was driven by cost-savings. Forty-fifty people worked full-time on reducing energy use⁴²⁹. In y/e 2010-2014 year-on-year energy savings were roughly less than 8% of the annual energy costs^{430,431}. The firm had a dedicated energy efficiency budget about the same size as these savings⁴³².

The firm applied a three-year payback requirement on energy and carbon mitigation projects, extendable up to five years for individual sites within the programmes to be approved on a case-by-case basis. This was a longer payback period than was usually required by the firm⁴³³. Subsequently the firm used the price of carbon in the CRC Energy Efficiency scheme to evaluate energy efficiency schemes⁴³⁴. Upwind has most of its property in the UK, most of which is leased⁴³⁵. The Interviewee said the expiry of the lease had to be factored into evaluation of the financial viability of GHG mitigation measures.

Rising energy prices were one reason why the firm investigated self-generation of renewable electricity. This reason was supplemented by the goal of maintaining longer-term energy security.⁴³⁶ However, solar panels needed to be installed on a large scale to get a good return on investment (Interviewee) and

⁴²⁶ 2h (ii).

⁴²⁷ 12.1.

⁴²⁸ CC11.1. The increase in percentage does not necessarily mean that energy costs as a percentage of operating costs has risen. In CDP2012-2016 responding firms were asked to choose a band of percentages that represented their operating costs. "Less than or equal to 5%" was the lowest band.

⁴²⁹ CDP2013 5.1b, CDP2015 CC5.1a.

⁴³⁰ 2014 corporate report p.38.

⁴³¹ £256m given in 2012 corporate report PDF p.57, £274m given in CDP2013 2.2a, more than £300m given in CDP2015 CC5.1a.

⁴³² Energy efficiency budgets were of the following amounts in these y/e: more than £10 million (2011), £10 million (2012), £11 million (2013), £10 million (2014), £26 million in (2015), £16 million (2016) (CDP2011 3.3b, CDP2012, 2014-2016 3.3c). Upwind has also had a dedicated budget for other emissions reduction activities. (CDP2012 3.3c, CDP2014-2016 3.3c)

⁴³³ CDP2011 3.3b, CDP2014-CDP2016 3.3c.

⁴³⁴ CDP2015 2.2b.

⁴³⁵ CDP2008 "More Information" section, 2016 annual report p.36.

⁴³⁶ CDP2015 CC5.1a.

unpredictable financial incentives from the UK government were a contributing factor in dropping its highly-ambitious plan to generate 25% of its consumed electricity itself⁴³⁷. Smaller PV schemes did go ahead⁴³⁸.

When in 2013 the firm dropped its goal of generating 25% of its electricity demand itself, it signed PPAs as well as purchasing other RECI. It said that long-term PPAs - between 15 and 25 years in term - reduced exposure to rising prices⁴³⁹, meant Upwind did not bear the full risk of the planning application process and gave a long-term supply of renewable electricity⁴⁴⁰. Cost and reliability would be the criteria for judging what type of contractual instrument to use (Interviewee).

In summary, available finance has not been a particular constraint, but inadequate financial returns and planning constraints ended its plans to generate 25% of its electricity itself. Cost-saving drove energy efficiency/saving while self-generation of renewable electricity would have offered protection against rising electricity prices and energy security. The self-generation plan was partly replaced by PPAs that were seen to offer financial and security of supply benefits.

9.2.6.4 Non-financial resources and capabilities and technical issues

The Interviewee said in the past there were not the opportunities to reduce energy consumption with mechanical telephone exchanges but that had changed; *“...I think it is just follows technology as well. I think if there is an opportunity to reduce the costs, then you try to do that and it followed the technological route because of electronics and how we actually process data now.”*

Subsequently Upwind did not encounter non-financial barriers to energy efficiency/saving. Upwind said addressing skills and knowledge gaps were as important as addressing financing issues in improving energy savings, although the comment seems to be a general one rather than applying particularly to itself (CDP2013 2.3a). It described a training programme in energy management for its employees that it was looking to offer as a service to customers (2014 corporate report p.39). However, the Interviewee said compared to firms that were just starting out to reduce GHG emissions - Upwind was *“...getting to the bottom of the barrel”* in terms of energy efficiency/saving options.

Regarding self-generation of renewables, this had proved difficult in terms of ensuring acceptable financial returns, getting planning permission and getting permission to put them on leased premises, which comprised most of Upwind's UK premises. The Interviewee said that it was better for Upwind to leave the

⁴³⁷ CDP2013 5.1a.

⁴³⁸ CDP2013 and CDP2015 CC3.3b.

⁴³⁹ CDP2013 2.2a, email dated 17 October 2017 from Interviewee.

⁴⁴⁰ CDP2015 5.1a.

building of renewable generation to the utility firms that could put together projects of sufficient scale to get the financial returns and had the expertise in gaining planning consent for these large-scale projects. Upwind preferred to enter into a PPA with the generator than carry out the installation itself (Interviewee).

In summary, the perception of opportunities for energy efficiency/saving had ebb and flowed with changes to telecoms technology, but otherwise non-financial barriers did not seem to have hindered energy management. Upwind preferred a PPA with renewable electricity generators that had more relevant resources and capabilities to install generation equipment than it did.

9.2.6.5 Stakeholders

The Interviewee confirmed that Upwind had a conception of corporate responsibility like the description of CSR from Crane, Matten and Spence (2013) that I had been using. This description entails the recognition that a firm has stakeholders. Upwind's 2016 corporate report (p.9) lists its stakeholders as including customers, employees, government bodies, investors, NGOs and suppliers.

The firm undertakes a materiality analysis to discover the issues that are of most significance to Upwind and most relevance to stakeholders. Analysis for y/e 2012, 2014 and 2016 found that climate change and energy were among the top issues.⁴⁴¹ In y/e 2015 the firm said that all its stakeholders were looking for the firm to make *"an unequivocal commitment to tackling climate change"*⁴⁴². The Interviewee said *"If materially climate change did not even appear on the radar probably we would not be doing as much work as we are at the moment, but climate change is obviously well up on the radar."* The Interviewee said that investors were the stakeholders driving climate change up the materiality index.

Turning to consider other stakeholder groups, a 2012 survey of residential customers found they wanted Upwind to reduce its carbon footprint⁴⁴³. In CDP2015, Upwind said many customers expected Upwind to take significant action on climate change immediately and its reputation and brand would suffer if it did not⁴⁴⁴. The Interviewee said interest has not been a major consideration among residential customers, but business customers were more closely considering climate change in their tendering process⁴⁴⁵.

The Interviewee said sustainability ratings influenced the firm as a good rating boosted the firm's brand and reputation. *"Oh gosh, yes, I mean the CDP A-rating. I think the objective if you commit to something,*

⁴⁴¹ 2012 corporate report PDF p.216, 2014 corporate report p.9, 2016 corporate report p.9.

⁴⁴² CDP2015 CC5.1c.

⁴⁴³ 2012 corporate report PDF p.184.

⁴⁴⁴ CDP2015 CC5.1c.

⁴⁴⁵ Email dated 26 October 2018 from Interviewee.

then you want a return. Some of that return is in money and the other it is in your brand and your reputation. At the end of the day, it is advertising if you really want to cut to the chase, I suppose.”

These ratings are frequently aimed at investors e.g. CDP. CDP had influenced Upwind's emission mitigation actions.

“...this was the problem that we had with CDP. I think the other year they said you have got to have a 4% year-on-year reduction and that was the issue that we took up with CDP because... if you are a company starting out from scratch in the carbon reduction sustainable environment you are a dirty company like you are buying all dirty fuel and bit like [Upwind] back in 1996-97 you have got a massive scope to reduce your emissions where we are at the moment though is getting to the bottom of the barrel.” (Interviewee) ⁴⁴⁶

The CDP 4% reduction criterion encompassed S1+S2 emissions, but Upwind's use of such a high percentage of RECI meant that its electricity efficiency work did not show up in the emission figures. For example, in CDP2014 and CDP2015⁴⁴⁷ GHG emissions reductions resulting from electricity efficiency are frequently listed as zero, with a comment *“Carbon savings are not recorded as all electricity purchased is 0 carbon”*. This left Upwind a narrow set of sources from which to find 4% year-on-year reductions. (Interviewee). Upwind focused on fleet vehicle efficiency. Therefore, a market-based scope 2 approach, legitimatised by the GHG Protocol's scope 2 guidance, together with CDP's requirement for a 4% year-on-year reduction in S1+S2 steered Upwind's focus in terms of GHG mitigation, although Upwind does list substantial financial savings from fleet management too in CDP2015 CC3.3b.

In summary, investors and sustainability ratings have been among the key drivers of Upwind's climate change approach. CDP has had a direct influence on Upwind's focus in terms GHG mitigation. There has been some business customer interest in Upwind's climate change approach.

9.2.6.6 Other firms

Upwind saw itself as a leader within its industry. Although it saw other firms catching up and had even set more challenging targets, Upwind saw its ambitions and methodology as credible and transparent (Interviewee).

No influence detected.

⁴⁴⁶ This description of the CDP 4% criterion has not been checked as the key point is Upwind's perception of the requirements.

⁴⁴⁷ CC3.3b.

9.2.6.7 Regulatory and policy context

The firm participated in a voluntary programme run by the UK government in the 1990s. “Making a Corporate Commitment Campaign” was aimed at raising awareness of energy efficiency at board level.⁴⁴⁸ In 2001 the UK government introduced the Climate Change Levy, a tax on business users for their use of fossil fuel energy. Renewable electricity and electricity from certain types of CHP electricity were exempted from the main rate of the levy. The generation method of the electricity was evidenced by Levy Exemption Certificates (LECs), denominated in MWh. (GOV.UK 2017)

By y/e 2003 about half of Upwind’s consumption was described as CHP-generated electricity, a fraction that continued through until y/e 2012. By y/e 2014, the percentage of CHP contractual instruments was 0%. This drop coincided with the cessation of LECs being issued for CHP-generated electricity, although they could still be redeemed before the end of March 2018⁴⁴⁹. In y/e 2014 Upwind started to use renewable LEC for 100% of its UK electricity consumption⁴⁵⁰. Upwind said that the premium it paid for renewable contracts was offset by the exemption from the CCL, rendering it broadly cost-neutral⁴⁵¹. LECs ceased to be issued for renewable electricity in 2015⁴⁵². Although the fiscal advantage was due to end, Upwind has committed to only entering into contracts for renewable electricity supply. In terms of origin of the RECI, a third of Upwind’s electricity consumption was backed by the REGO, the UK’s version of the GO, in y/e 2010 and REGOs covered 100% of its UK supply in y/e 2015 (CDP2015 CC3.3b). In its 2012 corporate responsibility report, Upwind says that the limited supply of renewable electricity in the UK meant that it paid a premium for this electricity. In the summary for this section, I infer that the CCL influenced renewable electricity purchase, but the inference cannot be extended to low-carbon electricity purchase as my data does not extend to a period before CHP use was reported.

The mandatory programme CRC Energy Efficiency acted as “a key driver” for the firm’s energy savings programme. Its exposure to costs related to compliance was approximately £17 million in y/e 2015 and y/e 2016.⁴⁵³ In its original form CRC Energy Efficiency payments were recycled to firms judged to be more energy efficient. Upwind was expecting to be in this group, said the former manager who had worked on

⁴⁴⁸ CDP2 (2004) emissions trading strategy question, Department of the Environment, UK n.d.

⁴⁴⁹ HM Revenue and Customs (2015a), Ofgem (2016a), Bellingham (2013)

⁴⁵⁰ CDP2013 5.1a, CDP2015 CC5.1a.

⁴⁵¹ This point is made in CDP2 (2004) strategy and external targets questions for renewable electricity only, not CHP-generated electricity. The point is repeated in CDP2015 5.1a.

⁴⁵² HM Revenue and Customs (2015a), Ofgem (2016a), Bellingham (2013)

⁴⁵³ CDP2011-2016 3.3c.

energy efficiency and energy supply. Even so, this would not have driven extra measures because this amount was not significant – low single percentage - of the overall energy spend. Instead the firm was more motivated by the reputational advantage of being high on the performance leader board, though this feature along with the recycling of payments to top performers was scrapped (interview, former manager).

A further problem with the CRC Energy Efficiency programme from Upwind's perspective was that it did not recognise a firm's support of RECI; *"It [the CRC Energy Efficiency scheme] removes any incentive for us and others to purchase renewable energy. Our positive positioning on climate change has been built on the 58% reduction we have achieved since 1996 – this new approach will wipe this away."*⁴⁵⁴ The Interviewee said *"It was almost like flicking a switch. One minute you are on one side and the next minute you are the switch is flicked over and we have done nothing on the other side - not to the extent of the amount of gains that we had got from going renewable, obviously anywhere near that."*

The firm had planned to generate 25% of the electricity it consumed by 2016. Again, the firm considered this was not supported by the CRC Energy Efficiency scheme. *"Any incentive for [Upwind] and others to invest in on-site renewable energy sources will be removed. On-site renewables will only count as zero carbon if the generator doesn't claim the ROCs"*⁴⁵⁵. *This will destroy the business case for many projects including [Upwind]'s proposed wind farm project."* (CDP2008 1(a)(i)).

Upwind had a group of independent experts to advise and challenge it on its sustainable development and corporate responsibility. This group – referring I assume to the CRC Energy Efficiency scheme – said *"Although the UK Government has effectively penalised companies like [Upwind] that have proactively invested in renewable energy, [Upwind] continues to demonstrate extraordinary leadership in this area."* (2010 corporate publication, PDF p.9)

In 2012 Upwind dropped its 25% self-generation target. It said *"This is because of difficulties faced in getting planning consent and unpredictable government policy on incentives. Instead, we have committed to working with strategic partners to incentivise the creation of low-carbon energy. This includes signing a contract with [name of supplier] to source 100% renewable energy from July 2013 through to 2016. [Upwind] will continue to monitor the government incentives to renewable energy generations."*⁴⁵⁶ One of

⁴⁵⁴ CDP2008 1(a)(i).

⁴⁵⁵ ROCs – Renewable Obligation Certificates. These were issued to renewable electricity generators that could sell them to suppliers who could use them to evidence that they had a legally-required percentage of renewable electricity in the electricity they were supplying (Ofgem 2016b).

⁴⁵⁶ CDP2013 5.1a.

the Interviewee's colleagues explained by email that it was the economic and planning difficulties of self-generation, rather than CRC Energy Efficiency, that lead the firm to focus on Power Purchase Agreements (PPAs) instead⁴⁵⁷. By y/e 2016 these supplied 16% of electricity demand⁴⁵⁸.

Upwind campaigned for the UK government to support business use of RECI more e.g. it lobbied against the approach of CRC Energy Efficiency to RECI use⁴⁵⁹. The firm was wary that the UK government may further disincentivise RECI use via its regulation on mandatory GHG emission reporting for quoted companies. It said that if in the future the UK government required alignment with a methodology that did not allow RECI to be reflected in scope 2 figures: *"This would inflate our carbon figures and damage our brand perception in the market."* Upwind said it fully supported a reporting approach that allowed reporting of both market-based and location-based scope 2. (CDP2015 CC5.1a)

Turning to other relevant regulation, its Dutch subsidiary entered into a voluntary agreement with the Dutch ministry of economic affairs to reduce its energy use by 30% by 2020 from 2005 levels⁴⁶⁰. It has had to comply with EU legislation on the phase-out of ozone-depleting refrigerants HCFCs, but these have been replaced by the greenhouse gases HFCs (2009 corporate publication). So, it invested £12.5 million in y/e 2015 in water-based cooling. It described this as a voluntary move, but also said that it had to comply with EU directions on refrigerants with high Global Warming Potentials. Use of water-based cooling also led to an energy reduction of 87% on the new cooling units.⁴⁶¹ It has small compliance costs related to limited exposure to the EU Emissions Trading Scheme⁴⁶².

In summary, the Climate Change Levy exemption for renewable electricity facilitated Upwind's choice of contracts for renewable electricity. The CRC Energy Efficiency scheme did not incentivize energy efficiency beyond existing drivers and disincentivized renewable electricity self-generation and use of RECI, although financial and planning reasons led to Upwind dropping its plan to generate significant amounts of renewable electricity itself, re-focusing on RECI. It was switching to water-based cooling which ensured compliance with an EU directive on coolants with high Global Warming Potentials.

⁴⁵⁷ Email dated 17 October 2017 from Interviewee.

⁴⁵⁸ CDP2015 CC5.1a.

⁴⁵⁹ CDP2008 1(a)(i) and 2012 corporate report, CDP2013 2.3c.

⁴⁶⁰ CDP2015 CC5.1a.

⁴⁶¹ CDP2015 CC2.2a, CC3.3b and CC5.1a.

⁴⁶² CDP2012 and CDP2016 CC13.1.

9.2.6.8 Organisational values

The Interviewee said that Upwind wanted to be seen to be leading on climate change. It saw climate change as something that would impact the business, and it was responsible to act. When in 2004 Upwind entered into a large contract to procure its electricity backed by RECI⁴⁶³, it said that it had taken the “*wider societal advantages*” of renewable energy into account to reinforce its business case for procurement. Upwind has said it had a moral duty to act on climate change as its consumption accounts for 0.7% of the UK national consumption⁴⁶⁴.

The Interviewee confirmed that Upwind’s meaning of corporate responsibility was close to the description of CSR given by Crane, Matten and Spence (2013). The 2010 sustainability report said corporate responsibility benefited stakeholders and the firm by helping it to identify business opportunities and risks, enhancing its reputation and performance in sustainability ratings, helping to avoid costs through environmental management and motivating employees (PDF p.4). The Interviewee said “*I think carbon, what carbon does, it has been proven in research that if you just [use] cost to drive things people don’t seem to have so much focus on it. Carbon gives another angle to it and drives more in depth focus and by more in depth focus you end up reducing costs even further in a lot of cases anyway.*” The Interviewee said all business cases included some sort of return to the firm, although this may not be easily quantifiable, such as a benefit to reputation or brand. The Interviewee said both RECI use and self-generation of electricity were activities to fulfil its corporate responsibilities. Offsets had not been used because of concern about their sustainability benefits.

In summary, CSR motivated Upwind’s climate change approach. CSR activities had wide-ranging business benefits such as motivating employees, leading to cost-saving benefits, and brand and reputational enhancement, but there was a moral driver to Upwind’s climate change approach.

⁴⁶³ CDP3 – risks and opportunities question.

⁴⁶⁴ Evidence to government committee 2008. Further specification cannot be given to avoid identifying Upwind.

9.2.6.9 Reputation

Upwind appreciated the reputational enhancement that climate change leadership could bring. It said that its sizeable purchase of renewable energy⁴⁶⁵ enabled it to “...*demonstrate substantial thought leadership and enjoy reputational benefits in addition to protecting the company from potentially increasing carbon taxes*” (CDP2013 and CDP2015 6.1a).

I asked if concern about the implications of climate change on its reputation was behind Upwind's activity on the issue. This was sparked by the following quote from Upwind's answer to CDP2008 1(a)(iii).

“The analyst Gartner has reported that ICT accounts for 2% of global CO₂ emissions and this brings the risk that ICT could become considered a villain of climate change rather than a tool to help mitigate it. We therefore have to be seen reducing the impacts of our operations and are promoting this through a variety of collaborative networks...”

This theme was raised again by a group of independent experts in Upwind's 2010 corporate report.

“The entire ICT industry must also wrestle with the scope for web-enabled technologies in increasing emissions of CO₂. This is a significant additional challenge requiring profound and rapid attention, otherwise the widespread perception of the ICT sector as a ‘a clean and green’ sector will be at risk.” (PDF p.9)

This issue was addressed by the Global e-Sustainability Initiative (GeSI), a group of ICT firms – including Upwind - and industry associations formed in 2001 to develop approaches to drive economic growth and foster economic, environmental and social sustainability. It commissioned an independent report from The Climate Group (2008). This report called SMART 2020 asked (p.9): “...*what impact do pervasive information and communication technologies have on global warming? Is it a sector that will hinder or help our fight against dangerous climate change?*” It concluded that the sector could deliver “...*carbon savings five times larger than the total emissions from the entire ICT sector in 2020*” (p.10). This report was updated with the report SMARTer 2030 prepared by management consultancy Accenture Strategy (2015) for GeSI that estimated that the GHG emissions avoided by the use of ICT were nearly ten times greater than the emissions generated by deploying it.

⁴⁶⁵ Other answers indicate that this is referring to RECI.

Upwind has set itself a goal of helping its customers to avoid at least three times the emissions of the “end-to-end” carbon impact of its business by 2020⁴⁶⁶. It has used a market-based scope 2 approach for these calculations⁴⁶⁷. The ratio at time of interview stood at 1.8 to 1. Asked what prompted the 3:1 goal, Upwind said *“This was in line with thought leadership wanting to demonstrate that [Upwind] was a net positive company”* (email dated 17 October 2017 from Interviewee).

In summary, Upwind valued the reputational benefits that a proactive approach on climate change could bring.

⁴⁶⁶ 2014 corporate report PDF p.3, CDP2015 CC2.2a.

⁴⁶⁷ 2017 Upwind carbon accounting methodology p.4.

9.2.6.10 Summary of findings for RQ1

Table 29 Summary of factors affecting Upwind's GHG mitigating activities – presented by factor

Factor	Finding
Individuals in firm	CEOs have been key drivers of Upwind's ambitious climate change approach.
International experience	No influence detected.
Available finances and cost-savings	Available finance has not been a particular constraint but inadequate financial returns and planning constraints ended its plans to generate 25% of its electricity itself using wind. Cost-saving drove energy efficiency/saving while self-generation of renewable electricity would have offered protection against rising electricity prices and energy security. The 25% self-generation plan was partly replaced by PPAs that were seen to offer financial and security of supply benefits. Smaller PV schemes did still go ahead.
Non-financial resources and capabilities and technical issues	Upwind's perception of opportunities for energy efficiency/saving had ebbed and flowed with changes to telecoms technology, but otherwise non-financial barriers did not seem to have hindered energy management. Self-generation of renewable electricity had proved problematic as it was difficult to attain permission to install generation equipment.
Stakeholders	Investors and sustainability ratings have been among the key drivers of Upwind's climate change approach. CDP has had a direct influence on Upwind's focus in terms GHG mitigation. Increasing emphasis from business customers.
Other firms	No influence detected.
Regulation and policy context	Climate Change Levy exemption for renewable electricity facilitated Upwind's choice of contracts for renewable electricity. CRC Energy Efficiency scheme did not incentivize energy efficiency beyond existing drivers and disincentivized renewable electricity self-generation and use of RECI, although financial and planning reasons led to Upwind dropping its plan to generate significant amounts of renewable electricity itself, re-focusing on RECI. It was switching to water-based cooling which ensured compliance with an EU directive on coolants with high Global Warming Potentials.
Organisational values	CSR motivated Upwind's climate change approach. CSR activities had wide-ranging business benefits such as motivating employees, leading to cost-saving benefits, and brand and reputational enhancement, but there was a moral driver to Upwind's climate change approach.
Reputation	Upwind valued the reputational benefits that a proactive approach on climate change could bring.

9.2.7 EFFECT OF RECI/LCECI ON OTHER GHG MITIGATION ACTIVITIES

(RQ2)

To investigate how extensive use of RECI/LCECI influenced other GHG mitigation actions, I looked for a pattern between normalized emissions and the % of total electricity consumption covered by RECI/LCECI. Upwind's chosen emission intensity metric had S1+S2+selected S3 emission categories as its numerator⁴⁶⁸, so I used this aggregation of emission sources for the numerator. For a denominator, Upwind has used a financial accounting metric⁴⁶⁹. However, this intensity metric is not a close proxy for activity as it is a profit metric⁴⁷⁰. Therefore, I used Gravadlax's proxy for activity - revenue – which is arguably more representative of activity, although it may also vary for other reasons e.g. related to the prices that a business is able to charge. See Figure 49.

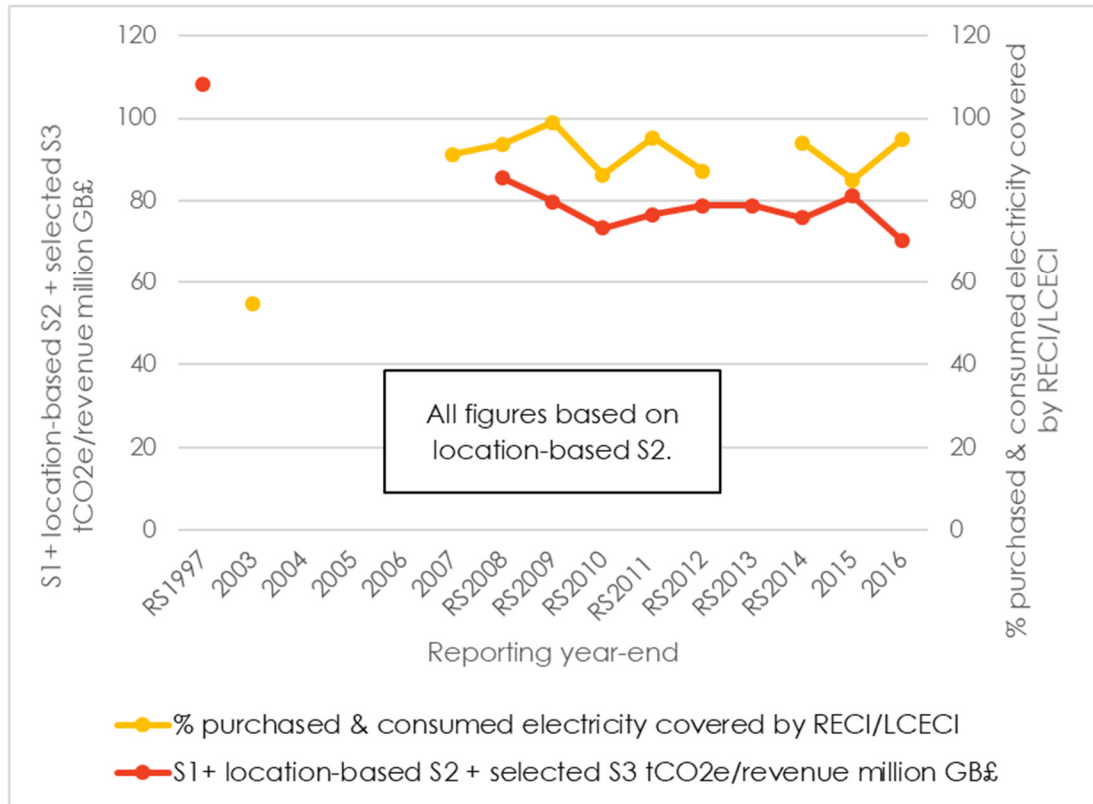
Figure 49 does not show an obvious relationship between the two lines. Emission intensity ratio declined and then plateaued. While the RECI/LCECI percentage increased and then plateaued. I interpret this as a maturation of policies and practices related to GHG emissions. Firstly, that most energy efficiency options deemed appropriate had been implemented. Secondly, that the policy of maximizing use of RECI/LCECI had been implemented and was being maintained.

I used revenue as the denominator for normalising purchased electricity consumption and plotted that against the percentage of purchased electricity covered by RECI/LCECI. See Figure 50. Purchased electricity consumption normalized by revenue and the percentage of purchased electricity consumption covered by RECI/LCECI appear more closely related: both initially increase, and then the electrical intensity increases until y/e 2015 while the RECI/LCECI percentage varies between 80-100%. The invisibility of electricity efficiency measures in GHG emissions figures could have led to a reduced focus on reducing intensity, although technological changes may account for increased electrical intensity.

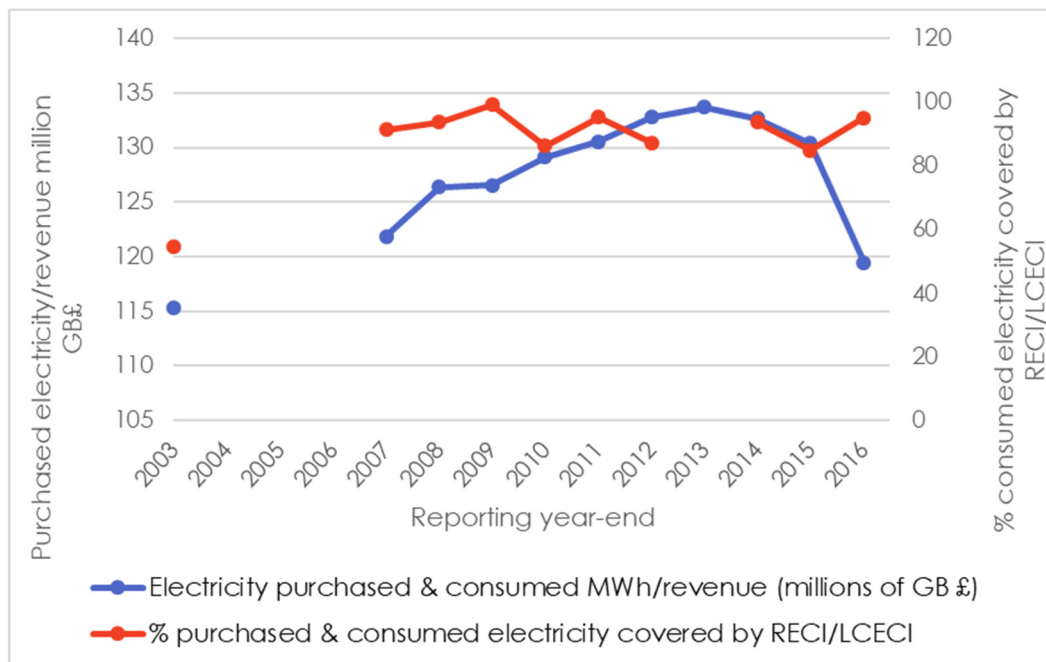
⁴⁶⁸ See section 9.2.4.1

⁴⁶⁹ CDP2011 3.1b, 2016 corporate responsibility report p.43.

⁴⁷⁰ CDP2008 3.1b.

Figure 49 Upwind's emissions intensity and % purchased electricity covered by RECI/LCECI

Sources: See section 14.2.13

Figure 50 Upwind's electricity consumption intensity and % consumed electricity covered by RECI/LCECI

Sources: See section 14.2.13.

The attractiveness of RECI/LCECI is shown by Figure 51 of the lifetime of emissions-saving of different mitigation actions in tCO₂e vs. lifetime cost savings minus investment costs. This shows the huge reduction in reported emissions that can be achieved by use of RECI/LCECI and the market-based scope 2 approach compared to other measures. The next biggest estimated emission reduction project would save over its lifetime an estimated third of the emission reduction reported for RECI use in one year. This project to switch off redundant equipment and improve network efficiency required £5.25 million investment whereas RECI use was cost-neutral due to a reduction in the Climate Change Levy for using RECI (email dated 17 October 2017 from Interviewee). The financial situation is changing with the cessation of LECs⁴⁷¹, although this may be counteracted if good financial deals are made on PPAs.

Turning to the interview and qualitative documentary data, Upwind switched to the accounting and reporting approach of gross/net methodology for its y/e 2010 emission figures (CDP2010 Q.11). This followed the publication of “*Guidance on how to measure and report your greenhouse gas emissions*” by the UK government in September 2009 which also had this approach (Defra and DECC 2009). Prior to this, examination of Upwind’s 2009 and 2010 climate change reports leads me to conclude that it was reflecting RECI/LCECI in its scope 2 figures. After the publication of the GHG Protocol Scope 2 Guidance (Sotos 2015a), Upwind switched to using the location-based and market-based scope 2 terminology. The Interviewee explained how this related to the relationship between use of RECI and energy efficiency/saving.

“The issue was that it became apparent that you need two measures. You need one to measure your renewables but you also need one to measure your gross or as it is now called location-based because that drives your reduction. One...it is like squeezing a balloon. If you just have the one target and the one is to reduce your energy. Yes, you will focus on reducing your energy, but you won’t bother buying any renewables. Whereas if you have just a renewables target, you drive, which is what [Upwind] was doing. They were buying...going down totally the renewables route, but they weren’t really driving energy efficiency to the extent, though saying that energy efficiency is driven mainly by cost. The more electricity you buy, the more it is going to cost you so you are going to try to drive efficiency anyway by cost. But what that means is that there should be two targets for any company and that is your market-based and your location-based which is what has come effectively out from the GHG [Protocol] I think isn’t it?” (Interviewee)⁴⁷²

This suggests that there may have been a reduced emphasis on energy efficiency/saving prior to Upwind reporting both market-based and location-based scope 2 emission figures. However, asked if energy efficiency/savings projects went ahead even if there was no benefit to the GHG emission figures because

⁴⁷¹ Bellingham (2013), HM Revenue and Customs (2015a and 2015b).

⁴⁷² The conclusion that the gross scope 2 figure = location-based scope 2 figure and the net scope 2 figure = market-based scope 2 figure is rejected by the GHG Protocol Scope 2 Guidance (Sotos 2015a).

of the use of RECI, the Interviewee said: *"No, there's no influence on whether they do it or not because they are driving it from a cost basis."* Further evidence of a strong focus on energy efficiency/saving is that Upwind has consistently had a dedicated budget for energy efficiency and had applied a longer payback period to energy and carbon projects than other projects⁴⁷³. The former manager of energy efficiency and supply said the view in Upwind was that RECI use on their own would not be credible: it was energy efficiency first, then self-generation, and thirdly RECI use.

The Interviewee said Upwind's renewable electricity use could increase its costs depending on the contract in different countries. I assume that the end of the CCL discount for renewable electricity (it began to be wound down in 2015) means that it may no longer be cost-neutral for Upwind to support renewables in the UK. The premium that the firm had paid for RECI was about equivalent to what the Climate Change Levy payment would have been if it had not bought RECI i.e. about £11 million⁴⁷⁴. This is roughly the same as the budget dedicated to energy efficiency actions. This could make these activities compete for funding, which could make displacement more likely in the future.

Although the Interviewee said that reporting both a location- and a market-based scope 2 figure balanced the emphasis on renewable electricity and energy efficiency/saving, the GHG Protocol Scope 2 guidance does allow for only one approach to be used for targets and totalling with other scopes (Sotos 2015a, 60–61).

The Interviewee said *"...energy efficiency was driven quite hard by cost whereas renewables are driven by market based reporting. LBM⁴⁷⁵ measures add additional focus or pressure particularly if supported by targets. So I would not go as far as to say displacement of attention but more along the lines that energy efficiency focus is enhanced by LBM reporting. One way to look at it is the energy team are driven by reducing kWh whereas CSR are driven by CO2e reduction. The two areas overlap within any company, but are most effective with an integrated approach."* (Email, 26 October 2018, Interviewee, reviewing draft chapter).

In a 2016 CSR report from Upwind, there are emission reduction targets, which include market-based scope 2 emissions, but no location-based scope 2 figure is given. In the 2016 annual report p.44, market-based figures are used in aggregated S1+S2+S3 figures while the reader is directed to an Excel file on the firm's website for location-based figures. So, the market-based figures have greater profile. So, while

⁴⁷³ CDP2011 3.3b, CDP2014–CDP2016 3.3c

⁴⁷⁴ Email dated 17 October 2017 from Interviewee forwarding information from colleagues, CDP2015 5.1a.

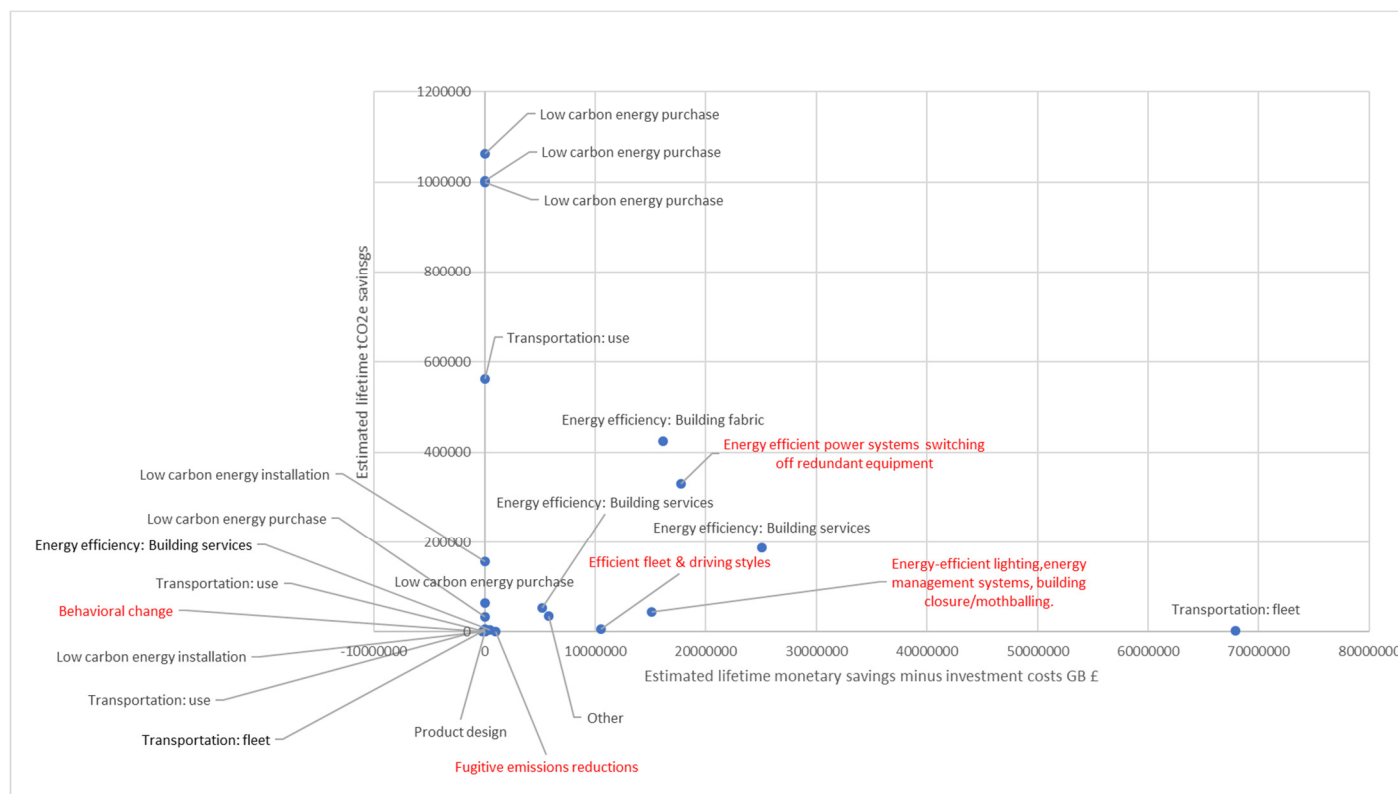
⁴⁷⁵ LBM – location-based method.

reporting location-based in this fashion may exert some pressure for energy efficiency/saving, it does not have the influence of the market-based method.

Furthermore, the use of the market-based scope 2 approach has shifted the focus to scope 1 emissions. The Interviewee said that CDP at one point was requiring a 4% year-on-year reduction in S1+S2 emissions. It turned the firm's attention to other sources of emissions as its scope 2 emissions had been significantly reduced by very high percentages of electricity consumption covered by RECI. This increased its focus on scope 1 emissions from the fuel use of its vehicle fleet. In CDP2014, CDP2015 and CDP2016 (CC3.3b), Upwind reported that diesel and petrol vehicles were being replaced with electric or hybrid vehicles, along with other measures to reduce emissions and improve efficiency of the vehicle fleet. In CDP2015 Upwind gave a figure of £42.1 million of investment in its fleet programme, significantly greater than its energy efficiency budget⁴⁷⁶. This could suggest that cheaper electricity efficiency measures were being overlooked because they would no longer influence the reported GHG emissions due to application of the market-based method. However, the fleet programme has the sizeable benefit of offering estimated annual cost-savings of £11 million, so one must not over-state the impact of RECI. The Interviewee said the key driver currently was to achieve its S1+ market-based S2 intensity target set in 2017 and linked to limiting global warming to 1.5 degrees Centigrade.

⁴⁷⁶ In CDP2014, Upwind said the figure for the package of measures is confidential and in CDP2016 it said it cannot attribute an investment figure to GHG mitigation as there were other benefits such as reduced running costs.

Figure 51 Upwind – lifetime tCO₂e savings and estimated lifetime cost savings minus investment



Sources and notes: CDP2013-2017 CC3.3b. Notes: The labels in red font are estimated lifetimes of the mitigation projects assigned according to appendix section 14.2.2 as follows: behavioural change (15 years), efficient fleet and driving styles (3 years), energy-efficient lighting, energy management systems, building closure/mothballing, energy-efficient power systems, switching off redundant equipment (3 years), fugitive emission reductions (3 years). This figure is reproduced in the accompanying A3 portfolio.

To summarise, cost-saving drove energy efficiency/savings, but the location-based scope 2 emission figure also had a role. It reinforced the cost-saving driver of energy efficiency/saving. The use of a market-based scope 2 approach had diverted attention to scope 1 emissions to maximise its CDP rating. Currently the key driver was to achieve its S1+market-based S2 intensity target set in 2017.

Through the Climate Change Levy reduction, it had been broadly cost-neutral for Upwind to buy RECI in the UK, so there were no/limited financial resources that could have been diverted from RECI to other mitigating activities, although there may have been an impact on the allocation of non-financial resources. With the end of LECs, there could be greater competition for finances between RECI and energy efficiency/saving projects. This hinges in part on whether RECI cost more than default electricity contracts, which will depend on the RECI used by Upwind. An additional factor is that Upwind has given less visibility to the location-based scope 2 figure compared to the market-based scope 2. Therefore, I would judge that in the past there has been a displacement of attention on energy efficiency/saving, although the impact is unclear.

The results are discussed further in the discussion for RQ2 in chapter 11.

10 DISCUSSION OF RESEARCH QUESTION 1

This first discussion chapter answers research question one:

RQ1. What factors influence a firm's voluntary GHG mitigation choices with regard to renewable electricity and low-carbon electricity contractual instrument use?

This section is broadly organised according to the headings of the case study chapters. However, some data and findings were found to straddle more than one heading and so sections have been merged. New headings have been introduced based on factors that emerged during examination of documentary evidence and interviews.

One of the criteria used to group cases was their business sector. This acted to group firms according to their emission sources, consumer proximity and their regulatory context. However, I found it to be more fruitful to look at all the cases together as findings often cut across sectoral lines. This is considered further in the subsequent section 10.3.

10.1 INDIVIDUALS IN THE FIRM

In this section, I look at the influence of staff on GHG mitigation strategies before focussing on their influence on RECI/LCECI use and summarising the section.

In none of the cases were specific employees below managerial level identified as driving GHG mitigation activities. This may be because I interviewed more senior staff. However, there was ample evidence of the influence of managers, departmental heads and CEOs. They fit the definition of champion given by Andersson and Bateman (2000, 549); “...individuals who, through formal organizational roles and/or personal activism, attempt to introduce or create change in a product, process, or method within an organization...”. Personal commitment to climate change actions was shown by managers at banks Gamete and Umbrella, Upsilon supermarket and Gravadx telecoms. Employees below board level were nudging Ursa B2B financial institution towards action on climate change. Senior staff played significant roles although their motivation – whether normative or instrumental – was not known (a CEO at Goshawk supermarket, former and current CEOs at both Upsilon supermarket and Upwind telecoms). A departmental head at Umbra supermarket explained his passion for innovation in the field of GHG mitigation.

An isolated but interesting remark was made by a former Upwind manager who is from Germany. The manager contrasted the approach of the Upwind CEO in the late 2000s with the approach of German firms. The latter identified products that they thought would assist with the transition to a low-carbon economy. In contrast, the former manager, who moved to the UK to work for Upwind in 2008, found a CEO personally committed to addressing climate change. The former manager noted that there was a

generation of CEOs who showed leadership on climate change. This period is discussed further in section 10.11.

Sullivan and Gouldson (2013) said corporate responsibility managers at UK supermarkets identified public targets set by their firms as key drivers for the deployment of management structures for GHG emission and energy management including data-gathering systems. Employees at Gamete bank and Upsilon supermarket used targets in a slightly different way. Employees who personally supported action on climate change used the public targets as a tool to maintain the level of effort by the firm on implementing GHG mitigation actions, rather than implementing supporting infrastructure for these activities. The Gravadlax telecoms interviewee also talked about reconciling different agendas within the firm. These situations fit with Cyert and March's behavioural theory of the firm (1963), seeing it as a coalition of groups seeking to advance different agendas.

Gliedt and Parker (2010) and Gliedt et al. (2010) found environmental champions in North American firms played a dominant role in the decision to buy RECI. I found opinion was divided on RECI/LCECI use among employees who were advocating for climate change mitigation. Environmental champions in Gamete bank were upholding the bank's commitment to extensive use of energy attribute certificates bought separately from electricity while an Umbra environmental champion had curtailed the use of stand-alone certificates, preferring PPAs. Employees in Upsilon supermarket strove to find ways to ensure energy attribute certificate use did not displace other GHG mitigating activities.

In summary, this research adds evidence to the wider debate described by Cannella, Finkelstein, and Hambrick (2009) on whether a firm leadership has significant influence on its outcomes. The cases described above show that the firm's leadership can have a strong influence on its GHG mitigation strategy. Further down the hierarchy, two cases were found of managers using public commitments on climate change as internal leverage for action. The role of environmental champions in RECI use was found to be more complicated than prior research in a North American context indicated. The research on North American firms did not record any negative views about RECI; in my research environmental champions in two European firms had sceptical views on the effectiveness of energy attribute certificates on GHG mitigation.

10.2 INTERNATIONAL EXPERIENCE

Experience of operating internationally was not a discernible factor in the firms' GHG mitigating choices. All the case studies had had or did have international operations, although Urban bank and Umbra supermarket had strong foci on the UK markets. Upwind telecoms – although it had had extensive international operations – stressed that the UK was its primary influence. This did not lead to their mitigation strategies differing from the firms with greater international outlook. Two firms commented that

the direction of influence was from their home market to their international operations (Goshawk and Upsilon supermarkets). I could not discern any pattern in this factor, although the contrast in international experience may not be marked enough for a pattern to be apparent.

10.3 BUSINESS SECTOR

As explained in the methodology (section 5.4), firms were grouped according to their business sector. I considered business sector a reasonable proxy for consumer proximity for which there is a limited, but consistent body of evidence as to its association with environmental management. I have deferred consideration of consumer proximity to section 10.6.5 on customers (consumers and B2B customers) as stakeholders. In this section, I consider the influence of business sector *per se*.

No pattern emerged in the existing research on the influence of business sector on environmental management. Nevertheless, I would argue that business sector can be expected to influence the type and significance of GHG emission sources, although sector can only be an indicator as there can be variation between firms. This seems particularly likely with groups of firms; the group may be predominantly sector X but have a large subsidiary in sector Y with a different profile of emission sources. The type and significance of emission sources would shape opportunities for mitigation and also the regulatory/policy context which is separately discussed in section 10.10.2. Therefore, although past research did not suggest a clear association between sector and environmental management, in this section, I consider the characteristic emission sources of different sectors and any sectoral patterns in their mitigating activities including RECI/LCECI use.

Turning first to their emission sources in scopes 1 and 2, the banks and B2B financial institutions typically had a limited range of scope 1 and scope 2 emission sources: offices and data centres. The telecoms firms had a wider range as - in addition to offices and ICT - they had network infrastructure and vehicle fleets. Supermarkets had stores, distribution centres, transportation fleets, refrigeration equipment and offices. Scope 3 sources would include the emissions from activities financed by the banks, the energy consumption of consumer products for the telecoms sector and supermarkets' supply chains. Scope 3 sources were only investigated to the extent they were included in emission reduction targets with sources from scopes 1 and 2. This varied between cases, but inclusion of scope 3 emissions tended to be limited.

Turning to mitigating activities and discussing RECI/LCECI use first, in scoping out potential cases for this thesis, I found RECI/LCECI users in the following sectors, but did not assess their frequency: financial, telecoms, business services, home shopping, construction, capital goods manufacture, IT services, consumer discretionary (e.g. holiday and leisure providers, clothing manufacturers), and consumer staple (e.g. supermarkets). This is a diverse list. International Renewable Energy Agency (IRENA) (2018) also

found that firms using RECI or generating their own renewable electricity came from wide-ranging businesses.

Firms in the materials sector (which includes chemicals, extractive industries, and paper and pulp) were the biggest consumers and had comparatively high self-generation capacity. Outside of the materials sector, unbundled energy attribute certificates, i.e. certificates bought separately from the commodity electricity, were the most common route for claiming renewable electricity use. In terms of the percentage of total consumption claimed to be renewable, the dominant sector across all sectors was the financial sector at 24% followed by IT, health care and real estate which were all at 12%. All other sectors were in single figure percentages. (International Renewable Energy Agency (IRENA) 2018). The findings of this thesis fit with the pattern found by IRENA in that all the cases from the financial and telecoms sectors had had periods of heavy RECI/LCECI use, although sometimes these periods were of limited duration due to the influence of other factors.

In terms of RECI/LCECI use among the supermarkets, Umbra used renewable electricity PPAs, but rejected unbundled energy attribute certificates, i.e. certificates bought separately from the commodity electricity, as did Goshawk which considered it had plenty of energy efficiency/saving opportunities it could pursue instead. Upsilon needed unbundled energy attribute certificates to reach its zero-carbon goal. So, approaches among the supermarkets were diverse.

Looking at energy-efficiency/saving projects, five cases (four financial sector firms plus Upwind telecoms) perceived a lack of energy efficiency/saving opportunities. Gamete remarked that the lack of energy efficiency/saving options made RECI use very useful. Geode said in CDP2014 that RECI use offered the only remaining route for mitigation, although it did go on to report further energy efficiencies/savings. Grange and Upwind commented on dwindling number of mitigation projects available for them to implement. Ursa noted a difficulty in finding extra energy efficiency/saving projects, but this situation became more pointed because it wanted to set a science-based target and considered it needed RECI to achieve one. So, a reduced number of options in combination with the target steered Ursa towards RECI use. For completeness, I should add that the other telecoms firm and two banks – Gravadlax, Umbrella and Urban - did not say mitigation opportunities were getting scarcer and also had histories of RECI/LCECI use. None of the three supermarkets expressed a lack of energy efficiency/saving projects to undertake.

Regarding self-generation of energy, examples were found in the four sectors. I calculated that Umbra supermarket was the biggest generator in absolute terms among the cases, but PV and CHP self-generation still only accounted for 2% of total electricity consumption. The biggest generator in relative terms appeared to be B2B financial institution Geode. I calculated Geode had generated up to 16% of its electricity consumption through CHP, although it had very few sites to cater for compared to the other cases except for the other B2B financial institution Ursa. Offset use was found in all sectors.

Supermarkets also had emissions of refrigerants with high Global Warming Potentials to curb, which were significant sources. Furthermore, it was noticeable that among the cases the less common or even unusual GHG mitigating projects were found among the supermarkets. These were usually energy generation projects. I speculate this relates to the acreage of land that supermarkets occupy and their frequently out-of-town locations. Sullivan and Gouldson (2013) noted the innovation of UK supermarkets in GHG mitigation.

In summary, sector has influenced GHG mitigating activities to different extents. There was a pattern among office/ICT-based firms whose opportunities for GHG mitigation were concentrated in the field of energy efficiency/saving for them to perceive that these opportunities were drying up. RECI/LCECI were useful for these firms. In contrast, the supermarkets' physical footprint and range of emission sources appear to have given them more scope for mitigating projects. However, other factors drove RECI use among two of the supermarkets i.e. target achievement and cost benefits of Power Purchase Agreements.

10.4 AVAILABLE FINANCES AND COST-SAVINGS

In this section, I look at the availability of finance together with the influence of cost-savings on GHG mitigation activities. The two are linked due to the investment required for some GHG mitigation actions that have the potential to reduce ongoing expenditure e.g. energy efficiency/saving and self-generation of energy (Sorrell et al. 2004, International Renewable Energy Agency 2018).

I turn first to available finance in the banking sector before moving to other sectors. The banking sector was at the centre of the global financial crisis in the period covered by this thesis. The global financial crisis affected the money that Gamete and Umbrella banks had available for energy efficiency/saving schemes. I infer that this was also the case at Urban bank whose targets switched from emissions reduction to cutting energy use and business travel i.e. they were more closely related to cost-cutting. For Grange bank, rather than a dramatic change of financial fortunes, it was more the case that fewer schemes were available that paid back in an acceptable period. The Grange Interviewee said return-on-investment on the energy efficiency projects that remained for the bank to undertake was often too low: *"We have seen the number of energy efficiency initiatives drop from 600 per year 10 years ago, to 100 in 2018. This is simply because there are very few economically viable projects that can pay back in less than 8 years."* This was reinforced by uncertainty over whether the firm would remain in leased premises long enough to reap the benefits of energy efficiency/saving measures.

Turning to the other sectors, Gravadlax telecoms said there was strong competition for capital internally with demands for investment in network improvement and expansion. This affected both energy efficiency and self-generation of energy schemes. In 2016 it said *"Higher investments into energy efficiency measures may also be taken into consideration, but is expected to require much more money"* (CDP2016

CC5.1a). Upsilon supermarket had experienced some boom years when there was considerable investment in self-generation of energy, not always with successful outcomes. There followed a period in the mid-2010s when available finance became constricted. However, for the other cases, available finance was not portrayed as a significant constraint.

Regarding cost-cutting, this drove energy efficiency/ savings in most cases, although neither Gamete bank nor Geode B2B financial institution gave this as a driver. I was unable to interview a staff member at Geode and so I might have been corrected on this impression. Both firms said they were running out of energy efficiency/saving projects to implement, although Gamete also discussed a shortage of finance for energy efficiency/saving. As mentioned, the investment costs of energy efficiency/saving measures were off-putting for Gravadlax telecoms.

Turning to self-generation of electricity, this was seen as offering protection against potential price volatility (Goshawk supermarket), a new income stream (Umbra supermarket) and as offering security of supply (Umbra and Upwind telecoms). However, for Goshawk, Umbra, Upsilon supermarket and Upwind, the financial case for investment in some self-generation projects had fallen down with a lack of government incentives playing a role.

Upwind's ambitious self-generation goals were partly replaced by renewable electricity PPAs. These were favoured by other firms over other RECI as they were seen to offer financial benefits (Upwind and Upsilon), security of supply (Upwind) and greater support for extra renewable capacity (Upsilon and Umbra). These findings fit with observations from the International Renewable Energy Agency (2018) report on corporate sourcing of RECI and self-generation of renewable electricity which said (p.57) *"As renewables become even more cost-competitive in the energy marketplace, energy management and economic and financial drivers, such as cost savings, long-term price stability and security of supply, will likely increase in importance in the coming years"*.

Focussing now on RECI use, despite being an ongoing expense⁴⁷⁷, even firms that had reported the impact of available finance on their other mitigating activities could find the money for RECI. In the case of Gamete, the RECI budget seemed privileged compared with the budget for energy efficiency/saving measures, which had been affected by financial strictures. Gravadlax had assigned an important role for RECI in its 2015 climate change strategy, although investment in energy efficiency was constrained. For Umbrella purchasing RECI was seen as the moral step and the monetary costs were not significant. Grange – which did not seem to be so affected by financial constriction as the other banks - purchased

⁴⁷⁷ I do not have data on LCECI costs.

RECI even though it was an ongoing expense. Financial restrictions only appeared to have curtailed RECI use in the case of Urban bank.

In summary, the above evidence confirms the role of available finance and cost-saving as important influences on GHG mitigating activities. However, even if finance is not a particular constraint, the return on investment must meet the firm's internal criteria for mitigating projects to go ahead. This especially affected plans for some renewable and low-carbon energy generation projects where the financial case was not considered to be good enough due to the level of government incentives. However, in the case of RECI, the cost – although ongoing – was relatively insignificant, and therefore could be borne even by some firms with restricted available finance. The role of cost-saving is explored further in the discussion on Research Question 2.

10.5 NON-FINANCIAL RESOURCES AND CAPABILITIES AND TECHNICAL ISSUES

I have considered non-financial resources and capabilities in tandem with technical problems encountered by the firms as their description of the technical problems may point out a gap in their technical resources and capabilities. Firstly, I discuss issues related to self-generation of electricity before turning to the availability of specialised products. Then I turn to an issue of potentially wider relevance: a perceived shortage of energy efficiency/saving actions left for office/ICT-based firms to take.

Firstly, on self-generation of electricity, Gamete bank and all three of the supermarkets had experienced technical difficulties with successful operation of their own energy generation equipment, although Goshawk Interviewee 2 did state that technical expertise was not a barrier; it could be bought in. However, both Gamete and Upwind interviewees said it was better to form partnerships with firms whose core business was energy generation as, for example, they had experience of putting together projects of sufficient scale to be financially viable. The remarks of Gamete and Upwind support the findings of López-Gamero, Claver-Cortés, and Molina-Azorín (2008), Pulver (2007) and International Renewable Energy Agency (2018) about the importance of firms having resources and capabilities that can be adapted to environmental management. For Gamete and Upwind, the implementation and operation of their own energy generation projects were far removed from the capabilities that they needed for their businesses. In contrast, Umbra managed to fill a gap in technical knowledge of how refrigerants with low Global Warming Potentials would work with a training programme for engineers. However, Umbra already had knowledge of refrigerants.

In some instances, there was a different type of resource that had been difficult to source: the availability of a suitable product on the market. Upsilon and Goshawk had encountered challenges in sourcing low-GWP refrigerants for specific circumstances. Gravadlax B2B had looked into installing more renewable

electricity generation equipment on its premises. However, it encountered practical constraints in terms of the ability of its buildings to bear the weight of generation equipment, suggesting lighter equipment would have been useful.

The following set of findings relates to a similar issue, although in this case the required resource was not specialised and therefore the findings may have wider relevance. B2B financials Geode and Ursa, banks Grange and Gamete and Upwind telecoms considered that they were running out of energy efficiency/saving options available to them. Umbrella bank had been running out of options but had found a new supply of potential actions through an innovative external partnership.

To investigate this point, I compared the intensity metrics of the banks and B2B financials based on the hypothesis that firms that were running out of options would have implemented common mitigation actions and would therefore have similar or lower intensities to their peers⁴⁷⁸. This assumes similar business models e.g. there has been an international trend towards online banking with closing branches and fewer staff per branch (PwC 2014).

The first noticeable feature of the banks' electricity consumption intensity graph (Figure 9) is the convergence of the four banks towards a similar electricity intensity. Grange has decreased intensity to converge with the other banks while Urban has increased. Umbrella and Grange have more zig-zag paths. The convergence of the four banks towards a similar electricity intensity (6.0-7.5 MWh/FTE employee in y/e 2015) suggests a standardisation of both ICT usage that serves to increase intensities and the electricity efficiency measures that serve to decrease intensities. This may have led to increased electricity usage, which was not being fully negated by electricity efficiency/saving actions, hence the second noticeable feature of the graph: the overall upward trend in electricity intensity for three banks. Only Grange ended the period of analysis with a lower electricity intensity than when the period started.

I would expect data centre demand to be a significant component of the banks' electricity demand. Shehabi et al. (2018) presents a bottom up model of data centre electricity use in the USA, finding that while data centre workload had increased exponentially since 2000, electricity use has stabilised due to efficiency measures. However, intensities could still increase if the denominator was reducing. My proxy for activity is FTE employee which is not wholly satisfactory given the shrinking numbers of staff (PwC 2014). However, the important point for this research is the convergence of intensities which I would argue indicates that similar electricity efficiency/saving steps have been implemented by the banks. This

⁴⁷⁸ I did not compare the telecoms firms because my intensity metric denominator for both was revenue. I would have had to standardise on one currency to compare the intensities and comparison would have been complicated by exchange rate fluctuations.

picture of convergence is also seen with the B2B financials' electricity intensities (see Figure 29). Both report tumbling electricity intensities with employee numbers acting as the denominator while stating that they lack further energy efficiency options to undertake.

Turning to the banks' energy intensities (see Figure 10), the range narrows over time with the UK banks and Grange converging to around the same energy intensity of 8.9-10.2 MWh/FTE employee in y/e 2015. The UK banks' plots are largely stable, rather than increasing as they were with electricity, indicating that increases in electricity intensity have been offset by a reduction in the intensity of use of other forms of energy e.g. heating. I would have expected greater divergence due to the different climates in the UK and Germany, half of which has a colder climate than the UK (Peel, Finlayson, and McMahon 2007). One possibility is that greater use of district heating by the German banks compared to those in the UK has negated increased heating demands in the colder parts of Germany.

As it stands, the convergence of the energy metrics of banks Grange, Urban and Umbrella suggests a convergence in business models and energy efficiency/saving methods. As covered in the chapter on Gamete (section 6.1.7), the changes in Gamete's energy intensity appear to be due to an increased number of branches with fewer staff in them, with more of these branches heated by natural gas which Gamete suggests is less efficient than district heating schemes. One explanation for the higher energy intensity of Gamete was that its business model had a greater focus on bank branches than the other three banks. However, Grange – the best comparison due to the similar climatic conditions - had significantly more bank branches than Gamete in 2018 and had not undergone any relevant acquisitions since y/e 2015 when Figure 10 ends and 2018 nor had Gamete undergone any relevant divestments, indicating that this was also the situation during the latter half of the graph⁴⁷⁹. Therefore, this rival explanation fails.

Overall these convergences do suggest a lack of new technical measures to implement or a lack of projects with a payback within a period acceptable to the banks. Other candidate explanations are that there has not been a lack of options, but a perceived lack of options by the firms. This could relate to a lack of absorptive capacity⁴⁸⁰ enabling the discovery and assessment of further actions to undertake (Delmas, Hoffmann, and Kuss 2011) or to normative pressures among facility managers to stick with commonly-used methods. On this last rival explanation, the Grange interviewee described a trend 15 years ago for banks to outsource facilities management to specialist firms and a growth of the role of

⁴⁷⁹ Corporates webpages for Gamete and Granges. Both undated. Both accessed 25 November 2018.

⁴⁸⁰ Defined as the “*ability to recognize the value of new information, assimilate it and apply it to commercial end*” (Cohen and Levinthal 1990, 128).

“energy manager”. The Interviewee suggested there had been a “*maturation*” of facility management practices. This reminded me of the role of professions in structuration (Giddens 1979) of organisational fields which leads to similar responses from individuals to the circumstances that they encounter, as described by DiMaggio and Powell (1983). DiMaggio and Powell described two ways in which professionalisation of a role can generate isomorphism: through formal education and through professional networks.

Noticeably none of the supermarkets said that they were running out of mitigation-related actions either in absolute terms or relative to an internal payback period. In general, supermarkets have a wide range of mitigation opportunities that span lorries, warehousing, and stores. Gouldson and Sullivan (2014) found that major UK supermarkets had developed considerable expertise in GHG mitigation. Fugitive emissions of refrigerants were an area where large reductions can be made. However, among the office-/ICT-based firms, this issue of remaining energy efficiency/saving options to undertake would bear further examination as this may aid achievement of emissions reduction targets. Future research could look at whether a professionalization of facilities management has led to isomorphic responses.

A related issue is that of leased premises. Grange bank was the only firm that raised the issue of lessee firms needing to ensure payback for energy efficiency/saving actions before the end of a lease. This was surprising given the high proportion of leased non-residential premises in England and Wales. Based on floor area, in y/e 2015, the retail sector leased 45% of its premises, office-based firms - 52%, the hospitality sector - 52%, the industrial sector - 41%, the storage sector - 46%. (Department for Business, Energy and Industrial Strategy, UK 2016). The effect of leased premises on the GHG mitigation strategies of financial sector firms globally was noted by International Renewable Energy Agency (2018) which said that firms from the sector commonly used leased offices.

In summary, five firms encountered difficulties with the implementation of energy generation projects with two of them highlighting that the capabilities required were very different from those needed for the operation of their business. A lack of availability of an external resource - equipment needed to meet specific circumstances - was another constraint encountered by three firms. However, an issue with wider applicability was the perception by five firms - predominantly office-/ICT-based firms - that they were running out of energy efficiency/saving options, or at least options that meet their internal financing criteria. In contrast to these issues, no issues related to resources and capabilities or technical barriers were raised with regard to RECI/LCECI. This suggests that they are easy mitigating actions to implement.

10.6 STAKEHOLDERS

In some cases, specific stakeholders were identified for their climate change concern e.g. investors, NGOs, employees and customers. These are considered in more detail below. The instances where

stakeholders requested specific GHG mitigation action were limited. Umbrella bank, in an isolated reflection on this theme, said RECI use and occupying buildings certified to high sustainability standards were popular mitigation actions with stakeholders. This section begins with a more general point about declining stakeholder interest in climate change issues.

10.6.1 DECLINING STAKEHOLDER INTEREST IN ENVIRONMENTAL MANAGEMENT

While reviewing the evidence from the cases, I noticed a pattern of declining stakeholder interest in climate change for three UK firms, although not for the other eight cases. This section presents the evidence and then suggests rooting research findings in the context of what was happening nationally and globally when the data was collected.

In CDP2008 Urban bank cited a 2007 poll that found 45% of consumers wanted to see firms do more to protect the environment. By its 2015 environmental publication stakeholders generally did not identify climate change as a priority issue, although Urban said it remained so for the firm itself. This decline was also detected with Umbrella bank: environmental issues were sixth on a list of priorities with stakeholders in the 2006 corporate responsibility report. Environmental issues were a particular concern for employees in CDP2007. By the 2014 sustainability report, only NGOs and civil society had them as a priority. In the case of Upsilon supermarket, the 2006 corporate responsibility report had five pages devoted to climate change in the 74-page report whereas in the 2016 report the dominant issue was food waste. I assume this reflected market research into stakeholders' interests at the time.

In the early to mid-2000s Umbra supermarket found stakeholders including customers and employees wanted it to manage its environment impacts, but this interest had slackened off by the mid-2010s and the Interviewee said in 2017 that its climate change approach was internally driven.

Ambitious climate change goals were set at roughly similar times to the peaks in customer interest. Urban bank claimed carbon neutrality for y/e 2007 – the same year as the poll that found consumers wanted more done to protect the environment. In 2007 Umbrella bank signed a three-year deal to buy RECI for all its British consumption. Upsilon set a carbon neutrality target in 2009. I am not suggesting one event necessarily lead to another. There may have been common cause for firms and for stakeholders to become more interested in climate change e.g. the publicity around the UNFCCC meeting in Copenhagen in 2009.

Gouldson and Sullivan (2014) found in their discussions with UK supermarket managers that external pressure to act on climate change diminished following the lack of a deal at the 2009 talks with increased debate over the validity of claims about anthropogenic climate change and a focus on the outfall from the global financial crisis.

This evidence suggests that stakeholder views should be regarded as dynamic. Inconsistent findings about the views of groups of stakeholders on environmental management could be explained by the different periods in which research is conducted. This shows the importance of situating results concerning stakeholders in the events when the research was conducted and strengthens the call of Aguinis and Glavas (2012) for multi-level research i.e. at the levels of the individual, organisational and organisational field, which Aguinis and Glavas term “*institutional level*” and of Scott (2014, p.258) for “...*considering the wider drama being enacted...*” in understanding the behaviour of individual organisations.

10.6.2 INVESTORS

Investors were considered stakeholders by all the cases. Upsilon noted the interest of Socially Responsible Investors in climate change action in a 2006 corporate report. Interviewees from Goshawk supermarket and Upwind telecoms said in 2016 and 2017 respectively that among their stakeholders, investors were the most important driver of climate change activity. The B2B financial Ursa Interviewee said in 2017 that perceived investor interest in the sustainability benefits of a project might lead to it going ahead when it would have been rejected on purely financial grounds, but these would be isolated instances. Gravadlax telecoms said its reputation with investors for sustainability could affect the cost of capital. It sought inclusion in CSR ratings that included climate change. Furthermore, a fifth of its investors were interested in the firm’s sustainability. This evidence spanned the time period from Gravadlax’s CDP2015 response to the conversation with the Interviewee in 2017.

B2B financial Geode gave a mixed answer. A 2012 report said its operational GHG emissions were not a priority issue for its stakeholders but said in later CDP responses that it was continuously monitored by institutional investors and analysts for its climate change and CSR activities. In the latter answer Geode was responding to a questionnaire (CDP2014 and CDP2015 questionnaires) about its climate change response, so it may have wanted to highlight its inclusion among its CSR activities.

Overall this supports the reviewed literature that found that shareholders may drive business practices towards improved environmental performance. The findings of this research show that some investors have been key supporters of climate change-related action.

10.6.3 NGOS – OTHER THAN NGO CSR RATING AGENCIES

In this section, I will reprise instances of the influence of NGOs on the firms’ GHG mitigation strategies before commenting on the usefulness of institutional theory as a perspective on their influence.

The Grange interviewee in 2017 cited the influence of NGOs on its CSR response, particularly its CSR reporting activities. NGOs forced a specific change in Gravadlax telecoms’ climate change activities in 2013. The perceived stance of the GHG Protocol, a partnership between a charity and a membership

organisation⁴⁸¹, on scope 2 accounting, together with negative publicity drummed up by campaigning NGOs led Gravadlax to stop buying RECI to cover its electricity consumption in Germany⁴⁸². When the GHG Protocol published its scope 2 guidance (Sotos 2015a) this led to a renewed interest in RECI use at the group level of Gravadlax.

Umbrella bank had stopped reflecting RECI use in its emission figures in 2008. However, it continued to report that it was buying RECI until 2015 when it stopped as the use was not backed by “*good quality instruments*”⁴⁸³. “*Quality criteria*” is a phrase used in the GHG Protocol’s Scope 2 guidance (Sotos 2015a, 60). I would infer from this circumstantial evidence that Umbrella stopped because the RECI did not meet the requirements prescribed in the GHG Protocol’s revised scope 2 guidance. Urban bank entered into a PPA in 2015 but did not reflect that in its emission figures as it said it could not meet the GHG Protocol’s scope 2 requirements.

The GHG Protocol guidance falls, I would argue, within the normative category of institutions described by Scott (Table 3.1, 2014). This describes the basis for compliance with normative institutions as social obligation. Normative institutions prescribe courses of action that are deemed “*appropriate*” and would result in “*shame*” if not followed. “*Shame*” is a strong word. One can imagine employees within a firm feeling defensive if asked why their firm had not followed the approach of the globally dominant organisation in this field (A. C. H. Smith 2016). Perhaps they might feel under suspicion of fiddling the emission figures – and hence embarrassed - or fear damage to the firm’s reputation, but “*shame*” seems extreme. However, overall, the perspective that sociological institutionalism – as described by Scott (2014) - has offered on the influence of NGOs and CSR rating agencies (see section 10.7) leads me to conclude that it provides a useful lens through which to study these actions.

In summary, I conclude NGOs have been significant influences on some GHG mitigation choices made by some firms, specifically the GHG Protocol has had significant bearing on RECI/LCECI use through the publication of its 2015 guidance (Sotos 2015a).

⁴⁸¹ World Resources Institute is a charity. World Business Council on Sustainable Development is a membership organisation (GHG Protocol Initiative 2004).

⁴⁸² The interviewee could not remember the specific NGOs concerned.

⁴⁸³ CDP2016 CC11.4.

10.6.4 EMPLOYEES

This section considers employees as a group, rather than individuals acting to influence a firm's GHG mitigation strategy (see section 10.1). I review the evidence from the cases and compare it with prior literature before summarising.

Several cases said (dates in brackets) that employees or potential employees reacted positively to climate change action (banks Gamete (2016), Grange (2013) and Umbrella (2007-2009), Upwind telecoms (2010), B2B financial institutions Geode (2010) and Ursa (2015-2016) and Umbra supermarket (2007)). These findings fit with the literature overview by Kassinis (2012).

Wiser, Fowlie, and Holt (2001) found that improvement in employee morale was the second most important motivation for RECI use by organisations after altruism. The paper was lengthily criticised by Haar and Stanciu (2002) who rejected this finding, although this appeared to be based on their personal opinion about what motivates employees. The Ursa interviewee said in 2017 that perceived staff interest in the sustainability benefits of a project might occasionally lead to it going ahead when it would have been rejected on purely financial grounds, but he clarified that employees were not a significant driver. This was the only evidence that attention to employees' interests led to a firm changing what it would do otherwise albeit in limited circumstances.

Therefore, the findings of this research tread a path between Wiser, Fowlie, and Holt (2001) and Haar and Stanciu (2002). The firms have identified too many benefits of climate change action in terms of employee relations to reject it as an issue that concerns employees. However, it does not support Wiser, Fowlie, and Holt (2001) that pleasing employees was a major driver. It falls closer to the finding of Henriques and Sadosky (1996) that employee pressure was in the top four motivations for environmental management, although what was the nature of the pressure was not developed in the research. These papers relate to North American firms, so my research adds a European perspective. I note but cannot explain that this benefit of employee motivation was not mentioned before 2007 in contrast to the findings of Henriques and Sadosky (1996) and Wiser, Fowlie, and Holt (2001) from some years before.

Eight cases (Gravadlax and Upwind telecoms, Grange, Umbrella and Urban banks, Geode and Ursa B2B financial institutions, Umbra supermarket) have described activities to engage employees on environmental and energy issues. In some cases, this was to promote behavioural change and in others to garner ideas for environmental initiatives.

In summary, my research adds to previous studies by showing that several firms said their GHG mitigation work improved employee relations, although evidence of this specifically changing what firms did was very limited.

10.6.5 CUSTOMERS

The literature review showed that consumer proximity was positively linked with environmental management. I considered business sector was a reasonable proxy for this. This section begins by situating the cases on a spectrum of consumer proximity. I then review the evidence from the cases. Note in this context I have used the term “*consumer*” where I refer to a person who buys things or uses services for his or her own personal needs (*Collins English Dictionary* 1998).

The cases were on a spectrum of consumer proximity. In contrast to supermarkets Upsilon and Umbra, Goshawk supermarket had a wholesale line of business too. The banks and telecoms firms had a mix of retail and business customers. At the other end of the spectrum were the two business-to-business financial institutions, Geode and Ursa. As there was contrast and similarity in terms of consumer proximity among the cases, this gave me the opportunity to see if there was a pattern of theoretical and literal replication (Yin 2014) in terms of the relationship between consumer proximity and their RECI/LCECI use.

As a static picture, looking at RECI/LCECI use “at close of play” of this research, there was not a pattern in relation to consumer proximity with firms across the spectrum of consumer proximity using RECI/LCECI strategically. By “*strategically*”, I mean the deliberate selection of RECI/LCECI use as part of an environmental management plan as opposed to ad hoc use based on primarily on financial considerations. B2B financial institutions Geode and Ursa and Upsilon supermarket showed later interest in strategic use of RECI than the other firms that used them strategically. If RECI is seen as best practice environmental management action, then B2B firms Geode and Ursa do fit with the findings of the literature review on consumer proximity, although consumer-facing Upsilon does not. However, the effectiveness of RECI use as a GHG mitigation measure has been questioned (see section 4.7). Setting aside that complication, there was some support for a relationship between consumer proximity and RECI/LCECI use.

Given this finding, one would expect consumer-facing firms to be driven by consumer interest in climate change action. However, I found that one had to consider consumer interest as a time-sensitive variable, a point that I develop in section 10.6.1. Therefore, I situate the following comments in the time in which they were made.

Some consumer-facing firms did not report a strong push from consumers to act on climate change. This applied to supermarket Goshawk in the period 2015-2016. Evidence from Umbra suggested declining consumer interest from the 2000s to late 2010s. Upsilon interviewee 1 did not report explicit customer interest in climate change in 2016. Urban bank saw in the mid- to late-2000s that its climate change work was a way to build stronger partnerships with its external stakeholders, customers key among them, but by 2015 it had noted a decline in interest. In 2017 the Gravadlax Interviewee noted that business and residential customer interest was growing. In Austria Gravadlax competed for custom on environmental performance. There was evidence from Upwind telecoms of consumer interest in its climate change

response in 2012. The Upwind Interviewee said in 2017 that there was more interest from business customers than residential. Also, in 2017 the Interviewee from B2B financial institution Ursa said its clients wanted to work with firms with a proactive approach to climate change. This was the extent of comments from cases on customer interest.

This evidence shows that customer interest in the environmental management was not exclusively located among residential consumers. The other point to make is that interest from residential consumers was greater in the 2000s than the 2010s. This could relate to a lessening of interest in climate change following the failed UNFCCC negotiations at Copenhagen in 2009. Gouldson and Sullivan (2014) found UK supermarkets experienced diminished external pressure for climate change action following the Copenhagen summit (see section 10.6.1). My findings about a declining driver from residential consumers do not fit the conclusion that I drew from the literature review. However, this was based on three papers, two of which were published in the early 2000s and a third which while published in 2011 used data extending back 13 years. Therefore, I would suggest that my findings and these papers are not contradictory; instead they need to be contextualised in the time period in which the events they study occurred.

There is a further set of research described in section 2.8.10 which took the approach of asking firms about the influence of stakeholders. Although this research suggested that firms' customers encouraged improved environmental management, linking my findings with this evidence is difficult as previous papers sometimes considered customers with other stakeholders in various combinations (i.e. Dögl and Behnam 2015, Boiral, Henri, and Talbot 2012 and Gliedt and Parker 2010). Furthermore, the literature review considered papers about firms and consumers in countries other than Germany and UK with the exception of Dögl and Behnam (2015) that studied Germany. It found a positive association between environmental management and customers, but this was in aggregation with competitors and suppliers.

In summary, in terms of RECI/LCECI use, the two firms that were B2B started to use/consider using RECI/LCECI strategically later than most other strategic users that were consumer-facing, but there was not a clear split along the dimension of consumer proximity. This research considered customers – and other stakeholders – separately and found greater motivation to act on climate change coming from residential consumers in the 2000s than subsequently. Linking with evidence from the literature review is difficult as previous papers sometimes considered customers with other stakeholders in various combinations. There was also little geographical overlap with previous studies. Future research should consider stakeholder categories separately and not treat their interests as static as this may reveal patterns obscured by considering different stakeholders as a homogenous group with fixed interests.

10.7 CSR RATING AGENCIES

I begin this section with a brief introduction to CSR rating agencies. I then review the evidence from the cases about the influence of CSR ratings on their activities. In some instances, firms have used the term “*sustainability ratings*”. I have assumed that there is a degree of overlap between CSR ratings and sustainability ratings in terms of the issues that they assess⁴⁸⁴. Exceptions would be ratings that are clearly focussed on specific subjects e.g. CDP’s climate change questionnaire. I then integrate my findings with prior academic research, drawing out the distinguishing features of my research. I finish with a brief discussion of the direction in which CDP is steering firms regarding RECI/LCECI use before considering the activities of rating agencies from an institutional theory perspective.

CSR rating agencies are frequently aimed at investors. RobecoSAM produces the ratings on which the stock market index, the Dow Jones Sustainability Index, is based (RobecoSAM undated). CDP does not describe itself as a rating agency, but it does assign public scores to firms that answer its annual questionnaire. It began by collecting data on firms for investors and then expanded into gathering data for major purchasing firms that want to know what their suppliers are doing on climate change (CDP n.d.c). The FTSE4Good series is an assessment of firms’ track record on environmental, social and governance issues which are used in a series of stock market indices (FTSE n.d.). A fuller picture of this field can be found in the Rate The Raters project carried out by consultancy SustainAbility (SustainAbility 2010).

Turning to my research, only Umbra and Umbrella did not indicate that ratings agencies and stock market sustainability indices were driving them on climate change action. Upsilon said CSR rating agencies were pressing for action on climate change. The influence of sustainability indices and benchmarks was noted by Urban. Grange said CDP was a significant influence in terms of firms’ CSR activities. Geode had a goal to raise its score in certain sustainability indices. Gravadlax and Goshawk had staff with monetary bonuses linked to performance in CSR ratings that considered climate change issues. In Goshawk’s case, this included the firm leadership.

Focussing on the world’s 25 largest retailers, Sullivan and Gouldson (2017) finds that nonstate actors can influence firms’ internal governance and strategies but the extent to which they can push firms towards specific actions is bounded by the financial case for those actions; “...*there is limited evidence that companies will invest capital in situations where the financial costs outweigh the financial benefits of such investments*” (Sullivan and Gouldson 2017, 422). My research found instances of firms (Gamete bank, Gravadlax and Upwind telecoms, Ursa B2B financial institution) making or considering specific changes to operational practices due to the scoring methodologies of ratings agencies, which are nonstate actors.

⁴⁸⁴ Montiel and Delgado-Ceballos (2014) found justification for including environmental CSR activity within the compass of corporate activity on sustainability.

Gamete described how rating agencies steered them towards actions such as introducing an environmental management system, then getting it audited, and so on. Gravadlax said that the legitimization of the scope 2 market-based approach through the publication of the GHG Protocol's Scope 2 Guidance in 2015 and its reflection in the CDP questionnaire had led Gravadlax to look for less carbon-intensive electricity suppliers. Ursa was considering adopting a science-based target in part due to the emphasis put on such targets by CDP (CDP 2016b) and DJSI⁴⁸⁵. This in turn was leading it to consider strategic RECI use. Depending on the RECI chosen, this might involve ongoing expense for Gravadlax and Ursa. Upwind said a CDP criterion of a 4% year-on-year reduction in S1+S2 emissions in order to receive a good score⁴⁸⁶ had led it to focus on reducing emissions from its vehicle fleet as its use of RECI had dramatically cut its scope 2 emissions.

These instances are limited as Sullivan and Gouldson (2017) found with their investigation into the world's largest retailers. What is new is that the firms themselves have explained how their actions are at times shaped by a specific group of nonstate actor - ratings agencies. A point to note is that assessment of GHG mitigation projects may entail more than financial considerations, a discussion which is picked up in section 10.12.

Turning to research specifically on rating agencies, Chatterji and Toffel (2010) describe their statistical study as among the first to theorize the effect of environmental ratings by an independent, non-governmental body, KLD Research and Analytics⁴⁸⁷, on the environmental performance of firms. They tested their hypotheses, finding that firms initially rated poor improved their environmental performance more than other firms. Environmental performance was measured by the annual amount of toxic emissions in pounds reported to the US Environmental Protection Agency. The improvements were most notable in business sectors covered by high levels of environmental regulation or with opportunities to make low-cost reductions.

Sharkey and Bromley (2015), building on Chatterji and Toffel (2010), also looked at the effect of CSR ratings on the emissions of toxic pollutants by public firms in the USA. They found that the presence of peers that had been rated by KLD Research and Analytics was often linked with lower emissions by the firm of interest, but this depended on whether the firms of interest were rated (and whether this was positive or negative) and features of the competitive and regulatory milieu. The case of Ursa particularly

⁴⁸⁵ While CDP does reward science-based targets within their scoring methodology (CDP 2016a), DJSI said that it did not at the moment, but it was under consideration (email from RobecoSAM DJSI Helpline dated 22 February 2018).

⁴⁸⁶ I did not investigate the existence of this criterion.

⁴⁸⁷ This is aimed at provision of data on firms to investors (see Chatterji and Toffel 2010).

relates to the findings of Sharkey and Bromley (2015). Ursa had considered using RECI previously but rejected this because at that time it did not seem necessary to get a good rating or to achieve a desired score relative to its peers.

Further relevant research comes from a statistical study by Mackenzie, Rees, and Rodionova (2013) who looked at the effect of more rigorous environmental management requirements for inclusion in the FTSE4Good, a stock market index based on Environmental, Social and Governance criteria applied to the FTSE All-World Developed Index. It found that firms that were already in the index but failed to meet the new criteria were twice as likely to meet the new criteria in three years' time than a control group of firms in FTSE All-World Developed Index but not in the FTSE4Good (for reasons not given in the research). Mackenzie et al. suggested that the threat of expulsion from the index motivated firms to meet the new criteria. However, 24% of the control group implemented the criteria anyway which suggests either spill-over effect from the rating or that there were other unrelated reasons to introduce the measures.

What distinguished my research from the foregoing studies is that the firms themselves have made the link between what the CSR rating agencies have incentivised and what they have done or were considering doing, whereas the statistical studies of Chatterji and Toffel (2010), Mackenzie, Rees, and Rodionova (2013) and Sharkey and Bromley (2015) need to make inferences.

In other research Searcy and Elkhawas (2012) asked experts from ten Canadian firms what they did to gain entry to the Dow Jones Sustainability Index and to remain included. This was not limited to environmental management issues. They found firms got staff to supply data and improved the data-gathering process. This was a similar finding to Collison et al. (2009). These researchers conducted interviews with representatives of five FTSE4Good-listed firms which led onto a survey of firms in the UK and European FTSE4Good indices. They found from the interviews and the survey that only a small number of respondents said that membership of the FTSE4Good indices had led to operational changes other than monitoring and reporting and no details were given. This thesis shows that firms have made or were willing to make changes to operational practices to improve their rating as distinct from data processing improvements. It takes forward the work of Searcy and Elkhawas (2012) in showing the kind of changes that these case study firms were prepared to make.

A further difference between my research and Chatterji and Toffel (2010) and Sharkey and Bromley (2015) is that they focussed on firms that were regulated by the US Environmental Protection Agency. Most of Chatterji and Toffel's firms were manufacturers, utilities or in the extractive sector, although ten were professional, technical and scientific service providers. Sharkey and Bromley's firms were mainly from the sectors of manufacturing, metal mining, electricity generation, and hazardous waste processing (2015). This thesis shows that European firms within the service and retail sectors may also be very responsive to CSR ratings.

The degree to which firms' may be prepared to tailor their GHG mitigation activities to the methodologies of rating agencies justifies asking whether rating agencies are steering firms in the most effective direction to improve their sustainability and what rating agencies' governance processes are. CDP has put its full weight behind RECI use and the market-based method. CDP promoted the market-based scope 2 accounting approach (CDP 2013) before the publication of the GHG Protocol's scope 2 guidance (Sotos 2015a). With The Climate Group, CDP leads the RE100 group of firms committed to 100% renewable electricity use. In CDP's 2016 guidance document to firms completing its annual questionnaire, it said *"Businesses can drive the creation of a thriving global market for renewable power, a game-changer in reducing emissions, by committing to procure 100% of their electricity from renewable sources within the shortest practical timescale."* (CDP 2016e, 7)

Furthermore, starting in 2016, CDP began to give higher scores for the adoption of a science-based target which is linked with RECI/LCECI use. These methodologies preclude the use of offsets but recognise the use of RECI/LCECI, thereby incentivising their use. CDP regards targets approved by the Science-Based Targets initiative to embody best practice in science-based target methodology (CDP 2016b). The Science-based Target initiative is a collaboration between CDP, the UN Global Compact, World Resources Institute (one of the two GHG Protocol partners⁴⁸⁸) and the World Wide Fund for Nature. I would argue that these organisations have been creating new regulative and normative institutions supporting RECI/LCECI use which will become an increasing common component of firms' mitigation strategies as a result.

Brander, Gillenwater, and Ascui (2018) have been critical of the U.S. Environmental Protection Agency and World Wildlife Fund for not challenging the validity of the market-based approach and of the GHG Protocol for being too reliant for information and funding on the supporters of the market-based approach, including those for whom its adoption would have financial implication. More widely Andrew and Cortese (2011) have questioned the independence of CDP and the GHG Protocol. This was not in the sense that they were beholden to individual funders, but rather they were reliant on a range of funders that were primarily supporters of market-based solutions to environmental problems (p.137). However, in the case of CDP, this is consistent with its mission which has been to leverage the power of markets to drive climate change action (CDP n.d.a).

Avetisyan and Ferrary (2013) describe the emergence of CSR rating agencies, categorising them as *"institutional entrepreneurs"* (p.125), based on DiMaggio and Powell (1983) and Scott (2014). Although Avetisyan and Ferrary (2013) focus on the situation in France and the USA, the ratings agencies in their

⁴⁸⁸GHG Protocol Initiative (2004)

research cover firms incorporated throughout Europe. They describe CSR rating agencies as contributing greatly to the institutionalisation of the CSR field. This thesis shows the contribution of CSR rating agencies to the institutionalisation of GHG mitigation activity of the cases through the agencies' creation of regulative institutions to use the terminology of Scott (2014). Lyon and Shimshack (2015) offer empirical insight into why CSR ratings matter to firms. They found the release of Newsweek's 2009 sustainability ranking of the 500 largest U.S. firms had a significant impact on subsequent shareholder values. More generally Gravadlax telecoms said that a poor reputation for sustainability might increase the cost of capital for firms. A further example of the regulative nature of one rating agency was marketing material from a RECI provider which promoted its products as conforming to CDP's criteria for firms to reflect RECI in their emissions figures (Brander, Gillenwater and Ascuí 2018). However, I would argue that just as a good score from CDP now supports a firm's legitimacy, there is also a line of research in considering how firms legitimised CDP when it began by agreeing to answer its questionnaire.

In summary, academic research into ratings agencies is an emerging field (Chatterji and Toffel 2010). My research builds on previous work by describing the influence of CSR ratings on firms in Germany and the UK. It complements the statistical approach of Chatterji and Toffel (2010), Mackenzie, Rees and Rodionova (2013) and Sharkey and Bromley (2015) as some firms make the causal link between some of their mitigating activities and the scoring methodologies of rating agencies. It builds on Searcy and Elkhawas (2012) and Collison et al. (2009) as it shows that cases were willing in some instances to be guided in their GHG mitigating activities by CSR ratings. This shows the power of rating agencies and justifies questioning their governance mechanisms and the direction in which they are guiding firms.

10.8 OTHER FIRMS

In section 10.12 I make the case that the desire for legitimacy can motivate firms' GHG mitigating activities. Firms within the same organisational field contribute to the definition of what firms must do to be seen as legitimate in their organisational field (Suchman 1995). However, GHG mitigation activities could also be seen as a firm seeking competitive advantage by reducing costs or differentiating itself based on its climate change response. Its peers may undermine this by copying them. I assess these different explanations in relation to the activities of the cases before summarising this section.

Di Maggio and Powell's described mimetic isomorphism as "...resulting from standard responses to uncertainty..." and it is a contributory factor towards a firm's legitimacy (1983). I infer that mimetic force can be seen in the cases of Goshawk and Upsilon supermarkets. Umbra supermarket was first of the three supermarkets to announce the switch from high-GWP coolants (HFCs) to low-GWPs coolants in 2009, with a deadline of 2030, attributing its action to regulatory pressures and GHG mitigation objectives. Goshawk and Upsilon supermarkets did so the following year via their respective national branches of the

Consumer Goods Forum. The firms in the Consumer Goods Forum adopted a common position in advance of UNFCCC negotiations in Cancún on refrigerant emissions. I interpret this common position as mimetic isomorphism in the face of the uncertain outcome of the talks⁴⁸⁹. Upsilon went on to choose the same phase-out deadline as its fellow UK supermarket Umbra. In a separate instance of mimetic isomorphism, the Upsilon interviewee 1 saw competitors' use of Power Purchase Agreements as supportive of its decision to increase their use.

When firms choose the same course of action at the same time and through the same mechanism e.g. Goshawk and Upsilon and the Consumer Goods Forum, the case for mimetic isomorphism is stronger. When responses are similar but staggered in time, an alternative explanation could apply of one firm seeking a competitive advantage⁴⁹⁰ through differentiation and other firms preventing this by copying the action, rather than legitimacy-seeking. In the following paragraphs, I assess which explanation best accounts for the behaviour of the banks.

All four banks said they monitored competitors' activities in relation to their GHG emissions (Umbrella), climate change strategy (Gamete), environmental impact (Urban), or CSR response (Grange). The purpose was to look for ways to improve (Grange) and to assess how ambitious their plans were in relation to competitors (Urban and Umbrella). The firms started using RECI at broadly similar points in time: 2003 – Umbrella, 2005 – Urban, 2006 – Grange, 2008 – Gamete. Three made a carbon neutrality commitment: 2007 – Urban, 2008 – Grange, 2009 – Gamete. No carbon neutral commitment was made by Umbrella, although it was in a good position to do so as it signed a three-year deal to use RECI for all its British electricity consumption in 2007.

It does not seem credible that a bank would consider that it could win custom or access more favourable investment terms during the maelstrom of the global financial crisis through a carbon neutrality target. It seems more plausible that these goals were attempts to repair damage to their legitimacy. Based on Cornett, Erhemjams and Tehranian (2016) who looked at the perceptions of US banks' CSR strengths and weaknesses before and after the global financial crisis, I do not expect that carbon neutrality was the banks' sole CSR responses to the financial crisis. However, I would argue that these banks adopted a common response (addressing climate change) as a component of their attempts to shore up their legitimacy. Banks' response to the global financial crisis is discussed further in section 10.12.3.

⁴⁸⁹ Goshawk Interviewee 2 stressed Goshawk's mitigation target and regulations were motivations for this work on coolants. This fits with the narrative given in this section that the commitment from the Consumer Goods Forum members preceded regulations – see section 8.1.6.7.

⁴⁹⁰ I use the view of competitive advantage outlined by Hart (1995) in his exposition of a Natural Resource-Based View of achieving sustained competitive advantage and its relationship to social legitimacy.

The following examples show behaviour that is competitive in nature. B2B financial institution Ursa said its clients wanted to work with firms with a proactive approach to climate change and so Ursa benchmarked itself against peers' scores in CDP and the Dow Jones Sustainability Index (although it must also be borne in mind that Ursa had services related to business research, so it also wanted to be consistent between its products and internal operations by doing well in those ratings). No mention was found of this type of competitive behaviour for the other B2B financial institution Geode, although I was not able to conduct an interview. Competition influenced the environmental activities of Gravadlax telecoms in specific markets. Upsilon Interviewee 1 said firms tried to out-do one another. This fits with the eye-catching targets unveiled by Upsilon in 2009. Supermarkets Goshawk and Umbra and Upwind telecoms monitored the activity of other firms but saw themselves as climate change leaders⁴⁹¹.

For some of these firms it is difficult to see what they were hoping to win. Explaining the comments from Goshawk, Upsilon and Umbra as firms seeking a competitive advantage with customers does not fit with more recent assessments of customer interest, although both Gravadlax and Upwind telecoms see clear interest from a proportion of customers (see section 10.6.5). Gravadlax also noted in 2015 that a negative reputation with respect to sustainability may increase the cost of capital. One view of legitimacy is that it is sought as a means to an end of accessing a resource (Scott 2014). Another view is that these supermarkets are engaged in co-constructing what it means to be legitimate in their organisational field (Scott 2014) and good environmental performance is seen as part of that. Therefore, they drive up their performance to maintain their legitimacy.

To summarise, I argue the data shows two supermarkets and three banks acting with their peers to co-construct what is legitimate behaviour regarding refrigerant emissions and carbon neutrality respectively with further examples of behaviour from other firms that is not satisfactorily explained by seeking a competitive advantage with customers, but which may be explained by legitimacy-seeking.

10.9 ORGANISATIONAL VALUES

In this section, I discuss evidence from the cases of the role of organisational values – specifically morals – in deciding GHG mitigation strategies. I begin by highlighting that my conceptual framework assumed a CSR motivation for RECI/LCECI use. However, I decided against trying to discover if the CSR was motivated by morals or seen as a means to an end. Nevertheless, some firms volunteered that their

⁴⁹¹ Interviewee 2, Umbra interviewee, Upwind interviewee.

climate change activities were morally-motivated and this section will review this data, before integrating it with related literature.

I began the fieldwork regarding RECI/LCECI use as an environmental CSR response. In contrast to energy efficiency actions which may be implemented for cost-saving as well as moral reasons or curbing use of high-GWP refrigerants which may be undertaken because new laws requiring this loom on the horizon, reasons for buying RECI/LCECI seemed to be limited to a CSR motivation as I expected them to cost more than a standard electricity offering, although fieldwork revealed this was not always the case (see section 11.2.1). This CSR motivation would encompass either doing what the firm thinks is morally correct – a normative CSR approach - or being seen to do what other parties think is morally correct as a means to an end e.g. to win sales – an instrumental CSR approach (see section 2.2).

Some people have been sceptical about firms' claims of moral motivation. There has been a gap between what some firms say they do and what they actually do (Furrer, Hamprecht and Hoffmann 2011). Bowen and Aragon-Correa (2014) looked at incidences of greenwashing where positive aspects of environmental management were publicised and negative incidences were downplayed. I decided against trying to discern if firms were making a CSR response for normative or instrumental reasons. However, some firms (Grange and Umbrella banks, Geode B2B financial, Umbra supermarket and Upwind telecoms) volunteered that there was a moral⁴⁹² driver for acting on climate change.⁴⁹³

The Grange bank interviewee said the firm's carbon neutrality target was seen as an environmentally and socially responsible course of action and RECI use facilitated that goal. The phrase "*doing the right thing*" was used in connection with sustainability and RECI use specifically by Umbrella bank⁴⁹⁴. In CDP2011, Geode said that its position on corporate responsibility including its actions to reduce environmental

⁴⁹² I followed the definitions of Crane and Matten (2010, 8): "*Morality is concerned with the norms, values, and beliefs embedded in social processes which define right and wrong for an individual or a community*" and "*Ethics is concerned with the study of morality and the application of reason to elucidate specific rules and principles that determine right and wrong for a given situation. These rules and principles are called ethical theories.*"

⁴⁹³ Researchers have sought to categorise an organisation's moral position e.g. Logsdon and Yuthas (1997), Kefi (2012). However, Rossouw and Van Vuuren (2003) argue that decisions and actions develop from "*complicated group dynamic processes in which individual members of the organisation participate*", not "*a collective moral mind*" (p.390). Rossouw and Van Vuuren's perspective fits with Cyert and March's behavioural theory of the firm (1963) as a coalition of groups with sometimes competing agendas. I have taken the perspective of Rossouw and Van Vuuren (2003) which fits with findings on the role of individual in firms (see section 10.1).

⁴⁹⁴ To note, firms often use sustainability and CSR synonymously. Reports labelled as CSR and sustainability reports usually cover the same topics. I have noted this in conducting my research and it is a point already made by Carroll (2016).

impact was driven by its own “*convictions*” as well as desire to see the firm continue to prosper. I have interpreted “*convictions*” as moral values. The Umbra supermarket interviewee said that in addition to the commercial drive to improve the supermarket’s sustainability, it was “*the right thing*” to do. Upwind telecoms described a moral motivation as well as a business case driver to a major contract in 2004 for RECI. The Upwind Interviewee said RECI use and self-generation of electricity helped the firm’ to meet its corporate responsibilities.

These findings fit with four papers that address why North American firms use RECI and a fifth on why German small- and medium-sized enterprises use RECI. The first from Wiser, Fowle and Holt (2001) did not take a particular theoretical perspective. The authors conducted a survey to investigate the motivations of US non-residential customers that voluntarily purchased RECI. Most were retail and services businesses. Only 11% had budgets or revenues of more than US\$10m. So, they were smaller firms than my cases but were from the same sectors. They found altruism followed by improving employee morale were the dominant drivers compared to “*public image*”, “*green marketing*”, “*reduced regulatory risk*” and “*lowest cost*”. Altruism is represented in the survey by “*Organizational values: our organization feels a strong and pervasive commitment to public health and the environment*” and “*Civic responsibility: we feel a responsibility to be community leaders, not just for the environment*”^{495,496} The “*organizational values*” survey option fits with the viewpoints described by Grange, Umbrella, Geode, Umbra and Upwind. The “*civic responsibility*” option is not specifically about the environment and therefore was not relevant to my research.

In a survey of German small- and medium-sized enterprises - so again smaller firms than those in this research - Rahbauer et al. (2018) found that a sense of responsibility for the environment was a common motivation for procuring renewable electricity and that the customers’ acceptance of passed-on costs of “*green electricity*” were significant factors in uptake. Berkhout and Rowlands (2007) compared ten firms from Ontario, Canada, that purchased RECI with ten that did not. The firms were matched on variables such as industry sector. The authors concluded the firms that had purchased RECI were more likely to value improved GHG mitigation as a goal in itself, rather than as a means to gain financial advantage. This suggests a moral driver. This fits with the views expressed by Grange, Umbrella, Geode, Upwind and Umbra on moral drivers.

⁴⁹⁵ The authors tested hypotheses linking organisational characteristics and their purchase decisions using a linear regression model. The paper was lengthily criticised by Haar and Stanciu (2002) which was followed by a rebuttal by Wiser, Fowle, and Holt (2004). Haar and Stanciu’s criticisms largely related to the linear regression model.

⁴⁹⁶ “*Organizational values*” is not defined in the paper.

Gliedt et al. (2010) conducted a case study investigation of the factors that influence RECI purchase by firms in Alberta, Canada. They said they extended the work of Berkhout and Rowlands (2007) by finding that organisational culture and values moderated the influence of other factors e.g. an employee advocating RECI use. Gliedt et al. (2010) used the terms organisational culture and values without fully delineating the two. In a related paper, Gliedt and Parker (2010) conducted a survey of Canadian and US firms to analyse the important factors in influencing the renewable electricity purchase. Organisational culture (81%) was the most significant. However, Gliedt and Parker (2010) did not define “*organisational culture*”.

To summarise, I entered the fieldwork phase with a CSR perspective, but not intending to investigate whether motivations for CSR responses were normative versus instrumental. However, moral motivations were volunteered for RECI/LCECI use (Umbrella and Upwind) and for climate change activities more broadly (Grange, Geode, Umbra), although this was sometimes alongside other drivers e.g. reputational and economic motivations. This research extends the findings of the previous studies of North American firms and German SMEs by finding that morals motivated some large European firms to use RECI/LCECI. Some may be sceptical about firms purporting to have moral drivers. However, this is beyond the scope of this research.

10.10 REGULATORY AND POLICY CONTEXT

Under this heading, I first discuss regulatory and policy development relevant to RECI/LCECI (section 10.10.1). In section 10.10.2, I review my findings regarding the influence of regulations and policies relevant to the cases’ other GHG mitigation activities. I focus on the global policy context in section 10.10.3.

10.10.1 APPROACH OF REGULATORS AND POLICY-MAKERS TO RECI/LCECI

The actions of regulators and policy-makers in Germany and the UK affected the choices of some of the cases regarding their RECI/LCECI purchases. This supports the findings of the reviewed literature on the importance of regulatory and policy context. This section links the actions of the case study firms to regulatory and policy changes. This is summarised in the Table 30. Developments in the approaches of nonstate actors CDP and the GHG Protocol to scope 2 accounting and reporting are also included in this table. This follows the approach that I take in Table 3. Timeline of regulatory, policy and methodological changes relevant to accounting for scope 2 emissions from electricity (1997-2018)”. Furthermore, developments in the GHG Protocol’s approach to scope 2 accounting have influenced government GHG carbon accounting and reporting methodologies (Ascui and Lovell 2012).

Following Table 30, I discuss in more detail the influence of the German and UK governments on the actions of the firms. I then draw out three points. They relate to the UK government's carbon accounting and reporting guidance, how the German and UK governments' positions on RECI/LCECI reflect their categorisation in the Varieties of Capitalism literature (Hall and Soskice 2001) and how the German government's position reflects its categorisation in the work of Jepperson (2000).

Table 30 Actions of case study firms in relation to regulatory, policy and methodological changes relevant to Scope 2 accounting of electricity emissions**Legend**

Regulatory, policy and methodological changes relevant to Scope 2 accounting of electricity emissions are shown in green font for international changes, in purple font for changes specific to Germany and in blue font for changes specific to the UK.

Table 30 is reproduced in the accompanying A3 portfolio. Table 30 relates to Table 3 which gives fuller descriptions of the regulatory, policy and methodological changes given in the second column of Table 30. Goshawk has been excluded from this table as it emerged that its use of RECI was not strategic, but ad hoc and related to selecting the best deal financially. Goshawk did not gather data on RECI use systematically. See section 8.1.

Date	Regulatory, policy & methodological changes relevant to accounting for scope 2 emissions from electricity	Actions by case study firms
1997	VfU methodology for financial institutions published.	
1998		<u>Umbra supermarket</u> Pledged to raise % of electricity covered by RECI to 10%.
2001	Guarantee of Origin (GO) created. Climate Change Levy (CCL) implemented.	
2002	First CDP questionnaire published.	
2003	Renewable electricity GO system becomes operational in Austria. October - renewable electricity GOs introduced in UK.	<u>Umbrella bank</u> Begins to buy RECI, although the type is not specified. From 2008 onwards, there are references to Levy Exemption Certificates (LECs) being bought.

2004	Renewable electricity GO system enacted in Germany.	<u>Urban bank</u> Begins to purchase "green electricity".	<u>Ursa B2B financial institution</u> An overseas firm that later became part of the Ursa group commenced a PPA with a hydroelectricity plant.	<u>Upwind telecoms</u> Sets target to buy 10% of its electricity from renewable sources by 2010. Says exemption from CCL makes renewable electricity contracts cost-neutral.
2005		<u>Umbra supermarket</u> 10% RECI target achieved early. Enters into a Climate Change Agreement to reduce "notable" CCL costs ⁴⁹⁷ .	<u>Gravadlax telecoms</u> 50% electricity from CHP and 6% from renewables. Although not explicit, probably purchased and not self-generated.	
2006	Renewable electricity GO system becomes operational in Norway.	<u>Grange bank</u> Begins to buy RECI. Type not specified. Interviewee said the bank mainly uses energy attribute certificates from Norway.		
2007	In February, CHP GOs introduced in UK. In June, draft CRC Energy Efficiency scheme published.	<u>Upwind telecoms</u> Announces massive investment in wind turbines to cover 25% of current electricity use, although continues to use RECI and LCECI.	<u>Gamete bank</u> begins to follow VfU carbon accounting methodology.	

⁴⁹⁷ 2005 environment report p.87, p.90.

2008	<p>May - CDP steers firms towards location-based scope 2 approach, with option of presenting market-based figure.</p> <p>June - Defra recommendation to use location-based emission factor – even if LECs are used.</p>	<p><u>Gamete bank</u></p> <p>Begins to buy RECI. Type not specified. From CDP2010 onwards GOs and other instruments are specified. GOs were from EU, Switzerland and Norway.</p>	<p><u>Umbra supermarket</u></p> <p>Announces it will not increase green tariff purchases as it cannot justify the environmental benefit.</p>	<p><u>Gravadlax telecoms</u></p> <p>100% of firm's German electricity consumption covered by RECI. RECI sourced from outside Germany.</p>	<p><u>Upwind telecoms</u></p> <p>Objects that proposed CRC Energy Efficiency scheme does not reward purchase nor self-generation of renewable electricity.</p>	<p><u>Umbrella bank</u></p> <p>Stops reflecting RECI use in its emission figure due to change in Defra guidance. It continues to report it is buying renewable electricity.</p>
2009	<p>January - CHP GO implemented in Germany.</p> <p>September - Defra and DECC recommendation to use location-based emission factor – unless electricity contracts come with LECs, GOs and offsets.</p>	<p><u>Umbra supermarket</u></p> <p>States it is entering into a PPA with renewable generator.</p> <p><u>Urban bank</u></p> <p>Warns that change in Defra reporting guidance and design of CRC Energy Efficiency scheme may result in lapse in RECI contracts. No further mention of RECI found until 2015.</p>				
2010	<p>CRC Energy Efficiency scheme becomes operational.</p>	<p><u>Urban bank</u></p> <p>CRC Energy Efficiency leads to board-level awareness of climate change, monitoring of energy use and investment.</p>		<p><u>Upwind telecoms</u></p> <p>Changes accounting and reporting methodology in part to methodology recommended by Defra and DECC in 2009.</p>		

2011	Start of process to revise of GHG Protocol's Scope 2 guidance. End of CCL reduction for Good Quality CHP announced.	<u>Geode telecoms</u> Begins to buy RECI.		
2012		<u>Umbra supermarket</u> Sets a target of 20% of its electricity sourced via a PPAs with renewable electricity generator.	<u>Upwind telecoms</u> Drops 25% self-generation target. Announces major PPA.	
2013	December - CDP steers firms towards market-based scope 2 approach. CHP LECs ceased to be issued in March 2013.	<u>Gravadlax telecoms</u> Stops buying RECs for its German electricity consumption. Some subsidiaries continued.	<u>Upwind telecoms</u> No record found of Upwind buying CHP electricity from 2012 onwards.	
2014	Defra consultation on scope 2 guidance. CDP announces alignment with GHG Protocol scope 2 guidance.			
2015	Jan - GHG Protocol's revised scope 2 guidance published. July - End of CCL reduction for renewably generated electricity announced. August - Renewable electricity LECs cease to be issued.	<u>Urban bank</u> In 2015 agrees a PPA for renewably-generated electricity, although Urban does not reflect this in its emission figures as it cannot meet GHG Protocol's scope 2 requirements.	<u>Umbrella bank</u> stops reporting "green electricity" use due to a lack of "good quality instruments", reflecting phrasing used in the GHG Protocol scope 2 guidance. Decision to continue to buy RECI even with the end of the levy exemption for renewable electricity. Costs were not significant.	<u>Upwind telecoms</u> Says exemption from CCL makes renewable electricity contracts cost-neutral.
2016	March - End of CRC Energy Efficiency scheme announced.			

	CDP operationally fully aligned with GHG Protocol scope 2 guidance.	
2017		<u>Upsilon supermarket</u> Begins to buy GOs.
2018	March – CHP and renewable electricity LECs must be used before end of March.	

Turning first to the Climate Change Levy, Umbrella, Upwind and Urban⁴⁹⁸ bought Levy Exemption Certificates (LECs). Besides the fiscal advantage of LECs, firms buying LECs could reflect this purchase in reduced scope 2 emission figures, according to the annual Defra carbon reporting guidelines for firms (2007). However, the 2008 guidelines advised against doing this (Defra 2008). A subsequent publication - Defra and DECC (2009) - recommended that firms matched LECs with GOs and bought offsets to report a reduced scope 2 figure. So, this gave firms the following options to reduce their scope 2 emissions. They could choose either the no-cost option of not reflecting RECI/LCECI use in their emissions figures or do so and additionally pay for GOs and offsets or generate their own renewable/low-carbon electricity or they could ignore the guidance, which, I would speculate, could damage their legitimacy.

Urban and Umbrella complied with the Defra and DECC (2009) guidance by choosing not to reflect LEC purchase in their emission figures. Upwind was not using the Defra guidance in 2008, although it did in combination with a GHG Protocol methodology for y/e 2010. It continued to use RECI and reflected this in its emission figures which it presented using the terms “net” and “gross” which are also used in the Defra and DECC guidance (2009). However, no evidence was found that Upwind used offsets in combination with LECs and GOs to report a reduced scope 2 figure under the heading of net emissions. However, I infer that Upwind addressed any possible impact on its legitimacy by trying to change the UK government approach on scope 2 accounting, which it regarded as flawed. Umbrella was involved in this lobbying, although to a lesser extent than Upwind. Meanwhile Upsilon had a carbon neutral target and in 2010 intended to meet the target using an accounting technique in the Defra and DECC guidelines (2009) relating to renewable electricity generation.

The German government position on RECI has been far less complicated and provoked far less comment. Geode, Gamete, Grange and Gravadlax have all been major purchasers of RECI. I expect the approach of successive German governments on GOs has prompted German firms to source RECI from outside Germany. I use the term RECI because it is not always clear what has been purchased. Grange interviewee said the bank mainly used energy attribute certificates from Norway. Gamete bank used GOs from outside Germany. At Gravadlax, RECI were sourced from outside of Germany. I have no information on the origin of the GO used by Geode. Goshawk did not buy RECI strategically.

Despite the extent of their RECI use, only one firm referred to the German government approach and that firm (Geode) had an interest⁴⁹⁹ in GOs aside from using them to report reduced scope 2 emissions. The

⁴⁹⁸ This may have been for a short period only in Ursa's case.

⁴⁹⁹ This cannot be specified without implying the identity of Geode which would in turn imply the identity of Ursa, the other B2B financial institution.

other three did not seem concerned that they could not buy German GO even though Germany is renowned as the country of *Energiewende*. It may be that some German firms have been unaware of the German government's position differed from some of the other member states while UK government's position changed so that firms were aware that a contrasting position was possible.

Gravadlax did stop buying RECI for a time due to negative publicity about the instruments and Gamete was also aware of criticism about the effectiveness of the instruments in incentivising new renewable generation and had instigated a purchasing policy to counteract this, although – if effective - it would benefit the renewable electricity generation targets of countries other than Germany.

This strong pattern of overseas purchase of energy attribute certificates did not emerge for the UK firms. Some firms specified that they had used or would use REGOs⁵⁰⁰ at least at certain points in time (Upwind, Upsilon). Umbra had rejected use of energy attribute certificates from overseas, preferring PPAs with generators. Ursa was just beginning to consider strategic use of RECI. Urban stopped using RECI in the mid-2000s and I could not find out the origin of the RECI. The bank later entered into a PPA with a UK renewable generator in 2015. Umbrella used energy attribute certificates via suppliers rather than direct purchase, reducing its exposure to the origin of the certificates.

I have four comments on these findings. Firstly, looking at the contrasting positions of German and UK governments on the GO, there is strong although not comprehensive evidence of literal replication within the responses of the UK firms and German firms and theoretical replication between the two with regard to the German firms' tendency to procure RECI from abroad. Secondly, that the effect of guidance from Defra in 2008 and then Defra and DECC in 2009 shows that an approach recommended by government can be effective at producing changes, despite not being mandated. This highlights the utility of using institutional theory⁵⁰¹ to understand the power that governments can have through methods other than regulation. The government guidance falls, I would argue, within the normative category of institutions described by Scott (Table 3.1, 2014) which operate through binding expectations.

Thirdly, the positions of successive German and UK governments on RECI do reflect their categorisations as co-ordinated and liberal market economies respectively by Hall and Soskice (2001) in that successive German governments had a more interventionist approach compared to the UK governments. Successive German government closed part of the market by preventing the sale of government-supported GOs while the successive UK governments allowed this to happen, apparently not questioning whether it was right to

⁵⁰⁰ The UK government term for Guarantees of Origin is a Renewable Energy Guarantee of Origin (REGO) (Re-Diss 2012a).

⁵⁰¹ See section 2.5 in the literature review.

allow private appropriation to take place. The concerns of UK government departments Defra and DECC were not about the existence of the market, but about its efficient functioning: whether there was double-counting of emission attributes and whether extra demand would lead to additional renewable capacity (Defra and DECC 2009).

Fourthly, the approach of the German state to GOs also fits with the categorisation of modern nation-state polities by Jepperson (2002) who used a development of institutional theory, called institutional logics (Scott 2014). Jepperson (2002 pp.67-68) described a perception that there was a “*common good*” that persisted into modern German history. This fits with the German government approach of retaining the environmental benefits of renewable electricity (represented by GOs) for the electricity consumers who have paid for them, rather than issuing the GOs to the renewable electricity generators who could then sell them to entities that wish to make a private claim. Jepperson categorised modern nation-state polities according to the table shown below.

Table 31 Modern polity models according to Jepperson (2000, figure 1)

		Collective agency “how statist”	
		Societal	Statist
Composition and coordination “how corporate”	Corporate	<i>Social-corporatist</i> Examples: Nordic countries	<i>State-corporatist</i> Example: Germany
	Associational	<i>Liberal</i> Examples: USA, UK and former British colonies	<i>State-nation</i> Example: France and to a lesser extent other countries characterised as Latin e.g. Italy & Spain.

Looking first at the societal and statist terms, Jepperson described their long history in political economic studies. He sought to redress a muddying of the concepts and terms over the years. He said the two terms describe the locus of sovereignty. In statist polities, sovereignty lies in a centre, discrete from society. Jepperson (2000, 14) used the term “*charismatic*” which indicates the commanding pull that this central organisation exerts on society. In contrast, in societal polities Jepperson (2000, p.67) said “*Authority lies in a ‘public,’ that is, in society. Society retains more collective agency (and legitimacy), through its various modalities of public action (interest groups, ‘public opinion,’ etc.). In this model, government is more an instrument wielded by society, and thus has less independent legitimation and standing. Access to the public sphere is less restricted than under statist authority.*”

The Y-axis dimension is corporateness. A corporate society envisions itself as a single body composed of different parts. Often these parts may be organisations or groupings with different functions. However, society is one entity. This links with the “*common good*” concept referred to earlier. The contrasting polity envisions itself as an association of individuals that may co-ordinate to act but remain distinct. The UK contrasts Germany on both dimensions.

Research on the CSR activities of firms operating in different types of capitalism (Midttun, Gautesen and Gjølborg 2006, Aguilera and Jackson 2010, Kinderman 2009, Gjølborg 2009, Jackson and Apostolakou 2010 and Koos 2012) has not produced a consistent picture. Although Koos (2012) looked at statism as a factor linked to corporate donations and volunteering, the Jepperson categorisation has not been fully explored in relation to CSR and its different dimensions. This research suggests that this could be a new avenue of research that may help to unravel any links between the nature of a polity in which a firm operates and its CSR activities.

In summary, the evidence supports the reviewed literature regarding the importance of regulatory and policy context in the GHG mitigating activities of firms. This led to the replication logic in selecting case studies. The regulatory context in Germany gave rise to a greater tendency for firms to buy energy attribute certificates from abroad than in the UK. Furthermore, my research shows that the policy context such as guidance from governments to firms can be influential even if actions are not mandated as was the case in the UK with the government’s carbon accounting and reporting guidance. I would add the caveat that firms could follow the guidance without incurring extra costs. I would speculate that influence of a voluntary measure may be negatively related to the cost incurred in following it. A final point is that this research has suggested a possible new lens (Jepperson 2000) through which to look at the links between the dimensions of CSR and the nature of the polity in which a firm is operating.

10.10.2 OTHER REGULATION AND POLICIES

The replication logic applied in the case selection strategy was based on the contrasting positions of German and UK governments to RECI/LCECI. However, the cases have been affected by a wide range of other regulations/policies related to either GHG emissions, energy consumption or renewable/low-carbon energy generation. Few regulations/policies have warranted more than a passing mention by firms. This section will focus on those regulations accorded most significance by firms.

Some cases (Upwind telecoms, supermarkets Goshawk, Umbra and Upsilon) reported that changes in government incentives to invest in self-generation had hindered their plans. Concern was less pronounced with Goshawk. Both German banks and Umbrella bank mentioned the impact of Article 8 of the EU Energy Efficiency Directive (2012/27/EU) (European Parliament and European Council 2012) which requires large

organisations to comply with an energy audit obligation. However, only Gamete bank gave any weight to its expected effect on its energy efficiency activities.

Voluntary action by the supermarkets to phase-out HFC refrigerants preceded an international agreement on a phase-out. This echoes the finding of Christmann (2004) that managers' expectations of international standardisation of environmental regulations was a significant factor in higher global environmental performance standards being set by multi-national chemical firms operating in the USA. The action of the supermarkets on their refrigerant emission is considered in section 10.8.

Finally, the UK's CRC Energy Efficiency scheme was mentioned by firms including by German bank Grange. Urban bank and Upwind telecoms were critical that it did not reward use of RECI. Upsilon and Upwind objected to the lack of exemption for self-generated renewable electricity if the firm was receiving public policy support for this. Firms' assessment of the scheme's impact was mixed. In written comments made while the scheme was still running, Urban and Umbrella banks, Ursa B2B financial institution and Upwind telecoms reported it drove down electricity consumption, although Umbra supermarket said the scheme's costs and administrative burden were a distraction from its internally-driven mitigation activities. In interviews, the former Upwind manager who had worked on energy efficiency and energy supply and the Ursa interviewee were also critical. I gave more weight to the interview evidence from Upwind and Ursa made after the scheme had ended as it is possible to reconcile the difference in assessment between documentary and interview sources by speculating that firms may have been reluctant to dismiss the scheme in public documents in case the UK government replaced it with a regulation that the firms liked even less, but this threat had passed once the scheme closed and the interviews were conducted.

In summary, noticeably fewer comments were made by German firms about the regulation of their operations regarding GHG emissions, energy use, self-generation of renewable energy. Comments about the design of the CRC Energy Efficiency scheme – which also applied to German firms' operations in the UK - were mixed. Other policies that affected firms' suite of GHG mitigation activities were government incentives for the self-generation of electricity.

10.10.3 GLOBAL POLICY CONTEXT

Favotto, Kollman, and Bernhagen (2016) argued that firms' environmental CSR response reflected environmental management norms at a global level. Examples from this thesis support this argument, showing events at the UN triggering public pledges of environmental action by firms. I go through these examples before summarising.

The advent of UNFCCC's COP15 meeting in Copenhagen in 2009 was chosen by the then CEO of Upsilon supermarket to announce a suite of flamboyant climate change targets. These came at least a

year after three competitors in the UK had announced carbon neutrality targets.⁵⁰² Tying an announcement to a major event like COP15 can serve to answer journalists' questions of "Why now?" and dilute the impression that a firm is copying its competitors. Whether the event merely affected the timing of an announcement of a decision that had already been made or served an instrumental role in reaching that decision is a question that cannot be answered without insight from staff working at Upsilon at the time.

When members of the Consumer Goods Forum (which included supermarkets Goshawk and Upsilon) announced a phase-out of HFCs, refrigerants with high GWPs, they timed it to coincide with a UNFCCC meeting on the subject in Cancún in 2010. More recently, the Goshawk interviewee said the decision to set a science-based target was aided by the momentum created by the UNFCCC meeting - COP21 - in Paris in 2015. At Ursa B2B financial institution, COP21 at Paris focussed the group's leadership on climate change. The catalytic effect of events such as the COP21 was noted by interviewees at banks Grange and Urban.

UNFCCC events are sometimes disparagingly compared to circuses by environmental NGOs and media commentators, but these instances show they can act as a trigger for businesses to make commitments publicly. They assisted in setting new norms of behaviour – in terms of public pledges at least - for major businesses. This research does not examine the consequences of these commitments. However, staff at Gamete and Upsilon explained that they could use publicly made commitments to make the case internally for action on climate change. In the case of Gamete, the pledge - which I should highlight was not linked to a UN event - resulted in continued use of RECI. Upsilon embarked on RECI use to meet the public pledge linked to COP15 in Copenhagen. Therefore, public pledges produced a clear outcome in terms of RECI use, even if the benefits of RECI use have been questioned e.g. Brander, Gillenwater and Ascui 2018.

In summary, this research generated evidence of the important role of high-profile, global events such as those held by the UN in stimulating public commitments from firms. Actions ensued from these commitments e.g. Upsilon's use of RECI.

⁵⁰² Source cannot be specified without identifying Upsilon.

10.11 NATURE OF THE COUNTRY OF INCORPORATION

No clear picture emerged from the literature review on the effect of the polity characteristics on firms' environmental CSR⁵⁰³. However, evidence covered in section 10.10.1 suggests characteristics of the country may influence regulators and therefore the firms incorporated in their jurisdiction. This is supported by further evidence presented in this section. This begins with a discussion on the *Energiewende* in Germany, followed by a discussion of climate change-related activity among firms in the UK in the 2000s.

While the *Energiewende* or energy transition has been progressed through regulation, it has connections to the 1970s anti-nuclear protests (Evans 2016), so I have located it in this section of the discussion, rather than section 10.10 "Regulatory and policy context". Gamete bank, Geode B2B financial and Gravadlax telecoms repeatedly discussed their activities in the context of *Energiewende*. Although not referencing *Energiewende*, Goshawk Interviewee 2 said that the German focus on environmental issues had encouraged German firms to act and sometimes to take a leading role. This framing of activities in terms of the *Energiewende* was not found in the case of Grange bank. Overall though there was a clear contrast with the UK firms in framing activities as serving a widely-recognised national objective. This support of a national objective resonates with Jepperson's (2000) description of a statist polity - of which Germany was an example. A statist polity has a central, charismatic authority that commands the attention of society and carries the nation along in support of its objectives. How good a fit this is with the history of *Energiewende* is beyond the scope of this thesis, but further investigation would be interesting.

While the firms from the UK did not refer to UK energy and climate change policy in the way Gamete, Geode and Gravadlax referred to *Energiewende*, there was a *zeit geist* among UK businesses which was observed by Interviewee 2 at Upsilon who arrived to work in the UK from Germany in 2008. He was very impressed by the mitigation targets being driven by a generation of CEOs at big UK firms which contrasted with his experience in Germany. Gouldson and Sullivan (2014) in a study of the factors shaping the GHG mitigating activities of major UK supermarkets found that supermarket managers pinpointed 2005-2007 as a pivotal moment when climate change began to rise up their firms' agendas. Several factors coincided: the strengthening scientific consensus on climate change and growing public, media and customer support for action. In addition, campaigning organisations now had the internet as a tool. The EU had shown its commitment to action with the advent of the EU emissions trading scheme and energy prices were rising.

These factors seem likely to apply to German firms too. Indeed, Sullivan and Gouldson (2017) identified 2005-2007 as an era when climate change had a high profile in Germany as well. However, they found

⁵⁰³ Note this is specifically environmental CSR and not environmental management. See section 2.8.13.

that the pressure to act on climate change was counteracted by strong competition on cost among the German supermarkets. The Goshawk supermarket showed a strong emphasis on cost-saving. Goshawk rejected strategic RECI use to focus on energy efficiency/saving. However, other German firms did go on to set carbon neutrality targets – that entail RECI/LCECI/offset expenditure - not long after UK firms.⁵⁰⁴ In section 10.12 I make the case for legitimacy as a driver for these actions.

In summary, the use of *Energiewende* as framing for climate change activity by of three of the German firms is suggestive of the statist characterisation of Germany by Jepperson (2000). However, deep consideration of the history of *Energiewende* would be required to see whether this connection is substantiated.

10.12 REPUTATION AND LEGITIMACY

I turn first (section 10.12.1) to the perspective I have taken on reputation, legitimacy and license-to-operate in analysing the case studies. In section 10.12.2 I demonstrate that some cases undertook GHG mitigation actions that did not seem aimed at a particular stakeholder group, but instead were aimed at maintaining or achieving legitimacy⁵⁰⁵. In the subsequent sections, I present two particular examples. In section 10.12.3, I argue that some of the banks and financial institutions sought to repair damage to their legitimacy from the global financial crisis through GHG mitigation actions and, in section 10.12.4, I show how some firms adjusted their operational environmental management to be consistent with their goods and services. I assume this was to avoid any charge of hypocrisy.

10.12.1 REPUTATION, LEGITIMACY AND LICENSE-TO-OPERATE

Suchman (1995) argued that reputation and legitimacy are largely the same thing but viewed respectively from the perspective of the firm looking outwards or external parties looking at the firm. In analysing the case studies, I have taken the view that reputation is specific to a particular characteristic i.e. a reputation

⁵⁰⁴ In the UK, Urban bank claimed carbon neutrality in y/e 2007. Umbrella bank was well-placed to claim carbon neutrality target but changed its carbon reporting practices in y/e 2008 to fit with Defra recommendations which were not conducive to carbon neutrality targets. Upsilon supermarket set absolute targets in 2009, including a zero-carbon target. Three other UK supermarkets – not covered by this research – had already set carbon neutral goals (source cannot be specified without identifying Upsilon). Turning to Germany, by y/e 2008 Gravadlax telecoms said its main emission source – electricity consumption in its home market – was carbon neutral due to RECI use. Grange bank set a carbon neutrality target in 2008 and Gamete bank in the following year. Grange bank claimed carbon neutrality in 2012 and Gamete bank in 2015.

⁵⁰⁵ See section 2.5 for a discussion of legitimacy.

for being a good employer, for making durable products, or offering the cheapest services. Legitimacy is, as Suchman (1995) describes it, a generalized view of the firm, which does not hinge on specific incidents. Therefore, when firms have discussed the desire for a good reputation - without specifying with whom - I have interpreted that as legitimacy -seeking.

Legitimacy, however, seems to be predominantly an academic term and was infrequently encountered in the case studies. A term sometimes used by firms was *"license to operate"*. Like CSR, *"license to operate"* lacks a hard-edged definition. Moffat et al. (2016, p.480) in a critical review of firms' use of *"social license to operate"* – which I treat as synonymous with *"license to operate"* - describes it broadly as *"...the ongoing acceptance or approval of an operation by those local community stakeholders who are affected by it..."* and links it with legitimacy. Porter and Kramer (2006) took a similar view on license-to-operate, viewing it as permission from a local community or government to undertake an activity with undesirable side-effects. This view of license-to-operate is akin to the view of legitimacy as a resource to be acquired (Suchman 1995). However, in the following sections, some firms talk about license-to-operate in a far more nebulous way without specification of whose good favour they want. I have interpreted this as seeking legitimacy in the sense of Scott (2014, 72) *"...that it is not a specific resource, but a fundamental condition of social existence."*

10.12.2 LEGITIMACY AND CLIMATE CHANGE APPROACH

In this section I review GHG mitigation actions that seem to be aimed at wider societal acceptance of the firm than a strategy that is aimed at a specific group of stakeholders. The examples would fit with one of the views of legitimacy described by Suchman (1995); firms trying to behave in a way that is appropriate or proper with access to resources a coincidental outcome, not the driving rationale.

The telecoms sector has been concerned to head off threats to its legitimacy. Upwind noted that it needed to battle against the perception that ICT was part of the problem of climate change rather than a solution. Since that comment was made in 2008, there has been growing concern about ICT's electricity consumption e.g. Vidal (2017) describes a *"tsunami of data"* using one-fifth of the world's electricity by 2025. ICT firms have been keen to demonstrate that overall their services will lead to net emission reductions when the impact on the emissions of their customers is considered. RECI/LCECI use is, I will demonstrate, part of that calculation.

The Global e-Sustainability Initiative, an ICT industry association, commissioned the SMART2020 report (The Climate Group on behalf of Global e-Sustainability Initiative (GeSI) 2008). GeSI described the report as *"...the first major study identifying the significant contribution the ICT industry can make to creating a low-carbon economy"* (Global e-Sustainability Initiative n.d.). Subsequently #SMARTer2030 report (Accenture Strategy - prepared for Global e-Sustainability Initiative 2015) found that the ICT sector may offer its customers the opportunity to avoid emissions equivalent to 9.7 times the ICT sector's emissions

footprint by 2030. This is where the link with RECI/LCECI lies. #SMARTer 2030 does not say which scope 2 approach has been used. However, the first report - SMART 2020 - suggests that a scope 2 approach that reflects contractual instrument use has been used⁵⁰⁶. Upwind telecoms has a target of helping its customers to avoid at least three times the emissions of the “end-to-end” carbon impact of its business by 2020. It uses a market-based scope 2 approach in this target and Figure 46 shows how important RECI/LCECI use is in its mitigation strategy. The Gravadlax Interviewee used the finding of #SMARTer 2030 study in our interview as an argument against concern about the ICT sector’s electricity consumption. The point that I seek to make is the importance to the ICT sector of being perceived as part of the solution – of being legitimate - and of the relevance of RECI/LCECI use to that.

Moving away from the telecoms sector specifically, Gamete bank and Upwind telecoms considered that helping society transition to a low-carbon society would enhance their reputation. Grange bank said that its license-to-operate would increasingly depend on its contribution to the UN Sustainable Development Goals (UN SDGs). These include a climate change goal (United Nations undated). Grange decided to become carbon neutral to improve its reputation, among other motives. Ursa said if it did not encourage sustainable and responsible development, it risked losing credibility and license-to-operate in the market. I would argue that these are such broad goals that these firms are seeking legitimacy, rather than the approval of a specific stakeholder group. I would also argue that by seeking to contribute towards climate change mitigation and UN SDGs, they are participating in the co-construction of normative institutions.

The desire to protect its reputation was a powerful driver for Upsilon supermarket to find a way to meet its carbon neutrality target. This desire was heightened by recent unrelated reputational damage. This strong drive to protect its reputation contrasted with the drivers coming from stakeholders. While stakeholders (customers, NGOs, investors, sustainability ratings) were given as constituencies with expectations/interests in its climate change-related activities, they did not come across as a strong driver compared to Upsilon’s concern to protect its reputation in general.

In the cases of supermarkets Goshawk and Umbra, the importance of their reputation on climate change did not come across so strongly. They were not bound by an ambitious carbon neutrality target, although Goshawk has recently adopted a science-based target that could be very challenging. However, reputational considerations have had a direct influence on all three supermarkets’ GHG mitigation choices.

⁵⁰⁶ SMART 2020 says (p.26) that one way in which the ICT industry can reduce its emissions footprint is to use as much renewable electricity as possible. I would expect this to refer to RECI use as well as self-generated renewables, given the considerable amount of self-generation that would be required if this referred solely to self-generation.

All three had rejected offset use for reputational reasons. Goshawk had also rejected RECI use due to reputational concerns.

Further evidence came from Umbrella bank's sustainability manager who did not dismiss license-to-operate as a concept but considered that this was the aim of CSR whereas the firm had moved beyond this and was differentiating its business through its work towards sustainability. I interpret this as the first level of activity was to achieve legitimacy while the second was a strategy for competitive advantage.

To summarise, these findings add to the literature on environmental management and legitimacy e.g. Delmas and Montes-Sancho (2010) who argued that firms sought legitimacy through participating in a voluntary environmental management programme aimed at reducing firms' GHG emissions. Delmas and Montes-Sancho (2010) had to infer the reputation/legitimacy driver whereas in this research firms have specified the driver of reputation and I have then made the inference that they are seeking legitimacy because they are seeking a generalized good reputation – not necessarily linked to the approval of specific stakeholders but held more widely within society. In a couple of cases, the term *"license to operate"* was used in such a generalized way that I interpreted it as firms were seeking legitimacy. I have inferred that legitimacy is what the firms described above have been seeking through behaving appropriately or properly and this includes action on climate change.

10.12.3

GLOBAL FINANCIAL CRISIS

Some case studies within the financial sector linked their climate change response to counteracting the sector's negative reputation following the global financial crisis. This extends previous empirical work through firms' confirmation that they do make up for negative publicity in one area of activities with a CSR response in another. I argue that these cases were seeking to underpin their legitimacy by these actions and chose an issue that had a high profile at that time in the societies in which they operated. I present the evidence before integrating it with other research.

Grange bank took the decision to become carbon neutral in 2008, close to the start of the global financial crisis⁵⁰⁷ and also at a time when climate change was a top news item (Sullivan and Gouldson 2017). While the bank's reputation was given as a driver to the carbon neutrality target, this was not linked to the damage to the sector's reputation caused by the global financial crisis, although climate change action more broadly was linked to reputation and the global financial crisis. While Grange made a link between

⁵⁰⁷ 2008 corporate social responsibility report p.28, CDP2009 23.5, 2012 corporate report p.49, CDP2013 3.3b, Interviewee.

climate change action, its reputation and specific audiences (customers, employees, regulators), reputation was also discussed with reference to society as a whole. I would argue that this was legitimacy-seeking in the wake of the global financial crisis.

Gamete bank started to buy RECI in 2008 at the start of the global financial crisis. Interviewee 1 said that besides the perceived emissions benefit, it gave the bank something positive to talk about publicly. Although Interviewee 1 did not make a direct link with the global financial crisis, I infer that a positive media opportunity would have been particularly welcome at that time.

Geode B2B made the link between the global financial crisis, reputation and performance on environmental, social and governance issues. Although Geode specifically mentioned its climate change response, it may have been trying to make its answer more relevant to the climate change questionnaire from CDP that it was answering. I cannot make a connection with specific GHG mitigation actions. It is not clear if there was a specific party or parties with whom a good reputation was sought or what would be the consequence of that reputation. Therefore, I would characterise this desire for a good reputation as seeking to maintain legitimacy (Suchman 1995). Ursa B2B did not mention the global financial crisis.

Urban bank seems to have decided to become carbon neutral in 2007, the year the financial crisis began. It was already buying LCECI. In 2007 it bought offsets to use in y/e 2006, claiming carbon neutrality for that year. It thought its work on climate change would improve its reputation with customers and employee morale. These comments were made at the onset of the global financial crisis, although it did not link to that as a factor.

The link between climate change action and the global financial crisis was explicitly made in 2009 in case of Umbrella bank. The desire to win public and employee support drove the environment up the bank's agenda – although not to the top - and influenced its environmental targets set in 2011. Umbrella had a wider audience for actions than Urban.

In summary, this research shows that two banks attributed a causal link between their response to the negative reputation caused by the global financial crisis and their climate change work. A strong argument can be made to infer that in the case of a third bank, Urban. A weak connection was made by financial institution Geode and will not be considered further. I infer a connection between Gamete's RECI use and the global financial crisis.

To set this into the context of previous empirical work, Graafland (2004) described how the Dutch building sector responded to a price-fixing scandal by introducing a broader ranging code of conduct. Kotchen and Moon's (2012) statistical study of 3,000 publicly-traded US firms from 1991-2005 supported the hypothesis that firms in certain sectors – including banking - engaged in CSR to offset corporate social irresponsibility. They found that irresponsibility in one dimension of CSR e.g. human rights was associated with a greater response on that dimension. This held for community relations and the environment, but not

irresponsibility in corporate governance. This was associated with CSR in most other dimensions. Further research comes from Cornett, Erhemjamts, and Tehranian (2016) who found that after the global financial crisis concerns related to the CSR responses of US banks declined while perceptions of their strengths rose. This suggests a wide-ranging attempt by the banks to improve their standing rather than responding by dealing with issues related to the crisis alone.

My research adds to the findings that negative publicity may be addressed by CSR responses that are broader than or even different to the issue that prompted the publicity by showing this occurring in the European financial sector. This research also differs from the statistical studies of Kotchen and Moon (2012) and Cornett, Erhemjamts, and Tehranian (2016) that have to infer causality in that two banks linked their climate change CSR response to the global financial crisis.

Jo, Song, and Tsang (2015) concluded that they could see the effect of the global financial crisis on the CSR response of financial sector firms in the MCSI Environmental, Social and Governance database which covers 1,859 firms from 36 countries. Their multi-dimensional index of CSR declined significantly one year before crisis but increased significantly three years after crisis, although no statistically significant effect was found for the intervening years. They suggested that there was a delay in response as it took time to ensure managers re-engaged in CSR. My findings show the bank cases responding much more quickly to the crisis than three years hence.

The likely efficacy of the European banks' approach to CSR is supported by the finding of Godfrey, Merrill and Hansen (2008). They found that CSR responses with wider societal benefits were more likely to create goodwill that would cushion US firms from the financial effects of a reputational shock than CSR responses orientated to business partners only.

I do not attribute the behaviour of Gamete, Grange, Geode and Umbrella as seeking a competitive advantage (see section 10.8). I interpret their climate change approach as – in part at least - seeking to shore up their damaged legitimacy, given they did not have a specific audience in mind for their actions. Sullivan and Gouldson (2016) identified 2005-2007 as a pivotal point in climate change action by UK retailers. They point to a backdrop of national, EU and global events that convinced firms that they would be facing increasing energy costs and committed action from governments. This may be why banks chose this issue as this oblique response to the global financial crisis.

In summary this research shows firms within the European financial sector responding to the global financial crisis through their climate change response. This is a strong, explicit connection for two banks and a weak link is made by a B2B financial institution. I infer connections for two more banks.

Furthermore, I interpret the behaviour of four of them as seeking to repair their legitimacy damaged by the global financial crisis.

10.12.4 CONSISTENCY OF APPROACH BETWEEN INTERNAL OPERATIONS AND PRODUCTS

Some firms that offered products related to sustainability stated that they did not want to be seen as slacking in terms of progress in making their own operations sustainable (banks Gamete and Grange, Gravdlax telecoms, B2B financial institution Ursa). For Gamete and Grange, this led to specific actions. Gamete Interviewee 2 considered it important to be seen by stakeholders to use renewable electricity as it financed renewable electricity projects. For Grange bank, this wish for consistency led to a carbon neutral goal. This is not a surprising motivation, but it is not one that I have encountered in the literature. I argue that ensuring consistency would help to maintain their legitimacy by showing their commitment to climate change mitigation was not restricted to sales of their sustainability-orientated products.

10.13 SUMMARY OF CHAPTER

In this section, I analyse those factors that proved influential on firms' RECI/LCECI choices, beginning with the regulatory and policy context regarding RECI, turning to firm's motivations for RECI/LCECI use, organisational characteristics and the actions of individuals within the firm. That influences were found at multiple levels underscores the need for multi-level analysis of CSR, as argued by Aguinis and Glavas (2012). Furthermore, in answering RQ1, I have taken a broad look at the firms' GHG mitigating activities as I assumed firms' choices about RECI/LCECI use would have been made in light of the other options for mitigation and the drivers for them. I therefore look at some of the factors that have influenced use of other mitigating options. The findings of the whole chapter and their relationship to existing literature are summarised in Table 32.

I turn first to the regulatory and policy context regarding RECI that framed my case selection strategy, which I based on the technique of analytical generalisation from Yin (2014). Case selection was grounded on the contrasting positions of successive German and UK governments on GOs. This was found to influence cases' RECI use⁵⁰⁸ as I explain below.

⁵⁰⁸ I do not specify LCECI in the following paragraphs. While LCECI use has formed an important component of some cases' GHG mitigation portfolios, I do not have information on the German government approach to LCECI. The UK government allows publicly-supported CHP generators to sell LCECI that they receive – in the same way as renewable electricity generators can.

The German government's prohibition on private sales of GOs from publicly-funded generators did not dissuade the German cases from strategic purchase of energy attribute certificates for their German electricity consumption.⁵⁰⁹ Instead there was a tendency for the cases that wanted to use energy attribute certificates to source them from abroad (see 10.10.1). I would expect other large firms that want to cover significant proportions of their German electricity consumption with GOs to source them from abroad too. In contrast, UK firms are able to enter into contracts with publicly-supported UK renewable electricity generators or their intermediaries (suppliers) and have GOs from publicly-supported generation assigned to them.

The same course of action cannot be pursued with German publicly-supported generators. For German electricity consumption, firms must either buy energy attribute certificates from generation located abroad or ask their supplier to do so and then bundle the certificates with the commodity electricity.⁵¹⁰ Alternatively, consuming firms or their electricity suppliers could contract with a German generator that does not receive public support. However, most generators in Germany choose to receive public support (Marty 2017). I speculate that these three options could all lead to additional costs (see section 11.2.1 for a summary).

Regarding UK electricity consumption, firms have the option of entering into an electricity supply contract – a Power Purchase Agreement - directly with a publicly-supported generator. PPAs can be a good deal financially for the consuming firm, as this research has shown. If firms negotiate for energy attribute certificates to be bundled with the electricity, this may give them access to no- or low-cost RECI. Currently though PPAs are not the commonest type of RECI used by firms (see Table 2), hence firms may be paying a premium for unbundled energy attribute certificates or a renewable or low-carbon tariff from their suppliers.

Aside from the contrasting approach of the German and UK governments to GO, there have been other regulations/policies that have affected RECI/LCECI use. The UK government guidance on carbon accounting (see Table 3) has been influential and it has led to different responses from UK firms. The Gravdax Interviewee referenced some countries' carbon neutrality targets which he saw as linked to RECI/LCECI use.

Turning to firms' motivations for RECI/LCECI use, the foregoing discussion shows that it cannot be assumed that RECI/LCECI cost more than default or standard electricity offerings e.g. the contracts

⁵⁰⁹ To note that not all the German cases wanted to use energy attribute certificates strategically; Goshawk supermarket chose not to do so.

⁵¹⁰ See Table 2 Electricity contractual arrangements and self-generation for a description of instruments.

reported by Goshawk and Ursa. So, there may be a financial case for choosing RECI/LCECI. However, reputational and moral motivations were predominantly given by firms either for their RECI/LCECI use specifically or GHG mitigating activities generally. These findings are summarised in Table 32 in the next chapter.

Some people may be sceptical about firms acting morally. However, I have taken what firms said at face value as to assess these statements is beyond the scope of this research. Regarding reputation, I have argued that the drive for a good reputation with unspecified parties is motivated by an unarticulated wish for legitimacy. While firms may seek a good reputation with specific stakeholders, the emphasis here is on how the firm's behaviour is seen overall, following an institutional theory view of legitimacy (Suchman 1995). Examples of this in relation to climate change activities have been drawn from the case studies.

The reaction of the banks to the global financial crisis shows that firms may respond to negative press with a response that is unrelated to the issue that sparked the controversy i.e. their climate change approach. This research adds to the existing literature as it covers the German and the UK financial sectors. Furthermore, the links between the global financial crisis and their climate change response were made by the two banks concerned and do not have to be inferred. Some firms also sought to maintain consistency between their promotion of environmental management products and their own internal practices. This is not an unexpected driver, but I have not seen it articulated in previous research. RECI/LCECI use and the market-based scope 2 approach have enabled telecoms firms to present a narrative that they are part of the climate change solution, despite the electricity needed to meet our increasing appetite for digital data. Overall, a link between the wish to maintain or re-gain legitimacy and GHG mitigation is demonstrated.

Regarding RECI/LCECI use specifically, this was linked to some decisions that I have attributed to legitimacy-seeking. The telecoms sector has already been given as an example. RECI use has been crucial to the mitigation approaches of Grange, Upsilon and Urban, and the narrative presented by Gamete, all of which I have attributed to legitimacy-seeking. As RECI/LCECI use facilitates setting and meeting big reduction goals such as a carbon neutrality target or a science-based target, this makes it a useful tool for those firms seeking to maintain or improve their reputation/legitimacy by demonstrating they are playing their part in societal goals. I argue that where the RECI/LCECI is motivated by reputation/legitimacy, RECI/LCECI use is sensitive to changes in regulative and normative institutions that legitimise/delegitimise their use.

In this regard, I want to highlight the role of CSR ratings agencies. The main contribution to knowledge of this part of the thesis has been the demonstration of a causal link between the scoring of rating agencies and some GHG mitigating activities. In two instances, this related to RECI use. This illustrates the power of the raters in guiding firms' activities. Rating NGO CDP has put its full weight behind a market-based scope 2 approach. With The Climate Group, it leads the RE100 group of firms committed to 100% renewable electricity use. Furthermore, CDP has incentivised the setting of science-based targets.

Science-based target methodologies do not recognise offset use but do recognise use of RECI/LCECI and the market-based scope 2 method.⁵¹¹ I anticipate this, along with the legitimisation of the market-based method by the GHG Protocol, will drive up RECI/LCECI use.

I now turn to organisational characteristics of a technical nature that show why RECI/LCECI use appealed to some firms. RECI/LCECI were not a difficult mitigation option to implement in contrast to self-generation of electricity where difficulties were encountered by some of the cases. Regarding energy efficiency/saving, five cases raised the issue of a lack of projects remaining for them to take. I did not probe if this was an absolute lack of opportunities or a lack of opportunities that met their internal criteria for implementation as the first of those two options implies unlimited resources - financial and non-financial – with which to execute projects, and that is unrealistic.

Four of these five firms – two banks and two B2B financial institutions - were of the same type: office-based with IT infrastructure. The fifth also had a telecommunications network. I checked the electricity/energy consumption intensities of the banks and B2B financial institutions, working on the assumptions of (a) common business models and (b) that if usual mitigation actions had been implemented, then the intensities of firms and their peers would converge. The graphs of the energy and electricity intensities of the four banks normalised by full-time equivalent employee showed convergence⁵¹². Convergence in electricity consumption per employee was also seen with the intensities of the two B2B financial institutions⁵¹³. The convergence in intensities does support the point that commonly-used energy efficiency/saving methods have been implemented. This illustrates the usefulness of RECI/LCECI to firms, a point made most clearly by Interviewee 1 at Gamete; *“This is the biggest way to reduce emissions for a financial institution”*.

A relevant finding for policy-makers is that while the B2B financials showed a marked decline in electricity consumption intensity, only one of the four banks finished the period of the graph with a lower electricity intensity than when it started. The banks' energy intensity graph was only very slightly better with a second firm also showing an overall decline although only very slight. The absence in some cases of a marked decline in electricity/energy consumption intensity is useful data for policy-makers seeking greater

⁵¹¹ Science Based Targets initiative n.d.b.

⁵¹² The four banks' electrical intensities ranged from 6.0-7.5MWh/FTE employee in y/e 2015. Three of the four banks converged on an energy intensity range of 8.9-10.2 MWh/FTE employee in y/e 2015, although the fourth – Gamete - had a much higher energy intensity. See section 6.1.7 for a discussion on the reason for this.

⁵¹³ The intensities converged to about 10.0 MWh/employee. Please note that for one firm – Geode - the denominator was FTE employee and for the second – Ursa - it was average number of employees in year (assumed to be mean average).

GHG mitigation from these types of firms and could be investigated in tandem with an assessment of the availability of new mitigation options for office-/ICT-based firms to implement.

To return to contractual instruments, a further point to make is how the availability of money for investment interacts with the cost-benefits of the different mitigation options. As already mentioned, RECI use may not incur a premium (data is unavailable for LCECI), but it may do so – and it is an ongoing expense if firms want to keep reporting reduced emissions. Yet this expenditure could be easier to find than the investment needed for energy efficiency/saving and self-generation of energy. As Gravadlax said when explaining the key role that RECI would play in its new climate change strategy, *“Higher investments into energy efficiency measures may also be taken into consideration, but is expected to require much more money”* (CDP2016 CC5.1a) – and this is from a firm that spends about a million Euros a year on energy attribute certificates.

Figure 11 and Figure 51 illustrate well the scale of reported emission reductions that RECI can deliver. These figures show the estimated lifetime tCO₂e savings of the mitigation actions reported by Gamete bank and Upwind telecoms respectively versus the financial savings that the mitigation actions are expected to deliver over their lifetimes minus the investment costs. Figure 51 also shows the attractiveness of RECI versus the self-generation of low-carbon energy. The latter option does not offer the scale of reported emission benefits of RECI nor the financial savings of several energy efficiency/saving projects.

Finally, to complete this summary of the influence of factors on RECI/LCECI use with a reflection of the role of the individual. This research shows top management can have a strong influence on GHG mitigation strategy. Staff lower in firms' hierarchies can also be influential. However, the role of environmental champions in RECI use was not as clear-cut as research in a North American context indicated. In the North American research, environmental champions advocated for RECI use. I found environmental champions in two European firms who had concerns about the effectiveness of energy attribute certificates on GHG mitigation.

I now want to summarise the drivers and barriers to other mitigation options, turning firstly to self-generation of electricity. This was not widely-used by most cases, although Umbra was an exception with an ambitious goal for self-generation. The Umbra Interviewee wanted to cut costs and safeguard its power supply by becoming self-sufficient in electricity and already had extensive PV installations. Beside Umbra, other cases, i.e. Upwind and Upsilon, had had big ambitions for self-generation, but a range of barriers had hindered the implementation of generation equipment from the unsuitability of the buildings on which it would be installed to reduced fiscal incentives. Other cases had tried smaller scale installation with mixed results. Overall, barriers to self-generation were the financial case, technical/specialist knowledge and the suitability of locations for installation. In terms of drivers, a moral motivation was given by some cases, due

to the GHG mitigation benefits, although there was also security of supply, protection against price volatility and creation of a new income stream in selling electricity surplus to firm requirements.

Turning to other types of mitigation, energy efficiency/saving by firms was motivated by cost-saving in most case study firms, although it was not given as a motivation by two firms. Among the motivations given were regulations, reputation and legitimacy, stakeholders, and individuals within the firm. Refrigerant use was only a significant source of emissions for the three supermarkets. Reducing fugitive emissions was motivated by regulatory requirements, achieving self-set mitigation targets and the public pledge to reduce emissions made via a trade association. Finally, regarding offsets, some firms rejected offset use due to concerns about their reputation. However, they were used by firms that have or had carbon neutrality targets, which had a mixed set of drivers from organisational values to regulation and competitive advantage.

A summary of all the findings for RQ1 is given in the table below. These findings from RQ1 provide the context for RQ2 where I look at the effect of RECI/LCECI use on other GHG mitigation methods.

Table 32 Summary of factors investigated to answer RQ1, findings and relationship to literature

Factor	Findings	Relationship to evidence in literature review
Individuals in the firm	Evidence of the influence of firm leaders on specific and ambitious policies on GHG mitigation and of managers on specific aspects of GHG mitigation including RECI/LCECI use.	Adds to evidence that firms' leadership and managers can be a positive influence on the GHG mitigation activities of firms, depending on their views.
	Managers who personally supported action on climate change used their firms' public promises to act as leverage for further action.	I have not encountered this in previous research on environmental management. This finding supports Cyert and March's behavioural theory of the firm (1963), seeing it as a coalition of groups seeking to advance their different agendas.
International experience	I could not discern any influence of this factor on firm's GHG mitigation choices.	Does not support conclusion of the literature review that this factor is influential. However, cases were largely similar in their international experience. A pattern might have been apparent if there had been more diversity.
Business sector	Does play a role in some types of GHG mitigating activities. Supermarkets' physical footprint and range of emission sources offered more scope for mitigating projects. Some office/ICT-based firms whose opportunities for GHG mitigation were concentrated in the field of energy efficiency/saving considered these opportunities were drying up. RECI/LCECI were useful for these firms, but they were used by other firms too.	Adds to a limited body of research on the association between sector and environmental management.

Available finance and cost-cutting	Availability of investment and payback period influences which projects are undertaken. Some energy efficiency and renewable energy generation projects required investments that were considered too large by some firms, even though they were willing to pay the ongoing cost of RECI/LCECI.	Adds to evidence that available finance and cost-saving are important influences on GHG mitigating activities.
Non-financial resources and capabilities and technical issues	5 firms had difficulties with the implementation of energy generation projects, incl. a lack of related resources and capabilities. Assertion by 5 firms - predominantly office-/ICT-based operations - that they were running out of energy efficiency/saving options to implement. No related issues raised about RECI/LCECI.	Adds to evidence that non-financial resources and capabilities are important influences on environmental management.
Stakeholders - investors	Investors were key supporters of climate change activity for some cases. Investor interest was more noticeable in the 2010s.	Adds to evidence that investors can drive climate change-related action.
Stakeholder - NGOs	NGOs have been significant influences on some GHG mitigation choices made by some firms. The GHG Protocol has had significant bearing on RECI/LCECI use.	Prior research grouped external stakeholders in various combinations, making it difficult to assess the association between a type of external stakeholder and environmental management. Using a case study method, I have been able to understand the influence of different stakeholders.
Stakeholders – employees	Several firms believed their GHG mitigation work was linked to employee satisfaction, although evidence of this specifically changing what a firm did was very limited.	Adds detail to limited literature on employees' influence on firms' environmental management.
Stakeholders - customers	B2B firms started to use RECI/LCECI strategically later than other strategic users that were closer to the consumer (except for Upsilon supermarket). Customer interest in the environmental management was not exclusively located among residential consumers. I found greater motivation to act on climate change coming from residential consumers in the 2000s than subsequently.	Adds to research on the effect of consumer proximity which has focussed on US firms. Adds to literature on firms' perception of interest among customers on climate change.

Stakeholders - general	Evidence from 4 firms of stakeholder interest in climate change action declining from the mid-2000s to the 2010s. Could be related to a decline in stakeholder interest after the failed UNFCCC COP15 talks in Copenhagen in 2009 (Gouldson and Sullivan 2014).	Makes the argument for situating results concerning stakeholders in the context of the events when the research was conducted. This strengthens call from Aguinis and Glavas (2012) for multi-level research.
CSR ratings agencies	Firms make the causal link between some of their mitigating activities and the scoring of rating agencies. Shows firms do more than improve their data-gathering process to improve their CSR ratings. Firms were willing in some instances to be guided by CDP in their GHG mitigating activities. Two instances related to RECI use. Shows the power of rating agencies and justifies questioning of the direction in which they are guiding firms and their governance processes.	Distinguishing features of this research are the causal links that firms themselves have made versus the inferences that statistical studies have to draw and the data on the nature of the changes that firms are willing to make.
Other firms	2 supermarkets and 3 banks act with their peers to co-construct what is legitimate behaviour regarding mitigation with further examples of behaviour from other firms that is not readily explained by seeking a competitive advantage with customers, but which may be explained by legitimacy-seeking.	Provides further evidence to support using institutional theory to understand firms' behaviour.
Organisational values	Some cases volunteered moral motivations for RECI/LCECI use and for climate change activities more broadly, although this was sometimes alongside other drivers e.g. reputational and economic motivations.	Extends prior research findings on organisational values motivating North American firms and German SMEs to use RECI by finding instances among larger German and UK firms too.

Regulatory and policy context	Regulatory context in Germany led to firms buying RECI from abroad. The significance of Climate Change Levy on renewable and low-carbon electricity use could not be established. Guidance from UK government on carbon accounting and reporting was influential on RECI use even it was not mandated. Comments about the potency of the CRC Energy Efficiency scheme were mixed. Changes to renewable electricity generation support programmes had a significant effect on firms' plans for self-generation. Noticeably fewer comments were made by German firms regarding the regulation of their operations.	Supports the finding of the literature review about the importance of regulatory and policy context in the GHG mitigating activities of firms.
Global regulatory context	Evidence of the important role of high-profile, global events such as those held by the UN in stimulating public commitments from firms. One resulting activity (RECI use by Upsilon) was identified.	Supports argument of Favotto, Kollman, and Bernhagen (2016) that firms' environmental CSR response reflected environmental management norms at a global level.
Nature of country of incorporation	Typology of modern nation-state polities by Jepperson (2000) may explain the use by 3 German firms of <i>Energiewende</i> to frame their climate change activities.	Suggests a new line of research testing the relevance of the Jepperson (2000) typology to environmental management.
Reputation and legitimacy	I argue the drive for a good reputation not linked to the approval of specific stakeholders is the unarticulated wish for legitimacy. This explains why some banks saw their response to climate change as a means of countering negative perceptions of the sector in the aftermath of the global financial crisis. RECI/LCECI use were linked to some decisions that I have attributed to legitimacy-seeking.	Adds to the literature as finding applies to German and UK financial sector. Also adds in that links between an environmental CSR response and the global financial crisis were made by the firms and do not have to be inferred.
	Some firms changed their operations to ensure consistency between them and their sustainability-related products and this was a motivation for some GHG mitigation activities. In 2 instances, this involved RECI use.	This finding is not unexpected, but I have not seen it articulated in previous research.

11 DISCUSSION OF RESEARCH QUESTION 2

This second discussion chapter answers research question two (RQ2);

“For those firms that have used renewable and low-carbon electricity contractual instruments, what effect has this had on other GHG mitigating activities?”

I will begin this section with general comments on the nature of my methods and their effect on the nature of my findings. Then I turn to findings relating to individual firms before moving onto general comments on the circumstances in which use of these instruments may lead to displacement of other GHG mitigating activities, a discussion of the interaction with offset use, and finally the implications of the research for regulators and GHG Protocol partnership. Findings for individual firms are summarised in Table 34 at the end of this chapter.

11.1 GENERAL COMMENTS ON THE NATURE OF MY METHODS

I have addressed RQ2 using numerical data, documents and interviews. I have found or constructed series of emissions and/or energy/electricity consumption per unit of activity that I have plotted against the percentage of electricity or energy consumption covered by RECI/LCECI and I have looked for patterns in changes in the emissions/energy/electricity intensity and the percentage covered by RECI/LCECI.

The cases have shown that when they do decide to use RECI/LCECI for CSR reasons (e.g. as opposed to solely looking for the cheapest electricity supply), they typically do so to a significant extent (e.g. banks Gamete and Grange, telecoms Upwind and Gravadlax, supermarket Upsilon). I would therefore argue that one would expect to see an impact on emission/energy/electricity intensity figures if displacement of other GHG mitigating activities was occurring.

However, there may be alternative explanations for a change in intensities e.g. the firm's business model has changed and it now has more emission sources relative to the unit of activity that is the denominator. Another rival explanation could be that data collection has become more comprehensive and there are fewer excluded sources of emissions or energy-using equipment. Furthermore, if intensity metrics are falling while the firm is using RECI/ LCECI, I cannot state that displacement has not occurred as these intensity metrics may have fallen faster in the absence of their use. Intensity figures need to be evaluated with the qualitative evidence to decide between explanations. Consequently, my findings are almost exclusively couched tentatively.

11.2 FINDINGS

Brander et al. (2013) and Brander et al. (2015) raised concern that the reflection of RECI/LCECI use in scope 2 emission figures may disincentivise firms from undertaking other GHG mitigating activities. In a

development of this argument, Brander, Gillenwater and Ascui (2018, 31) said “*The purchase of contractual emission factors is not a benign activity, as the opportunity cost is to forgo genuine mitigation activities that could otherwise have been funded*”. In this section, I look first at the issue of opportunity costs in financial terms and then the effect of RECI/LCECI use on decisions about GHG mitigating actions.

11.2.1 FINANCIAL OPPORTUNITY COST OF RECI USE

For Gamete bank, Geode B2B financial institution, Gravadlax and Upwind telecoms and Umbra supermarket, it was possible to get an indication of any financial opportunity cost of RECI by looking at the cost of other GHG mitigating projects implemented by the firms and the cost of offsets. In Table 33 I have taken the RECI expenditure for one year and the percentage of S1+location-based S2 emissions for that year that RECI use has been estimated to have avoided. I then assess the effect if RECI expenditure had been re-allocated to other mitigating projects. For this, I have looked at all the mitigating projects reported in CDP2013-2017. Using the ‘RECI expenditure budget’, I worked my way through the list of mitigating activities starting with those that mitigated the most p.a. Sometimes, there was a portion of this expenditure that was ‘unspent’ as there was not enough to ‘buy’ another mitigating project. LCECI is not covered by this line of investigation as only Gravadlax and Upwind have reported using LCECI and this pre-dated the CDP responses that I used for this part of the research⁵¹⁴.

The limitation to this approach is that it only considers mitigation options that have met any investment criteria of the firm, for example, payback period, and have been implemented. A three- to five-year payback criterion was typical⁵¹⁵. Therefore, a change in criteria might bring a new set of possible mitigating activities. Furthermore, it assumes that there are similar projects to those implemented that could have been instigated if finances were available. This may not be so as among those cases for which I have this cost data, Gamete, Geode and Upwind said that they were running out of mitigating projects to implement. Therefore, this line of enquiry only serves to give a sense of scale of what re-allocated money might be able to buy.

⁵¹⁴ I used CDP2013-2017 data for this analysis as the relevant question - CC3.3b - had a highly-structured data input field that made analysis easier. However, I did see a cost figure for RECI use for Geode in CDP2012 3.3b so have also used that.

⁵¹⁵ Payback periods: Upwind - three years for energy and GHG emission projects, extendable to five years for individual projects within a programme; Grange - very difficult to get funding for projects with payback in excess of five years; Gravadlax - three years; Ursa - no specific payback period required; Goshawk - four years for energy efficiency projects; Upsilon - three years; Umbra - period confidential. I did not have this data for Gamete, Geode, Umbrella and Urban.

A further limitation to this approach is that the offset reductions shown - like RECI - require on-going expenditure to be maintained year after year while the internal mitigating projects require one-off expenditure that lead to on-going savings. However, the lifetime of some internal mitigating projects can be difficult to quantify. For examples of this difficulty, see the methodology section 5.7.2.4, Figure 11 and Figure 51. Therefore, only a picture for a year-long period is presented in the table.

Table 33 Assessment of financial opportunity cost of RECI use

Firm	RECI expenditure in y/e (given in brackets)	Estimated emission savings attributed to RECI use in tCO ₂ e in y/e	Column 3 as % of S1+location-based S2 emissions in y/e	Estimated annual savings after re-allocation of cost to other internal mitigating activities - tCO ₂ e	Column 5 figure normalised by S1+location-based S2 emissions - tCO ₂ e in y/e	Estimated annual savings after re-allocation of cost to offsets - tCO ₂ e	Column 7 figure normalised by S1+location-based S2 emissions tCO ₂ e in y/e
Gamete	590,000€ (2012), 551,700€ (2013), 603,860€ (2014), 700,000€ (2015)	141,474 (2012)	53% (2012)	3,638	1% (2012)	113,852 (based on mean 2012 offset price of \$5.9/tCO ₂ e)	43% (2012)
		No data for 2015 expenditure of 700,000€	No emission figure attached to this purchase.			241,504 (based on 2015 mean offset price of \$3.3/tCO ₂ e)	143% (2015)
Gravadlax	1,000,000 € (2012)	1,400,000 (2012)	46%	17,530	0.4% (2012)	270,157 (based on mean 2012 offset price of \$5.9/tCO ₂ e)	6.8% (2012)
Upwind	£0 (2014), £0 (2015), £30,000 (2017)	1,002,711 (2014), 1,061,970 (2015), 33,000 (2017)	81% (2014) 0.03% (2017)	10 (2017 expenditure use)	<1%	12,835 (based on 2016 mean offset price \$3.0/tCO ₂ e)	1.0% (2017)

Goshawk	4,000 € (2013), 0€ (2014), 0€ (2015)	2,400 (2013), 4,291 (2014), 454 (2015)	0.08% (2013) 0.02% (2015)	0	0	816 (based on 2013 mean offset price \$4.9t/CO2e)	0.03% (2013)
Umbra	£0 (2017)	21,933 (This is an incremental extra purchase of biomethane supplied via the gas grid and renewable electricity PPA)	3%	0	0	0	0%

Notes and sources: for sources, see section 14.3. For the expenditure figure for Gamete in y/e 2015, CDP reports were not the source for this figure. I used the 2015 GRI format report indicator G4-EN31 which did not have an emission reduction figure associated with the purchase. Where I have more than one year of RECI expenditure data, I have only completed the table for the first and latest years of expenditure to avoid cluttering the table. The source of mean average offset prices was the series the State of the Voluntary Carbon Market authored by Peters-Stanley and Yin (2013), Peters-Stanley and Gonzalez (2014), Hamrick and Goldstein (2016), Hamrick and Gallant (2017). For Upwind, for the y/e 2017 RECI expenditure, the latest available mean offset price were used.

For Gamete, the portion of 590,000 € RECI expenditure in in y/e 2012 not used to “buy” other mitigating actions was 1,160 €.

For Gravadlax, the portion of 1,000,000 € RECI expenditure in y/e 2012 not used to “buy” other GHG mitigating actions was 0 €.

For Upwind, the portion of £30,000 RECI expenditure in y/e 2017 not used to “buy” other GHG mitigating actions was £1,000.

For Goshawk, the portion of 4,000 € not used to “buy” other GHG mitigating actions was 0 €.

Umbra’s RECI purchase was reported in aggregate with the purchase of biomethane.

This table is reproduced in the accompanying A3 portfolio.

To go through the background to the table before assessing the findings, Gamete bank has principally bought energy attribute certificates. Both GO and REC purchases have been reported to CDP. The GO and REC markets are linked as the certificates are traded as equivalent and only one may be issued per MWh of electricity (Klimscheffskij 2011). Supply has tended to exceed demand in the GO market (Kuronen and Lehtovaara 2017) and therefore I would assume in the REC market too. Gamete has introduced a procurement criterion to incentivise extra capacity, only buying from generation facilities less than seven years old. This criterion was later tightened to less than six years old. This criterion may explain the difference in price paid by Gamete for its energy attribute certificates compared to Gravadlax⁵¹⁶. However, despite Gamete's intentions, it remains an open question whether their RECI purchases are more effective mitigation choices than offsets that are created by applying a defined assessment methodology (Hamrick and Gallant 2017) e.g. ISO14064-2.

The Gravadlax purchase referenced above is for RECs purchased in y/e 2012. The Interviewee said the following year Gravadlax stopped buying them for its electricity consumption in Germany because supply on the market exceeded demand, so Gravadlax did not see an environmental benefit. The publication of the GHG Protocol's scope 2 guidance (Sotos 2015a) had renewed Gravadlax's interest in their use and the Interviewee said the supply-demand balance had improved.

Upwind's RECI use in the UK has been cost-neutral due to the Climate Change Levy exemption, which was being phased out. Therefore, there may be more non-zero figures for RECI costs reported in the future depending on the deals Upwind can negotiate. The £30,000 reported above seems to represent RECI (type not specified) that applied to a relatively small quantity of electricity.

The cases of three firms are not considered further. Goshawk's RECI purchases have been ad hoc in nature. The 4,000 € expenditure shown was just for two buildings. RECI has predominantly been used because it was the best deal financially, so Goshawk's case is not considered further. Umbra entered into a PPA for renewable electricity for which there was no premium. Therefore, this case is not considered further.

Finally figures for Geode have not been added to the table. Geode bought RECI for electricity consumption at a data centre at a cost of 25,071 € (CDP2012 3.3b). In CDP2013 (3.3b) their RECI was specified as GOs and the cost was given as 0 €. It is questionable whether 25,071 € represents the extra cost of procuring RECI or the cost of RECI plus the commodity electricity. As I could not clarify this with an interviewee, I have not considered this further.

⁵¹⁶ A further procurement preference probably plays a part too; Gamete has preferred run-of-river hydropower energy attribute certificates due to their scope 3 emission.

Turning to qualitative data on RECI costs, Grange and Umbrella banks paid a premium for RECI but viewed it as negligible. Like Upwind, Umbrella had decided to continue to use RECI despite the end of the Climate Change Levy exemption for electricity consumption covered by Levy Exemption Certificates. Ursa has had a long-standing PPA with a renewable electricity generator that was considered a good deal financially.

Returning to Table 33 to assess the findings for Gamete and Gravadlax, this table shows that the redeployment of funds from RECI use to internal mitigating projects might have led to small, ongoing annual savings, but potentially significant one-off savings if RECI funds were diverted to offset use. The scale of these depends on offset prices in the voluntary emission reduction market which have varied considerably. Given the supply-demand balance in the GO market to which the REC market is linked, the emissions benefit offered by offsets would be more certain, even though Gamete has imposed a purchase criterion to address this issue. However, although offsets can be reported alongside emission figures under the GHG Protocol's *Corporate Standard*, they cannot be deducted from scope 1, 2 or 3 emissions. This does not make them an attractive prospect for firms unless they are going for a carbon neutrality target, which is not covered by the *Corporate Standard*.

This finding reinforces the argument of Nordenstam, Ilic, and Ödlund (2018) that the attributional GHG accounting approach (e.g. the GHG Protocol's *Corporate Standard*) and the consequential accounting approach (the foundation of offset methodologies⁵¹⁷) can lead to different GHG mitigating choices in certain circumstances. This is problematic because while the consequential approach considers the bigger picture, it is also technically complex to enact as illustrated by Nordenstam, Ilic, and Ödlund (2018).

In summary, RECI use does not always entail a cost for firms operating in Europe. Even if it does, it may be small compared to other operating costs. In the cases of Gamete and Gravadlax, their RECI expenditure – if redeployed to internal GHG mitigating projects - would have yielded relatively small ongoing emission benefits as Table 33 shows. However, re-deployed RECI expenditure would have led to substantial one-off emissions reductions in the form of offsets. In contrast, the RECI money has been spent in an energy attribute certificate market in which supply exceeds demand as represented by cancellations, so while the reported reduction in emissions was large, the benefit in terms of incentivising extra renewable generation capacity is doubtful. Gravadlax itself called into question the benefits in 2013, although the firm considers that demand and supply were becoming better matched. To counter the issue of an excess of supply to demand, Gamete had introduced a procurement criterion, but the effectiveness of this is not known. Overall, this shows that the concern about the financial opportunity cost of RECI use

⁵¹⁷ Brander (2016)

by Brander, Gillenwater and Ascui (2018, 31) is justified, but will not apply to every RECI user and cannot be assumed.

11.2.2 IMPACT ON GHG MITIGATION CHOICES

RECI use renders the emission benefits of electricity efficiency/saving invisible while LCECI use reduces the impact of electricity efficiency/saving in organisational GHG inventories. I argue that because emissions from different scopes are frequently aggregated under a single target, RECI/LCECI use could have a knock-on effect on GHG mitigating activities other than electricity efficiency/saving. The table below summarises my findings on the effect of RECI/LCECI use on GHG mitigation choices. A discussion on offsets is considered separately in section 11.2.4.

Table 34 Summary of data and findings for research question 2 for individual firms

This table is reproduced in the accompanying A3 portfolio.

Firm	Why did the firm buy RECI/LCECI?	What was the role of cost-saving in GHG mitigation choices?	What was the staff view of RECI/LCECI?	Has RECI/LCECI use led to reduced focus on other GHG mitigation measures (excl. offsets)?
Gamete - bank	Began using RECI at start of global financial crisis. Reputational driver – a good news story.	Not mentioned in interview. Perception that no significant energy saving projects were left to be implemented.	Positive. Procurement criterion imposed on energy attribute certificates to boost ability to drive new renewable generation capacity.	<p>Indicated by high energy intensity cf. other banks. RECI budget seems more protected than energy efficiency budget. New mitigation actions other than RECI use total <500 tCO₂e p.a. 2012-2016 i.e. very small.</p> <p>Counter-indicated by compliance with EU Energy Efficiency Directive (2012/27/EU) using ISO 50001⁵¹⁸. Interviewee adamant no significant emission saving projects to be displaced by RECI use. Emission, electricity and energy intensities declined post-corporate restructuring, despite high % electricity covered by RECI. Electricity intensity was comparable with other banks.</p> <p>On balance, evidence suggests RECI use may have aided a reduction in focus on other GHG mitigating activities at a time</p>

⁵¹⁸ Requires continual improvement in energy management system and energy performance (International Organization for Standardization (ISO) 2018b, Lazarate 2016).

				when financial stress could have made it difficult to find investment for them.
Grange - bank	Carbon neutrality target drove RECI use. This goal in turn was driven by moral and reputational concerns.	Cost-saving was a clearly stated driver of energy efficiency/saving.	Positive.	Not indicated by intensity graphs for emissions and electricity/energy. Evidence does not suggest a reduction in focus.
Urban - bank	Regulation first encouraged and later discouraged RECI/LCECI use through changes to the financial context and I infer to reputational advantages.	Global financial crisis sharpened focus on costs. I infer cost-saving was a factor in firm's move away from RECI/ LCECI use which may have saved the firm money.	From sequence of events, I infer that staff perceived reputational and financial benefits of RECI/LCECI use had diminished.	A renewable electricity PPA has not been reflected in bank's emission figures. Period of GO and CHP GO use very short. Emissions and electricity/energy intensity graphs do not indicate an effect of RECI/LCECI use. Evidence does not suggest a reduction in focus.
Umbrella - bank	Moral course of action to use RECI.	Cost-cutting has been a strong motivation in wake of global financial crisis. CRC Energy Efficiency regulation has imposed costs and driven energy efficiency.	Positive.	Stopped reflecting RECI use in emission figures following change in reporting guidance from UK government in 2008 but continued to buy large quantities and report in MWh terms. Emission, electricity and energy intensity graphs do not indicate an effect of RECI use. Evidence does not suggest a reduction in focus.
Geode – B2B financial institution	Reputational and moral motivations were the only identifiable drivers of its GHG mitigating activities.	No references were found to the influence of cost-savings on Geode's GHG mitigation choices.	No interview conducted.	Not indicated by electricity intensity figures and explicit commitment to energy efficiency/saving.

				<p>Energy efficiency was included within a dedicated budget after “green power” and offset expenditure, suggesting it had had a lower priority but that this had changed.</p> <p>Evidence does not suggest a reduction in focus.</p>
Ursa - B2B financial institution	<p>Long-standing renewable electricity PPA has been cost-competitive and Ursa wanted to maintain a renewable supply.</p> <p>CDP has been steering Ursa towards further RECI use through its incentivization of science-based targets i.e. reputational driver.</p>	Energy efficiency/saving reduction measures mainly driven by cost-saving motivation.	Positive	<p>Interviewee could foresee possibility of borderline projects not going ahead because they were not that attractive financially and driver of GHG emission reductions was missing due to RECI use.</p> <p>RECI use could in theory in future lead to a reduction in focus.</p>
Gravadlax – telecoms	Had a moral motivation. Wanted to be carbon neutral. Carbon neutrality targets set by governments and legitimisation of market-based S2 by NGOs have also encouraged RECI use.	Cost-saving clearly stated driver of energy efficiency/saving. Projects had to compete for investment with other projects e.g. network enhancements to fulfil increasing demand for bandwidth and speed of transmission.	Positive, but heavily influenced by view of external parties on RECI.	<p>Could be indicated by emission and electricity/energy intensity graphs, but there is an alternative explanation regarding progress on energy efficiency.</p> <p>Not indicated by some of group having implemented ISO 50001. Interviewee certain that RECI has not taken focus from energy efficiency/saving as driven by cost.</p> <p>On balance, evidence does not suggest a reduction in focus.</p>

Upwind – telecoms	Reputational and moral drivers to its GHG mitigating activities. Use of energy attribute certificates was facilitated by Climate Change Levy exemptions. PPAs reduced exposure to rising prices.	Clearly stated that energy efficiency/savings were driven by cost, but this driver was reinforced by GHG emission reduction targets.	Positive.	<p>Not indicated by emissions intensity graph. May be indicated by electricity intensity graph, but an alternative explanation is technological change.</p> <p>Upwind agreed location-based S2 approach reinforced energy efficiency/saving. I judged this had been reduced by emphasis on market-based approach for emission totals and targets which also affected energy efficiency/saving choices. Instance of low market-based S2 figures leading to emphasis on vehicle fleet emissions.</p> <p>Evidence suggests RECI use and market-based S2 method can affect decisions on GHG mitigation strategy.</p>
Goshawk supermarket	RECI/LCECI not pursued as a GHG mitigation strategy. Any RECI/LCECI used would have mainly been selected as a good deal financially compared to non-RECI/LCECI products.	While cost-saving has driven Goshawk's GHG mitigating efforts, it has prioritised energy-efficiency/saving projects over other projects with cost-saving potential. This has been explained by their role in achieving Goshawk's GHG mitigation target. This suggests an additional motivation e.g. reputation / organisational values.	Cautious as aware that energy attribute certificates have a negative reputation in some quarters.	<p>At first sight, emissions and energy intensity graphs suggest a change in focus, but closer examination suggests these trends in plots cannot be explained by RECI/LCECI use, which was small scale in the context of the Goshawk group.</p> <p>Evidence does not suggest a reduction in focus.</p>
Umbra supermarket	Umbra's motivations for its GHG mitigating activities were to save money and improve energy security while acting morally. This	Cost-cutting drove energy efficiency/saving strongly.	Depends on RECI. PPAs were viewed positively, but energy attribute certificates	Not indicated by the graph of emission intensity.

	fits with its choice of a renewable electricity PPA. It was a no-added cost action and seen as more credible than energy attribute certificates.		were not seen as credible mitigating actions.	Evidence does not suggest a reduction in focus.
Upsilon supermarket	Difficulties with plans for self-generation of electricity led to a greater reliance on RECI to meet targets to preserve reputation. Also, CSR driver.	Cost-cutting drove energy efficiency/saving.	Depends on RECI type. Staff were concerned about GO credibility. PPAs seen as more likely to drive extra renewable capacity and other benefits.	Not indicated by emissions intensity graph. While cost-cutting drove energy efficiency/saving, sometimes the additional driver of reputation (e.g. to meet emissions targets) was needed to get projects implemented. One interviewee was concerned energy efficiency/saving would not show up in market-based scope 2 figures and this may lead to reduced focus and budget for energy efficiency/saving. Staff were acting to prevent this. Staff see potential for reduced focus and budget for energy efficiency and were acting to prevent this.

Table 34 suggests that RECI/LCECI use does not lead to a reduction or a change in focus for most cases, although I cannot say for certain what would have happened in the absence of RECI/LCECI use. For those cases, where a displacement or the potential for this was found, the instances were limited. However, given the size of some of these firms' emissions, I would argue that both firms and policy-makers need to be aware of this phenomenon. The following section characterises the circumstances in which displacement may or may not occur in the case of energy efficiency/saving measures.

Turning to the firms where there was evidence to suggest RECI/LCECI use may have caused or could cause a reduction or change in focus on GHG mitigating activities, there were no identifiable, enduring differences between these firms and the others. Given the difficulty of detecting a displacement of focus, my assessment of the cases may be at fault. Another explanation is that some of the factors that determine whether displacement of focus takes place are transient or on a spectrum, rather than permanent, discrete characteristics. This led me to conclude that displacement of focus on energy efficiency/saving specifically⁵¹⁹ could occur when three circumstances or criteria are all found:

1. where a reputational/moral motivation was driving RECI/LCECI use;
2. where energy efficiency/saving were not being driven solely or strongly by cost-saving;
3. where staff did not prevent a reduction or change in focus on energy efficiency/saving activities.

I would speculate that staff may not act on displacement of focus because they are unaware it is taking place/a possibility or they may be unconcerned about the effect on other GHG mitigation activities because they think RECI⁵²⁰ use will result in extra renewable capacity. I would assume that if a firm's use of RECI was morally-motivated, then the staff involved would by implication expect RECI use to have a positive impact on extra renewable capacity. They might see this as negating any effects on other GHG mitigating activities. However, as section 4.3 demonstrates, the impact of RECI use on extra renewable capacity in Europe is doubtful.

There are five points to be made about these findings. Firstly, these characteristics are not expected to be static for any of the firms, therefore the findings are valid for the period studied alone. Secondly, I should explain the grouping together of the moral and reputational drivers. This is because one and/or the other was always discussed by the staff in the cases where a displacement of focus was found. Thirdly, the strength of the cost-saving driver was likely to be partly an effect of the industries to which the firms belonged. Looking at all cases, there was only one instance – Goshawk - where energy costs exceeded

⁵¹⁹ Note that I have treated electricity consumption as a sub-set of energy consumption.

⁵²⁰ I do not discuss LCECI use in this section because I did not encounter any data among the cases on their view of the impact of LCECI use on extra low-carbon generation capacity.

5% of total operating costs – even though some cases used close to one per cent of the UK's total electricity consumption e.g. Upwind, Upsilon and Umbra, and 0.5% of Germany's in the case of Gravadlax. Nevertheless, energy costs were not a major category of expenditure in any of the firms. Fourthly, I use the term "reputation" here as this is the word used most commonly by the cases, although this does not negate the argument that I made in the discussion on RQ1 about the relationship between reputation and legitimacy. Fifthly, my research shows the benefit of multi-level analysis of CSR activities as the outcomes depend on the intersection of factors at different levels: organisational field, organisational and individual.

Aguinis and Glavas (2012) called for more multi-level analysis of CSR, following their literature review of research into the subject. Only 5% of the articles analysed looked at two or more of the following levels: institutional, organisational and individual. In addition, they found that individuals were only studied by 4% of all articles (both single- and multi-level studies). This research adds to the literature on both counts. To note though, that I have followed Scott (2014) and termed the institutional level as the organisational field level (see section 2.5 of the literature review). Furthermore, these findings about interacting motivations develops - regarding RECI/LCECI use - the findings of Gouldson and Sullivan (2013). They found two drivers for climate change action in the UK supermarket sector: cost-saving and benefits that were difficult to quantify in financial terms. Gouldson and Sullivan (2013) and Sullivan and Gouldson (2013) found cost-saving was sufficient motivation for energy efficiency/saving in UK supermarkets, although the public relations benefit of mitigating GHG emissions was welcomed. This research identifies instances where reputational effects - or more precisely the absence of reputational benefits⁵²¹ - have altered or could in the future alter GHG mitigating decisions.

In the following paragraphs, I go through all the cases characterising their approach regarding RECI/LCECI use.

Reputational/moral motivation was driving firms AWAY from RECI/LCECI use

Two of my cases did not view RECI/ LCECI use (specifically energy attribute certificates in the case of Umbra) positively and therefore had not used them strategically. Therefore, they did not meet the first criterion on motivation.

At Goshawk supermarket, RECI/LCECI use was perceived as potentially damaging to reputation. For Goshawk, energy efficiency/saving offered sustainability benefits and cost-savings, so it focused on that. This focus on costs fits with Sullivan and Gouldson's (2017) characterisation of

⁵²¹ Because electricity efficiency/saving actions do not have a GHG emissions benefit if the electricity is zero-rated for emissions.

the German supermarket sector as being highly cost-competitive. At Umbra supermarket, the cost-saving driver was dominant - within moral parameters. Reputation was not mentioned. The Umbra interviewee rejected use of energy attribute certificates as “greenwash”, therefore there was a moral driver to not using them. Instead he saw PPAs with renewable energy generators as offering businesses benefits with the coincidental benefit of being a credible mitigating activity. So, Umbra switched to PPAs. With regard to PPAs, Umbra could be placed in the next category.

Reputational/moral motivation has driven RECI/LCECI use; cost saving was the sole or strong driver of energy efficiency/saving.

The following four cases meet the first criterion on motivation, but not the second criterion on energy efficiency/saving and the evidence does not suggest displacement/ potential displacement of focus on other GHG mitigating activities.

At Grange bank, the cost-saving motivation had driven energy efficiency/saving and the carbon neutrality target, motivated by moral and reputational concerns, drove RECI use. At Gravadlax telecoms, cost-cutting drove energy efficiency/saving. The initial driver of RECI use had been moral, but when it had a negative impact on Gravadlax’s reputation due to NGO criticism in Germany, the firm stopped using RECI for its German electricity consumption. Following the legitimisation of RECI use through the publication of the GHG Protocol’s scope 2 guidance (Sotos 2015a), its use had been increasing. Umbrella bank is a further example. Cost-cutting drove energy efficiency/saving while RECI use was morally-motivated.

Urban bank bought RECI and LCECI and complemented them with offsets to claim carbon neutrality. However, subsequent UK government initiatives did not value RECI and LCECI purchases and the global financial crisis had sharpened the bank’s focus on costs. This may explain why Urban appears to have ceased using RECI and LCECI, as they were no longer reported.

Reputational/moral motivation was driving RECI/LCECI use; energy efficiency/saving NOT solely or strongly driven by cost-saving.

The five firms in this group met the first and second criteria: a reputational/moral motivation was driving RECI/LCECI use and cost-saving was not the sole driver or a strong driver of energy efficiency/saving. Therefore, the actions of staff decided whether there is a change or reduction in focus on energy efficiency/saving.

Looking firstly at Upsilon supermarket and Ursa B2B financial institution, reputation was driving RECI use and future RECI use respectively. In these firms, the driver of meeting GHG emission reduction targets was sometimes needed to supplement the cost-saving driver for an electricity efficiency/saving project to go ahead. This was recognised by Upsilon Interviewee 1 whose team

leader had devised a plan to prevent RECI use reducing the focus on electricity saving/efficiency activities. Upsilon had only just started to use RECI strategically. So far, the evidence does not suggest that RECI use has displaced other mitigating activities in the two first years of strategic use of RECI and a market-based scope 2 approach.

At Ursa, RECI had been viewed positively by staff. However, the Interviewee acknowledged that in theory a change or reduction in focus could occur as a result of use of RECI and the market-based approach. However, Ursa had not yet embarked on extensive RECI use, so it remained to be seen what actions staff would take.

With Geode B2B financial institution, reputational and moral motivations were the only identifiable drivers of GHG mitigating activities. Cost-saving was not found as a motivation of emission reduction actions, although Geode kept the pressure on reducing electricity use, saying “...*great efforts are made to reduce overall power consumption regardless of the origin of power (i.e. from renewables)*” (CDP2014 CC14.1). As I was not given an interview by this firm, I could not probe this view further. However, the firm’s views about the importance of energy efficiency/saving would account for the decline in electricity intensity in the absence of a strong cost-saving driver. I would speculate that Geode might consider it reputationally damaging if RECI use was seen to affect its work on energy efficiency/saving. I concluded there was no evidence of a loss of focus on energy efficiency/saving due to internal motivation to drive electricity efficiency/saving.

In the following two cases, staff did not see the interaction between RECI use and the market-based method and energy efficiency/saving activities as an issue that needed to be addressed.

At Gamete bank, RECI use had a reputational driver and cost-saving was not put forward as a driver of energy efficiency/saving. So, I interpreted the first two criteria for Gamete as met. My investigation led me to conclude that Gamete had higher energy intensity per employee than the other banks. I interpreted the evidence as RECI use aided a reduction in focus on energy efficiency/saving at a time when financial stress following the global financial crisis made it difficult to invest in these activities. However, Interviewee 1 did not think there had been any change or reduction in focus on energy efficiency/saving as a result of RECI use. Indeed, she said the bank had few emission reduction opportunities remaining to be taken and RECI were viewed positively.

At Upwind telecoms, RECI use was viewed positively and the Interviewee did not think that RECI use had led to a loss of focus on energy efficiency/saving. However, the Interviewee agreed that Upwind’s GHG mitigation goals reinforced the cost-saving motivation driving energy efficiency/saving. Furthermore, there was an instance which I interpreted as use of the market-based scope 2 approach leading to a change in focus on GHG mitigation. Due to a reputational

driver - an enhanced CDP rating - Upwind was looking for a 4% year-on-year reduction in a scope 1 and scope 2 emissions metric. As Upwind was using the market-based method, it could not find electricity efficiency/saving projects that would lead to this level of reductions. Therefore, it looked to reduce emissions from its vehicle fleet. There may have been a financial driver for this too. However, the Interviewee portrayed the reputational driver as strong enough to influence this energy efficiency/saving decision.

In summary, these firms met the first and second criteria: reputational/moral motivation was driving RECI/LCECI use in these firms and cost-saving was not the sole driver or a strong driver of energy efficiency/saving. This creates the circumstances for displacement of focus to occur, but the firm may not meet the third criterion i.e. action is not taken within the firm to prevent this.

I now turn from characterising firms' approaches and focus on my findings' relationship with existing literature. The interaction I observed between different motivations (reputational, moral and cost-saving) and staff is reminiscent of Gouldson and Sullivan (2014) who hypothesised that firms' GHG mitigating activities would be influenced by the alignment and strength of external governance pressures by state and nonstate actors and internal governance (such as management structures, the relationship with shareholders and with stakeholders to the extent they are recognised) and organisational culture, values and resources. This was tested in an examination of the GHG mitigating activities of major UK supermarkets from 2000-2010. Gouldson and Sullivan (2014) found that mitigating actions would generally only go ahead where the "business case"⁵²² was favourable, irrespective of public pledges made on GHG mitigation. However, my research has shown that there are firms (Upsilon supermarket and Ursa B2B financial) where reputational considerations sometimes augmented borderline financial cases for projects, leading to their implementation or where reputational factors reinforced the financial case (Upwind telecoms).

I want to point out that I am not suggesting that it is reprehensible for reputational concerns to influence GHG mitigation decisions. From a GHG mitigation perspective, I consider it is advantageous that reputational concerns can augment the financial case for a mitigation project, leading to it receiving internal approval. Presumably this leads to more projects going ahead. However, it is a consequence of the market-based scope 2 approach that the reputational benefit of being able to report emissions reductions due to energy efficiency/saving can be lost or diminished.

⁵²² In this paper "business case" is described in terms of the financial costs and benefits of a project with a note that firms generally expected the rate of return on GHG mitigating action to be comparable to other investment options p.2982.

Finally, I review what other GHG mitigation actions could be affected by RECI/LCECI use, looking firstly at reducing fugitive emissions of refrigerants and then at self-generation of energy. The possible effects on offsets require a longer discussion and are covered in a specific section (section 11.2.4).

Refrigerant emissions were a significant source of emissions for the supermarkets. As emission reduction targets frequently encompass S1+S2 emissions, pressure to curb fugitive refrigerant emissions could be reduced by RECI/LCECI use. However, as discussed in chapter 10, there are other drivers on refrigerant emissions i.e. regulations, self-set mitigation targets and public commitments on the phase-out of refrigerants with high GWPs. I would expect this would make action on refrigerants less likely to be affected by RECI/LCECI use.

Turning to self-generation of energy, this was not a major component of most cases' mitigation portfolios and so I did not focus on the effect of RECI/LCECI use on energy self-generation projects. However, I will describe some points that emerged from my investigation. Firstly, I should point out that data was restricted to the generation of electricity. I encountered limited data on the self-generation of heat, steam or cooling, so I will switch terms from energy generation to electricity generation.

In most cases numerical data on self-generation of electricity was either: not found in documentary evidence (e.g. Gamete, Urban, Umbrella), was 1% or less of total electricity consumption based on my calculations (Grange, Goshawk, Gravadlax, Upsilon, Upwind)⁵²³, or had not yet started (Ursa). This is despite the advantages of self-generation perceived by some cases i.e. security of supply, protection against rising and/or volatile electricity prices, and creation of a new income stream in supplying surplus electricity to the grid (see section 10.4). I assessed that the biggest generator in absolute terms was Umbra⁵²⁴. However, despite extensive acreage of PV, electricity generated from solar and CHP installations still only accounted for about 2% of annual electricity consumption. Geode had a high relative consumption of self-generated electricity - about 14% of total electricity consumption - in y/e 2014⁵²⁵.

So, did RECI/LCECI use appear to influence self-generation of energy? It did not in the cases of Gamete, Gravadlax, Upsilon and Upwind. These firms encountered decisive difficulties in relation to a lack of technical/specialist knowledge and/or the suitability of their locations for installation (see section 10.13). Goshawk, Gravadlax, Umbra, Upsilon and Upwind also found the financial case for some projects

⁵²³ For sources, see section 14.2.14.1 for Grange, section 14.2.12 for Gravadlax, section 14.2.13 for Upwind, CDP2016 CC11.5 for Goshawk, CDP2015 CC11.4 for Upsilon.

⁵²⁴ CDP2016 CC11.5.

⁵²⁵ See section 14.2.8.

unfavourable. The need for enhanced government incentives was raised e.g. by Upsilon and Upwind.⁵²⁶ Turning to Geode, its comparatively high level of self-generation was due to move to new headquarters which were powered by CHP. Geode had few premises compared to a bank with a branch network or supermarket chain so had – I infer - few opportunities to increase this percentage.

As for Umbrella and Urban, the effect of applying a zero emission factor to consumed electricity covered by RECI use would have been limited as they did not reflect RECI use in their emissions figures at different points in time. Umbra was using Power Purchase agreements with renewable generators while pursuing a vision of self-sufficiency in electricity. Therefore, RECI use (the PPAs) do not appear to have dampened its interest in self-generation. Similarly, Ursa was considering self-generation but a lack of suitable locations was nudging the firm towards RECI use, although the outcome was not known at the time of the interview.

In summary, the interaction between RECI/LCECI use and self-generation was not the focus of conversations with interviewees. However, evidence suggests that self-generation is more likely to be affected by difficulties with the financial case, technical/specialist knowledge and the suitability of locations for installation than by RECI/LCECI use.

11.2.3 METHODS OF AVOIDING DISPLACEMENT

As mentioned in the previous section, steps may be taken by a firm to prevent a loss of focus on other GHG mitigating activities. This section covers mechanisms from two cases that link energy efficiency/saving by using monetary savings from that to pay for RECI.

At Upsilon, the RECI budget had been linked to the energy efficiency budget in such a way as to shift RECI use from unbundled energy attribute certificates to PPAs, which were seen as more effective in stimulating extra renewable generation capacity and a better financial deal. The cost of buying energy attribute certificates was going to be included in the business case for electricity efficiency projects. This would reduce their payback period by increasing the cost of electricity. This in itself could boost electricity efficiency/saving as more may meet internal financial criteria for implementation. However, the plan included putting the money saved through electricity efficiency into PPAs⁵²⁷. Upsilon has a target for PPA use, so this could drive electricity efficiency/saving if monetary savings were needed for PPA contracts to

⁵²⁶ I did not probe the reasons for the reasons for the level of self-generation of Grange, Umbrella and Urban.

⁵²⁷ PPAs can have the supply of energy attribute certificates bundled with the supply of electricity (Sotos 2015a).

go ahead. However, the Umbra example shows that a PPA with a renewable electricity generator does not necessarily incur extra financial costs, so this second boost for electricity efficiency may not materialise.

Gravadlax has described a system that could address the issue of displacement of focus although I do not know what the motivation was as there was just a short description in three CDP reports in which Gravadlax said energy-saving and optimized energy procurement paid for energy attribute certificates. However, the Interviewee said energy-saving and optimized energy procurement were unrelated to RECI and did not say whether this was an ongoing practice. In theory, though, this mechanism could ensure that there was no lessening of focus on energy efficiency/saving if it was needed to maintain the level of reported emissions as a result of RECI use.

Looking at the mechanisms described for both firms and considering past and present prices of GOs relative to the cost of commodity electricity⁵²⁸, their impact seems likely to be limited; adding their cost of the commodity price of electricity would do little to increase the total cost of the electricity and conversely few - if any - energy efficiency/saving projects may be needed to generate enough savings to pay for RECI. These models could work if the cost of energy attribute certificates was a lot higher. This may also mean that energy attribute certificates would be more likely to incentivise extra renewable generation capacity, but it would also mean that more funds that could have been used for other GHG mitigating activities would be diverted to covering the cost of RECI.

Finally, I should mention Geode. This case said maintained a focus on electricity saving “...*regardless of the origin of power (i.e. from renewables).*” (CDP2014 CC14.1). Without an interview I cannot say whether this was in response to an acknowledgement that displacement of focus could occur.

In summary, these are interesting methods that may serve to maintain a focus on energy efficiency/saving. However, their success is dependent on the costs of different types of RECI and a careful analysis of the RECI markets by firms.

11.2.4 OFFSETS

I looked at the interaction between RECI/LCECI and offset use in my case studies because of speculation that the former may displace the latter. Offsets are discussed here as a separate case from other GHG mitigating activities, e.g. energy efficiency/saving and the reduction of fugitive emissions of refrigerants,

⁵²⁸ As a rough calculation to give a sense of scale, using the figures given in section 4.3, a GO may cost between 0.01% and 10% of wholesale cost of a MWh of electricity, but the more frequently given costs put it at about 0.4%.

because their use was not reflected in emission intensity figures used in the investigation of displacement of focus.

A report into the state of voluntary markets for carbon offsets (Hamrick and Gallant 2017) cites speculation that the GHG Protocol's amended scope 2 guidance (Sotos 2015a) could lead to a decline in firms' offset use as firms can now reflect RECI use in their scope 2 emission figures under the GHG Protocol standards⁵²⁹. Hamrick and Gallant (2017) found evidence that some participants in the offset market were reducing their offset activities and increasing their involvement in the RECI market. In informal discussion with academics and practitioners working on GHG accounting, I heard concerns expressed that a switch from offsets to RECI would be detrimental to GHG emission mitigation as offsets have to meet standards that establish a causal link between the purchase of the offset and the emission reduction action that led to the generation of the offset (Hamrick and Gallant 2017). In contrast, the market-based approach is a way of allocating scope 2 emissions that allows RECI/LCECI-using firms to report substantially reduced emissions, but no causal link is required.

There is also the question of cost. Offset prices vary considerably with the location and nature of the offset project and the standard applied to generate the offset (Hamrick and Gallant 2017). Offset prices have also changed considerably over time. The Grange interviewee said that when Grange began buying Certified Emission Reductions (CERs), an offset generated through the UN's Clean Development Mechanism⁵³⁰, in about 2008, the price was 14 €/tCO₂e. The price fell and the market became dysfunctional. So, Grange switched from buying CERs to Voluntary Emissions Reduction (VERs) offsets, which were costlier but had additional social, health, economic and environmental benefits. Even so, the price of VERs fell, with Grange paying about 3-4 €/tCO₂e in 2018. However, despite this low price, the Grange interviewee said RECI were still more cost-effective to use than offsets in terms of the reported reduction of emissions that resulted from their use⁵³¹. When evaluating the payback period of energy

⁵²⁹ Offsets had to be reported separately to emission figures under the *GHG Protocol - A Corporate Accounting and Reporting Standard* (GHG Protocol Initiative 2004) and this rule continues.

⁵³⁰ See Hamrick and Gallant 2017 for a discussion of different offset types.

⁵³¹ RECI are denominated in Watt-hours. However, it is possible to do a rough estimation of the difference between a location-based scope 2 figure and one reflecting the use of a Guarantee of Origin by using the grid average emission factor. In 2008 in the UK the grid average emission factor was 0.49608 kg CO₂e per kWh or 0.49608 tCO₂e per MWh. Klimscheffskij et al. (2015) estimated GO price was between 0.05-0.5 €/MWh although GO from small hydropower and new renewable generation schemes could cost considerably more. Using the 0.05-0.5 €/MWh range, 1 tCO₂e difference between a location- and a market-based scope 2 figure would cost between 0.1 € and 1 €. Note this is just indicative as there are more steps to calculating a market-based scope 2 figure.

efficiency/saving projects, Grange factored in a cost of tCO₂e based on offset prices, but the cost of RECI was so low as to be negligible.

The three other cases that have used offsets (Gamete, Urban, Gravadlax⁵³²) all began to use offsets about the same time as Grange. Therefore, I assume that they would have also seen a similar price advantage.

However, I have concluded that for these four firms the outcome of the interaction with RECI/LCECI is contrary to what might be expected and this is because RECI/LCECI reflected in scope 2 figures would reduce the reported GHG emissions that would need to be offset. This would have reduced the cost of setting a carbon neutrality target and which would in turn lead to offsets being bought.

I would judge that this is what happened at Urban bank. It began buying RECI for y/e 2004 and to also purchase LCECI for y/e 2006. In 2007 it bought carbon credits to offset its remaining reported emissions for y/e 2006 and pledged to do the same in 2008 for its remaining emissions in y/e 2007 after RECI and LCECI use had been taken into account (2007 corporate report, p.15). In 2008 Urban reported that RECI contracts may not be renewed at their current levels (CDP6(2008) 3(a)(iv)). No offset use was reported in CDP2009 for y/e 2008 and their use was then explicitly rejected in CDP2010 9.1. From this sequence of events, I infer that RECI/LCECI facilitated a carbon neutrality target by reducing the number of offsets that needed to be purchased. When the use of RECI/LCECI was curtailed, so was the use of offsets. Urban did not continue to claim carbon neutrality.

In 2007 Grange bank committed to covering all its electricity consumption in Germany and two other countries with RECI from 2008 onwards. Then in 2008, it set a goal of carbon neutrality from 2013. The Interviewee said *“The availability of renewables in the countries where we have significant operations and facilities was a core part of the proposal to achieve carbon neutrality. It was 1 part of a 10 point plan. Yes, indirectly the availability of RECI has caused us to set a target and buy more offsets than if they were not available.”* (Email Interviewee 19 September 2018)

In the case of Gravadlax telecoms, the earliest records I found of RECI and LCECI use was CDP3 (2003) and the first record of offsets use was CDP4 (2006). I do not have further information on LCECI use after the early 2000s, but RECI use grew to cover around 50% of electricity consumption in y/e 2008. Offset use also grew, peaking at almost 50,000 tCO₂e in y/e 2014. Specific activities were being offset. Then in y/e 2013 Gravadlax stopped using RECI due to doubts about the benefits of RECI from financial, environmental and reputational points of view. There had been aspirations for the group to be carbon

⁵³² Geode B2B financial institution said it had a dedicated budget for the purchase of “green power” and offsets (CDP2012 3.3c). However, figures showed they were used to mitigate less than 1 tCO₂e (CDP2014 3.3d).

neutral, but this was dropped with just overseas subsidiaries going on to claim carbon neutrality. Much smaller amounts of offset use were recorded for two years after y/e 2014. In this case RECI were a foundation to which offset use could have been added to make a carbon neutrality claim and had not led to displacement of offset use.

Gamete bank began buying RECI in 2008, the year the global financial crisis hit the bank. By the 2009 corporate responsibility report, it had committed to buying RECI for all its German electricity consumption and to work towards carbon neutrality, which entailed offset use. The first CDP record of offset use by Gamete found was in y/e 2010 (CDP2011 14). So, as with Urban bank, rather than displacing offset use, RECI use appears to have encouraged offset use by facilitating the setting of a carbon neutrality target.

Therefore, the evidence suggests⁵³³ that the use of RECI/LCECI encouraged offset use in three firms as it facilitated the setting of carbon neutral goals for these firms. In the case of Gravadlax, their use would have led to increased offset use had other factors not curtailed use of RECI. However, RECI options are becoming more prevalent globally (International Renewable Energy Agency 2018). This could lead to firms with carbon neutrality targets moving away from offsets to RECI as they become more widespread globally and depending on relative costs. The cost of both offsets and RECI vary greatly with their origin (Hamrick and Gallant 2017, Klimscheffskij et al. 2015) and therefore the procurement criteria of firms will influence the outcome considerably.

This finding is specific to firms with carbon neutrality targets. I would not expect to find this in firms with science-based targets as accepted by the Science-Based Target initiative (SBTi) as it does not factor in offset use within its methodology for assessing whether a firm's target reflects its share of the emissions reduction needed to keep global temperature rise below 2°C⁵³⁴. This organisation has considerable momentum behind it. Since its launch in mid-2015 in the run-up to the UNFCCC's Paris conference, 103 firms have had their targets approved by the initiative. Most are household names such as McDonald's and Sony. Furthermore 370 firms have joined the initiative and have committed to setting a science-based target within two years. (Simon 2018, Science Based Targets initiative n.d.a). Firms may choose SBTi-approved targets over climate neutrality goals as CDP, one of the founders of SBTi, incentivises science-based targets in its rating of firms (CDP 2016a and b).

⁵³³ This is explicit in the case of Grange as it has been confirmed by the Interviewee.

⁵³⁴ The temperature rise is compared to pre-industrial levels and based on the Intergovernmental Panel on Climate Change's fifth assessment report. For details of SBTi's methodology on offsets and contractual instruments, see Frequently Asked Questions F7 and 10 (Science Based Targets initiative n.d.b).

In conclusion, these findings that the use of RECI/LCECI has encouraged offset use in three firms and could have done in a fourth are specific to firms with carbon neutrality targets which – I would expect – may become less common with the promotion of science-based targets.

11.3 SUMMARY

This research is the first attempt to look for empirical evidence of the criticism of the market-based scope 2 approach by Brander et al. (2013) and Brander et al. (2015) regarding its impact on other GHG mitigating activities. I have also looked at the financial opportunity cost, which was subsequently raised in Brander, Gillenwater, and Ascui (2018).

My research shows that the concern about the financial opportunity cost of RECI use is justified but will not apply to every RECI user as RECI costs may be nil. Where there have been RECI costs, these - if re-allocated to internal GHG mitigating projects - would have yielded relatively small emission benefits. However, falling offset prices mean that the re-allocation to carbon credits could lead to significant emission benefits. As noted in section 11.2.1, a limitation of this assessment is that it does not consider the emission reduction benefits over the lifetime of an internal mitigation project. It does so only for a year. However, as can be seen from Table 33, the emission reductions attributed to RECI use are at least two orders of magnitude greater than the emission reductions attributed to internal mitigation projects of the nature of those already implemented.

My research has found instances where a change or a reduction of focus on other GHG mitigating activities may have occurred or could occur in the future. I have characterised the criteria which can lead to a displacement of focus on energy efficiency/saving specifically, all of which are necessary:

1. where a reputational/moral motivation was driving RECI/LCECI use;
2. where energy efficiency/saving were not being driven solely or strongly by cost-saving;
3. where staff did not prevent a reduction or change in focus on GHG mitigating activities.

I have also discussed the interaction between RECI/LCECI and other GHG mitigating activities, particularly offsets. I found that the use of RECI/LCECI encouraged offset use in three firms as it facilitated the setting of carbon neutral goals. In a fourth case, I judge their use would have led to increased offset use had other factors not curtailed use of RECI. Carbon neutrality targets were integral to this positive link between RECI use and offset use.

12 CONCLUSIONS

This section begins by setting this research into the context of existing work on firms' responses to climate change. I then explain the contributions to knowledge made through answering the research questions before turning to the limitations of my research. I follow this by describing the implications of my findings for regulators, policy-makers, standard-setters and practitioners. Finally, I outline recommendations for future research topics and methodologies.

12.1 DISTINGUISHING FEATURES OF THIS RESEARCH

This research has focussed on a specific GHG mitigation activity – the use of renewable electricity contractual instruments (RECI) and low-carbon contractual instrument (LCECI). This is the first time that their use has been studied in the context of large firms incorporated in Europe⁵³⁵. In addition, it is the first empirical study in any geographical region of the effect of RECI/LCECI use on other GHG mitigating activities. To gain insight into this interaction, I have looked at the factors that may influence GHG mitigation choices generally, not just the use of RECI/LCECI. The emerging picture justifies the call from Aguinis and Glavas (2012) for more multi-level analysis of CSR responses. Their literature review found that only 5% of the articles analysed looked at two or more of the following levels: institutional, organisational and individual⁵³⁶. This research considers all three levels.

A further strength of this PhD thesis is its longitudinal nature. For some case studies, I have considered more than a decade of documentary data. While this is not unknown, it is uncommon (Aguinis and Glavas 2012). This qualitative approach has created a deep and wide understanding of factors that have shaped firms' GHG mitigation portfolios and addresses a further point raised by Aguinis and Glavas (2012) that only 11% of articles in the 17 journals in their review of literature used qualitative methodologies, yet those that did offered insight.

There are two further points to highlight. Firstly, I hope this thesis will also encourage other researchers to use the CDP database which dates back to 2003. It provides a rich source of qualitative data and increasingly clear quantitative data. While some researchers have used this source e.g. Gouldson and

⁵³⁵ Wiser, Fowlie, and Holt (2001), Berkhout and Rowlands (2007), Gliedt and Parker (2010), Gliedt et al. (2010) have researched firms/non-domestic use of RECI in North America and Rahbauer et al. (2018) have done so in the context of German SMEs.

⁵³⁶ Note I have not used the same terms as Aguinis and Glavas (2012). I have termed the institutional level as the organisational field level, following Scott (2014) (see section 2.5).

Sullivan (2014), I think many researchers would be surprised at the detail that is available. Secondly, my case study firms have many calls on their time, but my connections with the CDP enabled me to secure interviews with managers or more senior staff in most cases. This level of access was unusual, something that I did not appreciate until I talked with other academics.

12.1.1 CONTRIBUTIONS TO KNOWLEDGE FROM RESEARCH QUESTION 1

RQ1 was “*What factors influence a firm’s voluntary GHG mitigation choices with regard to renewable and low-carbon electricity contractual instrument use?*” The full set of findings are set out in Table 32. Here I shall focus on the key findings, beginning with what motivated firms to use RECI/LCECI.

Firms predominantly specified either reputational and/or moral motivations for their GHG mitigating activities in general or RECI/LCECI use specifically (see Table 34). Although firms do not tend to use the term “legitimacy”, I argued in section 10.12 that the desire for a widely-held good reputation - not limited to specific stakeholder groups - is the desire for legitimacy. I have argued that some instances of RECI/LCECI use have been motivated by legitimacy, for example, in the case of telecoms firms’ demonstration that they are part of the solution to climate change and not part of the problem and also in some firms’ carbon neutrality positions.

Financial sector firms sought to shore up their reputation – or legitimacy, I argue – in the wake of the global financial crisis through the unrelated issue of their climate change approach. This extends previous research that found negative publicity may be addressed by CSR responses that are broader than or even different to the issue that prompted the publicity as this finding shows this occurring in the European financial sector. My research augments statistical studies on the links between environmental CSR responses and the global financial crisis as these connections have been explicitly made by some firms in this research and do not have to be inferred.

A further insight of my PhD thesis was that some firms wanted to maintain consistency between their promotion of sustainability-related products and their own operations, and this was a motivation for GHG mitigation actions. I would argue that firms were motivated by the desire to avoid the charge of hypocrisy by showing that they were taking steps to mitigate their contribution to climate change while encouraging others to do the same. This would help to maintain their legitimacy by showing their commitment to climate change mitigation was not restricted to sales of their sustainability-orientated products.

Whether or not my argument about the equivalence of legitimacy and the desire for a widely-held good reputation is accepted, reputational motivation was a key factor in determining whether RECI/LCECI use affected a firm’s focus on energy efficiency/saving. Reputation was also connected to a further key finding related to reputation - the role of CSR rating agencies. For this, my research adds new insight into the

influence of CSR rating agencies on firms from Germany and the UK. Firms made a causal link between some of their mitigating activities and the scoring methodologies of rating agencies. This shows that firms do not just improve their data-gathering process to increase their CSR ratings; in some instances firms were willing to be guided by CSR rating agencies towards specific GHG mitigating activities. Two firms had staff remuneration linked to CSR rating agency scores, illustrating the seriousness with which ratings were treated. This power of the CSR rating agencies justifies scrutiny of their activities and raises the question of whether the rating agencies are steering firms towards the most effective mitigation actions.

I would situate CSR rating agencies as an influence from the organisational field⁵³⁷ within which the firms sit. A further organisational field influence concerns the position of successive German governments on the energy attribute certificate, the Guarantee of Origin (GO). This research shows that the German government approach to the GO did influence firms' selection of energy attribute certificates. There was a marked tendency for German firms to source energy attribute certificates to apply to their electricity consumption in Germany from abroad, instead of Germany. In the UK, the government's carbon reporting guidance has been influential, appearing to have led to diverse reactions from UK firms regarding their use of RECI.

Moving from the organisational field to organisational characteristics, five case study firms – four of which were office-based with IT infrastructure - raised the issue of a lack of energy efficiency/saving projects remaining for them to take. The four bank cases showed electrical consumption intensities converging with a similar but less pronounced pattern for energy intensity. The two B2B financial institutions also showed convergence in electricity intensity. The narrow range of these metrics suggests a convergence in business models and energy efficiency/saving methods. It supports the assertion that there were few remaining options for these firms to undertake or few that meet their internal criteria for financing. Alternative explanations are that some options remain, but they are not perceived by firms or that the professionalisation of facilities management has created norms around the mitigating actions that facility managers undertake which might deter new methods from being tried and tested. These are important findings for policy-makers to note if they wish to stimulate greater energy efficiency/saving from this sector, especially given the second noticeable characteristic of both the electricity and energy intensities of the banks (this does not apply to the B2B financial institutions); only one bank showed a marked decline in electricity/energy consumption intensity in the period considered.

⁵³⁷ See the section 2.5 for description of organisational field.

Turning to the level of the individual within the firm, Sullivan and Gouldson (2013) found that public emission reduction targets led to the creation of supporting management structures and data-gathering processes in UK supermarkets. In a twist on this, I encountered two instances where employees, who personally supported action on climate change, used their firms' public promises as leverage internally for further mitigating action i.e. not just additional supporting structures and systems. Furthermore, in contrast to research on North American firms where environmental champions were found to be dominant drivers of RECI use, mixed views of RECI were encountered among environmental champions in my European cases.

Overall, my PhD makes three key contributions for RQ1. Firstly, I have argued for the use of legitimacy and reputation in understanding firms' motivations for climate change action and particularly the role of CSR rating agencies in steering firms' mitigation activities and conferring reputational benefits on compliant firms. Secondly, I found a convergence in electricity/energy consumption intensities for firms that are office/IT-based which may be due to a lack or a perceived lack of suitable options remaining to be implemented. Thirdly, I have developed the role of individual employees in determining RECI use.

12.1.2 CONTRIBUTIONS TO KNOWLEDGE FROM RESEARCH QUESTION 2

Research question two is *“For those firms that have used renewable and low-carbon electricity contractual instruments, what effect has this had on other GHG mitigating activities?”* It was prompted by concerns raised by Brander et al. (2013), Brander et al. (2015) and Brander, Gillenwater, and Ascui (2018). In the following paragraphs, I relate the findings on the financial opportunity cost and the effect of RECI/LCECI use on firm's attention on other GHG mitigating activities.

The concern about the financial opportunity cost of RECI use by Brander, Gillenwater and Ascui (2018) was found to be justified but will not apply to every RECI user as it cannot be taken as a given that there is any cost to RECI use. The low- or no-premium attached to RECI⁵³⁸ use by the cases for which I have cost data would mean that a re-allocation of funds to internal mitigating activities would not have led to significant emission reductions. Furthermore, this rests on the assumption that there were other projects that had not been implemented but could have been for want of funds. This is a key assumption as some RECI-using firms spoke about running out of other internal mitigating actions. I assume that this is unlikely to be in absolute terms, but rather in terms of projects that meet their internal financing criteria. These findings fit with an International Renewable Energy Agency report (2018) that found that *“corporate*

⁵³⁸ LCECI is not covered by this line of investigation. No LCECI cost data was reported in the period covered by the data used for this part of the research.

reliance” on renewable electricity was linked to the “*maturity*” of its GHG emissions and energy management.

If the funds spent on RECI had been re-allocated to offset/carbon credit purchase, they would have resulted in widely varying degrees of emission reductions from the highly-significant to the negligible in the context of the firm’s S1+location-based S2 emissions⁵³⁹. Given that the GO market in Europe has had an excess of supply over demand (as represented by cancellations of GOs), offsets offer more certain environmental benefits. One case imposed a criterion on their purchase of GOs designed to incentivise extra renewable capacity and this type of action should be encouraged - if future research finds it is effective.

Turning to the effect of RECI/LCECI use on firms’ focus on other GHG mitigating activities (except for offsets which are considered separately), Table 34 shows that RECI/LCECI use did not appear to have led to a change in focus on those other activities for most cases, although I cannot assess what would have happened in the absence of RECI/LCECI use. Instances of a change or reduction in focus or the potential for this were limited. However, given the size of some of these firms’ emissions, I would argue that both firms and policy-makers need to be aware that this can occur.

I have characterised the circumstances in which I found a change or a reduction in focus on energy efficiency/saving or the potential for this. This outcome depended on the intersection of circumstances at the level of the organisational field, the organisation and individuals within the organisation. The circumstances were (all three were necessary conditions):

1. where a reputation/moral motivation was driving RECI/LCECI use;
2. where energy efficiency/saving were not being driven solely or strongly by cost-saving;
3. where staff did not prevent a reduction or change in focus on energy efficiency/saving activities.

A further point to make is that these factors are not expected to be static. They may change over time within firms, as exemplified by the impact of the global financial crisis on the GHG mitigation strategies of the financial sector firms. Therefore, displacement or potential displacement of focus could come or go. I cannot see a reason why these findings on displacement of focus on energy efficiency/saving should not apply to firms other than my case study firms as they are not specific to a sector, geography or jurisdiction.

Given the above, I can say that research upholds the argument of Brander et al. (2013) and Brander et al. (2015) that use of RECI/LCECI and the market-based method may lead to displacement of focus on other

⁵³⁹ These categories of emissions are explained in section 4.4.

GHG mitigation activities. However, the occurrence of displacement of focus was limited. In the case of energy efficiency/saving specifically, it depended on the intersection of the circumstances described.

My thesis should not be taken as criticism of firms where displacement of focus or potential displacement has been identified. This was found where reputational/moral concerns could lead to mitigating projects being implemented that would not go ahead on cost-saving grounds alone⁵⁴⁰. That firms' reputational/moral concerns can lead to more GHG mitigating actions being undertaken than would be implemented due to the cost-saving driver alone is useful from a climate change perspective. The problem lies with the market-based scope 2 approach rendering actions widely regarded as beneficial invisible if the market-based method is not balanced by the perspective offered by the location-based method. To avoid this situation, I make recommendations that emission figures calculated using the market-based method must be accompanied by same metric calculated using the location-based approach (see section 12.3).

The evidence suggests that RECI/LCECI use encouraged offset use in three firms as it may have facilitated the setting of carbon neutral goals. In a fourth, their use would have led to increased offset use had other factors not curtailed use of RECI. However, I underline that this finding relates to these firms alone and is situated in the 2000s. Circumstances have changed since then. For example, the Science Based Targets initiative (SBTi) has been established. This initiative, which is favoured by CDP, does not reflect offset use in corporate emission inventories, but does recognise use of the market-based scope 2 approach, which will encourage RECI/LCECI use. In addition, the GHG Protocol has published its amended guidance on Scope 2 emissions, which some market-players considered may lead to reduced offset use in favour of RECI (Hamrick and Gallant 2017).⁵⁴¹

12.2 RESEARCH LIMITATIONS

This thesis has two research questions. Some limitations to their findings apply to both questions e.g. generalisation and the difficulty of understanding the actions of very large firms – indeed groups of firms – over about a decade. Other limitations are specific to each research question. For example, the large

⁵⁴⁰ With the third condition related to the actions of staff.

⁵⁴¹ To note, that even prior to the scope 2 amendment, offsets had to be reported separately to emission figures under the *GHG Protocol - A Corporate Accounting and Reporting Standard*⁵⁴¹ published by the GHG Protocol Initiative (2004).

number of factors influencing environmental management identified through the literature review. I shall deal with common limitations before turning to the limitations for each question.

This research covers a small number of firms (11 in total) from four sectors and just two countries (Germany and the UK) chosen for their different regulatory approaches to GOs. The small number prevents statistical analysis and generalisation about RECI/LCECI use to a population of firms. However, the firms were selected to allow the analytical generalisation approach of Yin (2014) to be used. This allows generalisations to be made to similar firms where the findings from RQ1 support this. With RQ2, the factor on which the multiple-case study design was based (the German and UK governments' contrasting approach to GOs) was not found to influence whether RECI/LCECI use led to a displacement of focus and financial resources. However, factors emerged that affected whether displacement occurred or could occur. These factors could form the basis of another multiple case study or other research design (see section 12.5). However, the findings of RQ2 are not limited to laying the groundwork for a further study. They should also be valuable to policy-makers and carbon accounting standard-setters as these firms are so large that their activities are significant in themselves. I have set out the implications for policy-makers, etc in section 12.3. Furthermore, the identified factors are not factors limited to specific types of firms. Therefore, the findings could form the starting point for conversations between policy-makers and standard-setters and other firms on displacement of focus.

In constructing my multiple case study design, I grouped firms according to the degree to which they were consumer-facing based on their sectoral categorisations within CDP. However, this is not a fine-grained categorisation. The cases were groups of firms and the degree to which they were consumer-facing could change over time through mergers, acquisitions and divestments. This did not significantly affect my cases in the periods considered. However, I did not analyse quantitatively how, for example, the proportion of their revenue that came from consumer-facing versus B2B activities changed, so incremental changes were not monitored.

In selecting the firms for the multiple case study design, I grouped them according to firm size and available finance in the three years prior to their first use of RECI/LCECI. I found that once I had embarked on the case studies, there were instances where I had to revise the start dates for RECI/LCECI use and this caused the grouping criteria to be only partially fulfilled. This occurred within the supermarket group leading to Upsilon and Umbra diverging considerably on employee numbers, my proxy for firm size. Bowen (2000) argued that visibility and organisational slack account for most of the association between firm size and environmental management. However, the visibility of both remained comparable in their domestic markets through the periods being examined. (See section 5.5.5.) *Prima facie*, it was more of an issue with Geode and Ursa that diverged markedly on available finance. However, available finance did not prove to be significant factor in their RECI/LCECI use.

The following limitations - valid for both questions - are outcomes of strengths of my project. Firstly, there is the length of time studied for the case studies. One can see GHG mitigation strategies evolve over a decade in most cases. However, this meant I was sometimes asking interviewees about events of which they had limited recollection or occurred before they were in post. That said, the contribution of the interviewees was significant and I am very grateful for their time. Furthermore, the cases are large firms with many calls on their time. As one professor within my research unit told me, I was fortunate to get the interviews that I did. However, this was limited to conversations with one or two interviewees per firm. Some interviewees made the point that they had limited insight into some relevant activities of their firms. This research risk was mitigated by the extensive use of documentary evidence over many years.

Regarding use of corporate publications, my perspective of the firm was influenced by Cyert and March's behavioural theory of the firm (1963). This views the firm as an association of groups of people, each with their own, possibly competing goals, with prioritisation being frequently re-negotiated. As I have only interviewed one or two staff members, the window through which I view the inner workings of the cases is very narrow. While I have drawn on corporate publications, these may portray the picture that the dominant coalition in the firm wants to show or they may represent the view of the employees that produced and/or sanctioned the publication. Therefore, all these data sources offer bounded insight into the workings of a large firm. This is mitigated by using them together to build as comprehensive picture as possible.

Turning to limitations specific to RQ1, the literature review identified factors for which there is empirical data for a link with environmental management. However, there were too many factors to take them all into account. The project would have been too unwieldy if I had. However, I had two safeguards against missing a crucial factor: the semi-structured nature of the interviews that allowed interviewees to raise additional factors about which I did not question them and the sharing the case study chapter about each firm with the relevant interviewees.

A further limitation to the findings of RQ1 relates to the findings about the influence of reputation and the desire for legitimacy. There were incidents affecting cases' reputation and legitimacy that could not be fully reported as the cases would have been identifiable beyond any doubt. However, anonymity also created the opportunity for greater openness by interviewees, which can be seen from some of the case study data. This was a valuable outcome in terms of producing robust findings on a topic of interest to all those concerned with business response to climate change.

A further issue was how to avoid leading questions within interviews. A demonstration of my approach to avoiding this pitfall relates to the contrasting positions of successive governments in Germany and the UK on Guarantees of Origin. This was the key factor on which the multiple case study design was based. However, the cases fell within the compass of several climate change-related regulations and policies. I

could not go through a list of regulations and policies with an interviewee in the time he or she had available, so I asked interviewees about the effect of regulation and policy in general on their firm's GHG mitigation choices and allowed them to raise those that were most material. I followed up by clarifying what had been said in documentary evidence about the effect of regulation and policy. This had the advantage of not leading firms into an answer, but the disadvantage that inferences had to be made in some instances.

Readers will have noted that I have taken firms' claims that they engage in climate change actions for moral reasons on face-value. This is not to say that I think that firms should be believed unquestioningly. However, I did not have the insight into the inner workings of the firms to be able to judge whether their motivation to act on climate change was a sense of responsibility or was driven by cost-savings, marketing advantages, or some other self-serving rationale.

Turning now to RQ2, I had assumed that if RECI/LCECI use was leading to a reduction in focus on other GHG mitigating activities, then there would be a detectable influence on emissions/electricity/energy intensities at very high levels of RECI/LCECI use. However, firms often began to use RECI/LCECI at very high levels close to the start of the period for which I had emissions/electricity/energy intensity data. This did not always give satisfactory periods of "before" data to compare with the "after" data. Therefore, the qualitative data carried considerable weight in my findings for RQ2. Finally, for RQ2, there is the difficulty of assessing the counterfactual: what might have happened in the absence of RECI/LCECI use.

A further limitation lies in use of firms' GHG emission figures from corporate publications and firms' reports to CDP. Despite my knowledge of GHG emissions accounting and of the CDP process, it was sometimes unclear what an emission figure represented from the issue of whether a mistake had been made with the units to which parts of the firm the figure covered to which scope 2 accounting approach had been used. Sometimes I had to make assumptions in assembling the data-series in the case studies. Therefore, the graphs are illustrative of trends and should not be used as sources of precise figures. While in my opinion the concerns raised in the methodology chapter about deficiencies in data quality are valid, I would add that since the mid-2000s GHG emissions reporting has improved considerably both in corporate publications and in the CDP datasets in terms of its comprehensiveness of coverage of GHG emissions and specification of what an emission figure represents.

12.3 IMPLICATIONS OF RESEARCH FOR STANDARD-SETTERS, REGULATORS, POLICY-MAKERS AND FIRMS

In this section, I will consider the implications of my research for organisational carbon accounting and reporting standards and present a suggestion for guidance for organisations on RECI/LCECI use.

12.3.1 IMPLICATIONS FOR STANDARD-SETTERS, REGULATORS AND POLICY-MAKERS

The GHG Protocol's Scope 2 Guidance requires - with limited exceptions - that firms report scope 2 emissions using both the location- and market-based methods. However, firms may use just one method for reporting a total of emissions from different scopes and for setting an emissions reduction target (Sotos 2015a). I would recommend that to maximise pressure for other GHG mitigating activities all totals, intensity metrics and targets that use the market-based method should be accompanied by the equivalent metrics calculated using the location-based method which will mean that changes to electricity consumption are visible. Furthermore, it should be stipulated that this data is reported adjacently.

This recommendation is relevant to the UK government. It recently conducted a consultation on Streamlined Energy and Carbon Reporting (SECR) by firms. The consultation on some aspects of reporting – including mandatory requirements - was concluded shortly before submission of this thesis with further aspects of reporting due to be dealt with later (Department for Business, Energy and Industrial Strategy 2019, email from SECR team dated 1 April 2019). I submitted a response to the consultation based on the findings of this thesis. The organisational carbon accounting and reporting standard ISO 14064-1 was also recently revised (International Organization for Standardization 2018a). The recommendations that I made above regarding the GHG Protocol's Scope 2 Guidance would be relevant to future revisions of SECR and ISO 14064-1. However, requirements to report energy consumption figures such as those found within the SECR mandatory obligations will go a long way to maintaining firms' focus on electricity efficiency/saving.

My recommendations for revising the GHG Protocol's Scope 2 Guidance would also apply to any revisions of *Accounting Principles and Guidelines for Operational Environmental Balances of Financial Service Providers with Standard Accounts* published by Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten or the Association for Environmental Management and Sustainability in Financial Institutions. Its methodology uses emission factors that reflect use of contractual instruments. (VfU n.d.a). However, I would argue that location-based scope 2 figures should be reported in parallel with market-based Scope 2 figures.

12.3.2 GUIDANCE FOR FIRMS ON RECI/LCECI PROCUREMENT TO STIMULATE EXTRA GENERATION CAPACITY

Brander, Gillenwater, and Ascui (2018) argue that firms (and policy-makers) are rarely aware of the actual dynamics of the energy attribute certificate market and their belief was supported by my research. In this section I argue for additional guidance for firms that sits between the existing generic guidance on

RECI/LCECI procurement criteria aimed at incentivising extra capacity and the offset methodologies with their more rigorous assessment of additionality⁵⁴². I argue that this guidance should be based on research – that would need to be conducted – that differentiates between different types of RECI/LCECI and different markets.

One of the criticisms of RECI/LCECI use by Brander, Gillenwater and Ascui (2018) has been that empirical evidence from the market for GOs in Europe and voluntary market for RECs in the USA⁵⁴³ shows that procurement of these energy attribute certificates does not significantly increase renewable electricity generation. There is concern about whether they lead to additionality. Offset methodologies assess additionality through the establishment of a baseline scenario in which the emissions mitigation project does not occur and then assessing the impact of the project. The methodologies can be quite short e.g. ISO14064-2 which is 38 pages long (International Organization for Standardization (ISO) 2006) to the GHG Protocol for Project Accounting which is 148 pages long (World Resources Institute and World Business Council for Sustainable Development 2005).

At the other end of the spectrum to the detailed methodologies are purchase criteria designed to stimulate extra renewable capacity e.g. section 11.4 in the GHG Protocol's Scope 2 Guidance (Sotos 2015a) and International Renewable Energy Agency (2018 pp.59-61). Both have been written to provide guidance to firms largely irrespective of the location of their operations.

I contend that between these complex offset methodologies and high-level steers, there is a need for a further type of guidance based on to-be-conducted research that differentiates between markets in different geographical regions and different types of RECI/LCECI e.g. energy attribute certificates and Power Purchase Agreements (PPAs). For example, one case study firm has tried to ensure that its RECI purchases incentivise extra capacity. It only buys energy attribute certificates from renewable generation plants that are less than six years old. This raises questions such as where might this be a useful approach and is this an effective criterion even if it is applied to GOs originating from generation facilities supported by public policy? Turning to PPAs, six cases had entered into PPAs. This may suggest that

⁵⁴² Additionality – “A criterion often applied to GHG project activities, stipulating that project-based GHG reductions should only be quantified if the project activity “would not have happened anyway”—i.e., that the project activity (or the same technologies or practices that it employs) would not have been implemented in its baseline scenario.” “Baseline scenario - A hypothetical description of what would have most likely occurred in the absence of any considerations about climate change mitigation.” (Broekhoff 2007, p.88)

⁵⁴³ The voluntary market is specified because there is a compliance market in the USA based on renewable portfolio standards or quotas.

PPAs are instruments in common use. This is not the case. While their use has been rapidly growing, it is from a low starting point, according to a survey of members of RE100, the organisation that encourages business to use 100% renewable electricity. The percentage of electricity consumed by a sample of RE100 members and covered by PPAs increased from 3% to 13% from 2015 to 2016 (RE100 2018). One interviewee voiced the opinion that PPAs would incentivize extra renewable electricity generation capacity more than the purchase of energy attribute certificates. Is this view justified in a jurisdiction where there is public support for renewable electricity generation? If so, what characteristics should a PPA have to maximise its effect on extra capacity?

In the face of these unknowns, offsets based on a rigorous methodology offer more certain GHG mitigation benefits, a point systematically argued in Gillenwater (2008b). However, as mentioned in section 12.1.2, there are some disincentives to offset use from the perspective of firms. Firstly, offsets will not be reflected in GHG emission figures based on the GHG Protocol's *Corporate Standard* and other attributional methodologies nor in targets approved by the Science Based Targets initiative. Furthermore, RECI/LCECI use has been legitimised by the GHG Protocol. Given this context, I doubt that firms will re-allocate their RECI/LCECI expenditure to offset use.

In addition, it seems prudent not to completely stifle business demand for RECI/LCECI which could serve to provide support to renewable and low-carbon electricity generators should public policy support for these generation methods dwindle. Therefore, on the pragmatic grounds of not wanting to hold out for the most rigorous option (offset use) and meanwhile let opportunities for shaping RECI/LCECI use slip away, I would argue for guidance that steers firms towards purchases that are more likely to result in additional renewable and low-carbon generation capacity.

I would recommend that the guidance does not form a new methodology for accounting for and reporting scope 2 emissions. Instead it should provide a strong normative steer, clearly explaining the supply/demand dynamics of relevant markets and what benefits RECI/LCECI purchase is/is not likely to achieve. A strong normative steer could be effective as this research has shown the importance placed by firms on legitimacy and only those practices with a reasonable expectation that they will GHG reduce emissions should be deemed socially appropriate. This element has been too weak in UK government guidance on carbon reporting and accounting e.g. Defra and DECC (2009).

It would be a fitting role for governments to commission the described guidance and underpinning research as some RECI/LCECI were created by regulation e.g. the GO. A steering role for policy-makers was foreseen by the GHG Protocol's scope 2 guidance (Sotos 2015a). UK energy regulator Ofgem put a lot of effort into ensuring that domestic renewable electricity tariffs met the expectations of residential consumers that their support would yield an environmental benefit (Insight Exchange on behalf of Ofgem

2013, Ofgem 2013a and 2013b). However, this research suggests that firms would benefit from assistance too.

In summary, I argue that there is a role for governments to commission research and publications specifically aimed at helping firms and other organisations operating within their jurisdictions to procure RECI/LCECI in a way that balances the need for effectiveness in stimulating extra renewable capacity without requiring a level of rigour that would lead to negligible take-up by firms.

12.4 IMPLICATIONS OF RESEARCH FOR PRACTITIONERS

There is an increasing number of tools available for investors, such as emission intensity metrics and stock market indices, to help them to factor GHG emissions data into their decisions. Use appeared to be low but was increasing (A.C.H. Smith 2016). This research has illustrated the high number of factors of which data-users must be aware in comparing both year-on-year changes in organisational GHG emission figures and inter-firm comparisons.

One issue is re-statement of data. Re-stating emissions is a legitimate practice under the GHG Protocol's *Corporate Standard* (GHG Protocol Initiative 2004). Data is restated for several reasons: to correct errors, improve the precision of data, apply methodological changes, and to reflect corporate restructuring (mergers, acquisitions and divestments). For example, corporate restructuring takes place in year y . To enable comparison, firms sometimes re-state $y-1$, $y-2$ and even further back, estimating what would have been the emissions in those years if the restructuring had already taken place. For robust normalisation of the data, restatement of commonly-used denominators is also needed but this happens infrequently or is not clearly labelled. My experience from this research leads me to urge firms to make the reason for restatement clear and be explicit when a new corporate structure is reflected in non-financial data as the aggregation of non-financial data from the new corporate structure may lag the date of mergers, acquisitions and divestments, and some types of nonfinancial data may reflect the new structure before others. Restatement is burdensome, although I would argue that restatement is only needed for the base year of the target and maybe $y-1$ if firms want to show the effect of the most recent mitigating actions.

12.5 FUTURE RESEARCH

In this section I discuss methodological modifications that I would make in future research before turning to new topics for research emerging from the findings for the research questions.

Beginning with methodology, Suchman (1995) gave two broad ways of viewing legitimacy: organisations instrumentally seek legitimacy to access resources and organisations participate in the definition of legitimacy with access to resources as a coincidental by-product. The first meaning suggests to me that firms are seeking a good reputation with a specific audience e.g. customers or capital markets. I have taken the view that legitimacy is broader than a good reputation with specific constituencies. It is about the desire for a widespread good reputation. However, legitimacy is an academic term which may require explanation from researchers that could influence how interviewees answer the question. A way of avoiding this pitfall while exploring these two views of legitimacy empirically would be to ask firms to rank stakeholders as drivers of an activity and additionally ask them to rank reputation without specifying whose good opinion was sought. A follow-up to this second question would be to ask firms to explain how they decide what produces a good reputation to see if they are working with others in their organizational field to co-construct what constitutes legitimacy.

An alternative method to consider for use in future research on RQ2 would be fuzzy-set Qualitative Comparative Analysis (fsQCA). It allows a systematic study of causality using Boolean algebra and set theory, enabling the researcher to discover factors that are sufficient or necessary for an outcome (Schneider and Wagemann 2006). In answering RQ2, I identified a set of conditions that determined if displacement of focus on other GHG mitigating activities had occurred or could occur as a result of RECI/LCECI use by the cases. The extent to which this combination of factors could account for displacement of focus in other firms could be investigated using fuzzy-set QCA.

To use QCA, one must decide the cut-off points that enable categorisation of data which can be difficult to do without being arbitrary. I had considered using this method as an alternative to case study method but rejected it for this reason. However, given the willingness of some staff members from the case study firms to acknowledge displacement of focus could occur, qualitative acknowledgement could be the outcome variable. The perceptions of interviewees of the strength of the drivers of cost-saving/reputation/morality could be calibrated using a Likert scale and would comprise the independent variables or conditions. As assembling the quantitative data to answer RQ2 was the most time-consuming aspect of this research project and this would no longer be needed, it would be easier to study a greater number of firms.

A further methodological refinement follows from prior research looking at the connection between external stakeholders and environmental management. Some prior research grouped stakeholders in various combinations, making it difficult to assess the association with specific groups of stakeholders. I would argue that external stakeholders are very diverse and need to be considered separately. Furthermore, while not the focus of this research, gathered data suggests that stakeholder views on climate change action should be viewed as dynamic and this may help in understanding contradictions in past research if it emerges that it was conducted at different times.

Turning to new topics for future research, firstly, the research questions could be applied to other firms in other sectors and incorporated in other countries to see if the key factors influencing RECI/LCECI use are consistent in these new contexts and whether the conditions that I found for displacement of attention on energy efficiency/saving holds in these new contexts. Furthermore, it would be useful to have more data on the costs of RECI/LCECI in different areas to permit further assessment of the financial opportunity costs of their use. This thesis should help to develop the methodologies, particularly for RQ2, where I found the qualitative data for this question more useful than I expected.

A further line of future research would be to probe the statement by five firms that they were close to exhausting the energy efficiency/saving actions open to them. I assume this is with reference to internal criteria for implementation. Four of the five fall into the financial sector which only uses 2% of global electricity demand (International Renewable Energy Agency 2018). However, the issues that they face may also be relevant for firms in other sectors with significant office and IT facilities. Indeed, a telecoms firm made the same comment as the office-/IT-based firms. The questions for policy-makers are whether these firms' criteria are reasonable given the challenge of climate change? If not, what can incentivise firms to modify them? If so, have they really implemented most of the mitigating activities that meet them and if this is the case what can be done to generate further options?

While not the focus of RQ1, I concluded from conversations with some firm interviewees that guidance based on research was needed to inform firms about the dynamics of RECI/LCECI markets relevant to them, the different RECI/LCECI options open to them and their relative effectiveness in stimulating extra renewable capacity. I have covered this in 12.3.2, but I mention it again here to stress that this needs to be underpinned by up-to-date research reflecting current market conditions and assessing emerging RECI/LCECI such PPAs.

The data gathered for answering RQ1 also showed the extensive use some firms have made of RECI/LCECI which may be reflected in market-based scope 2 emission figures that firms publish. A related topic to this thesis is the use of location- and market-based method scope 2 figures by external parties. Are data-providers and data-users, such as investors, aware of the difference between the two figures and do they ensure they are comparing like-with-like across firms? This research should extend into the impression gained by data-users, particularly policy-makers, who see the reported emissions of corporate giants plummeting due to the application of the market-based scope 2 approach. Do they think these firms' emission figures are representative of other businesses? Are they aware that if all electricity consumers were reporting their market-based scope 2 emissions, then the reported scope 2 emissions of consumers that do not buy RECI/LCECI would be rising commensurately to the drop in emissions from

those firms that do?⁵⁴⁴ However, not all electricity consumers do report their GHG emissions and those that do not use RECI/LCECI may be less likely to report their emissions than those that do.

Findings for RQ1 supported the case made by Aguinis and Glavas (2012) for further research on the impact of CSR responses on employees e.g. how does this affect their motivation and performance at work? Several cases have said that a good reputation on climate change and environmental issues will have a positive impact on their employees and this can be a driver for firms to change to please this stakeholder group. I am not arguing that it is as powerful a driver as cost-saving driving energy efficiency/saving, but it is worth considering as a lever for change. Further academic research on exactly what appeals to employees and what effect it has on employee activity would be of practical interest to firms and possibly campaigning NGOs too. NGO campaigns to change business practices have typically focussed on changing consumer behaviour. NGOs may be able to do as much or more in persuading the leadership of firms to take environmental action through campaigns targeted at their employees.

This PhD thesis has also suggested another fascinating line of research on CSR rating agencies. The importance of good scores from these agencies has been demonstrated by this thesis and I have argued are a means of the firm attaining or maintaining legitimacy. Yet the firms have also been responsible for legitimising rating agencies such as CDP as it relies on firms submitting data to it for assessment. This is distinct from ratings that use data already in the public domain. Of course, CDP has had the backing of increasing numbers of investors as evidenced by the lengthening list of investors signing its request for climate change information from firms. Firms have questioned how investors are using the data (Sullivan and Gouldson 2012). Yet firms have still responded to CDP. This suggests a co-construction between firms and CDP of the meaning of legitimacy within this organisational field, a hypothesis that would be fascinating to test.

This research found instances where the scoring methodologies of CSR rating agencies had influenced firms' GHG mitigating actions. A further line of enquiry would be to investigate the prevalence of this degree of influence on firms and to question the direction in which rating agencies have been steering firms? These new lines of research would contribute to our understanding of what happens when nonstate actors take on a governance role in climate change mitigation.

⁵⁴⁴ If Consumer A uses X MWh of RECI, then the MWh of fossil fuel electricity it is contracting for reduces by X. For other electricity consumers on the same grid, they have X MWh less renewable electricity available for them to contract for and therefore contract for X MWh more fossil fuel electricity. It is a zero-sum situation.

13 BIBLIOGRAPHY

- Accenture Strategy - prepared for Global e-Sustainability Initiative. 2015. '#SMARTer2030'. http://smarter2030.gesi.org/downloads/Full_report2.pdf.
- Aggarwal, R., and S. Dow. 2012. 'Corporate Governance and Business Strategies for Climate Change and Environmental Mitigation'. *The European Journal of Finance* 18 (3–4): 311–31.
- Aguilera, R.V., and G. Jackson. 2003. 'The Cross-National Diversity of Corporate Governance: Dimensions and Determinants'. *Academy of Management Review* 28 (3): 447–65.
- . 2010. 'Comparative and International Corporate Governance'. *Academy of Management Annals* 4 (1): 485–556.
- Aguinis, H., and A. Glavas. 2012. 'What We Know and Don't Know About Corporate Social Responsibility: A Review and Research Agenda'. *Journal of Management* 38 (4): 932–68. <https://doi.org/10.1177/0149206311436079>.
- Al-Najjar, B., and A. Anfiadiou. 2012. 'Environmental Policies and Firm Value'. *Business Strategy and the Environment*. 21 (1): 49–59.
- Andersson, L. M., and T. S. Bateman. 2000. 'Individual Environmental Initiative: Championing Natural Environmental Issues in U.S. Business Organizations'. *Academy of Management Journal* 43 (4): 548–70.
- Andrew, J., and C. Cortese. 2011. 'Accounting for Climate Change and the Self-Regulation of Carbon Disclosures'. *Accounting Forum* 35 (3): 130–38.
- Anton, W.R.Q., G. Deltas, and M. Khanna. 2004. 'Incentives for Environmental Self-Regulation and Implications for Environmental Performance'. *Journal of Environmental Economics and Management* 48 (1): 632–54. <https://doi.org/10.1016/j.jeem.2003.06.003>.
- Argote, L., and H. R. Greve. 2007. "A Behavioral Theory of the Firm": 40 Years and Counting: Introduction and Impact'. *Organization Science* 18 (3): 337–49.
- Arora, P., and R. Dharwadkar. 2011. 'Corporate Governance and Corporate Social Responsibility (CSR): The Moderating Roles of Attainment Discrepancy and Organization Slack'. *Corporate Governance* 19 (2): 136–52.
- Asci, F., and Lovell, H. 2011. 'As Frames Collide: Making Sense of Carbon Accounting'. *Accounting, Auditing and Accountability Journal* 24 (8): 978–99.
- Association of Issuing Bodies. 2017. 'Principles and Rules of Operation Release 7 v.9'. <https://www.aib-net.org/documents/103816/-/-/7b5c98bb-a1dd-e45e-2a92-b610bbea37b8>.
- Avetisyan, E., and M. Ferrary. 2013. 'Dynamics of Stakeholders' Implications in the Institutionalization of the CSR Field in France and in the United States'. *Journal of Business Ethics* 115 (1): 115–33.
- Bain, D. 2015. 'Scope 2 Corporate Accounting, Enron and Arthur Andersen – A Cautionary Tale'. Greenhouse Gas Management Institute. *Inside The Institute* (blog). 25 January 2015. <http://ghginstitute.org/scope-2-corporate-accounting-enron-and-arthur-andersen-a-cautionary-tale/#comments>.
- Bansal, P. 2005. 'Evolving Sustainably: A Longitudinal Study of Corporate Sustainable Development'. *Strategic Management Journal* 26 (3): 197–218.
- Bansal, P., J. Gao, and I. Qureshi. 2014. 'The Extensiveness of Corporate Social and Environmental Commitment across Firms over Time'. *Organization Studies* 35 (7): 949–66. <https://doi.org/10.1177/0170840613515564>.
- Barney, J. 1991. 'Firm Resources and Sustained Competitive Advantage'. *Journal of Management* 17 (1): 99.

- Bellingham, R. 2013. 'Climate Change Levy Exemption for Indirect Supplies of Good Quality Combined Heat and Power', 26 March 2013. https://www.ofgem.gov.uk/sites/default/files/docs/2013/03/chp-lec-information-note-260313_0.pdf.
- Berkhout, T., and I.H. Rowlands. 2007. 'The Voluntary Adoption of Green Electricity by Ontario-Based Companies: The Importance of Organizational Values and Organizational Context'. *Organization and Environment* 20 (3): 281–303.
- Birmingham Post. 2007. 'Climate Change Tops CBI Bill'. 1 November 2007. <http://www.birminghampost.co.uk/business/climate-change-tops-cbi-bill-3965621>.
- Boiral, O., J-F Henri, and D. Talbot. 2012. 'Modeling the Impacts of Corporate Commitment on Climate Change'. *Business Strategy and the Environment* 21 (8): 495–516. <https://doi.org/10.1002/bse.723>.
- Bondy, K., D. Matten, and J. Moon. 2008. 'Multinational Corporation Codes of Conduct: Governance Tools for Corporate Social Responsibility?' *Corporate Governance* 16 (4): 294–311. <https://doi.org/10.1111/j.1467-8683.2008.00694>.
- Borghesi, R., J.F. Houston, and A. Naranjo. 2014. 'Corporate Socially Responsible Investments: CEO Altruism, Reputation, and Shareholder Interests'. *Journal of Corporate Finance* 26: 164–81.
- Bortz, C. 2007. 'Conversation'. *Harvard Business Review* 85 (10): 32–32.
- Bowen, F.E. 2000. 'Does Size Matter? Organisational Slack and Visibility as Alternative Explanations for Environmental Responsiveness'. Doctor of Philosophy thesis, University of Bath, UK. <https://researchportal.bath.ac.uk/en/studentTheses/does-size-matter-organisational-slack-and-visibility-as-alternati>.
- Bowen, F.E., and J. A. Aragon-Correa. 2014. 'Greenwashing in Corporate Environmentalism Research and Practice: The Importance of What We Say and Do'. *Organization and Environment* 27 (2): 107–12. <https://doi.org/10.1177/1086026614537078>.
- Brander, M. 2016. 'Transposing Lessons between Different Forms of Consequential Greenhouse Gas Accounting: Lessons for Consequential Life Cycle Assessment, Project-Level Accounting, and Policy-Level Accounting'. *Journal of Cleaner Production* 112 (January): 4247–56. <https://doi.org/10.1016/j.jclepro.2015.05.101>.
- Brander, M., and F. Ascui. 2015. 'The Attributional-Consequential Distinction and Its Applicability to Corporate Carbon Accounting.' In *Corporate Carbon and Climate Accounting*, edited by S. Schaltegger, D. Zvezdov, I. Alvarez Etxeberria, M. Csutora, and E. Guenther, 99–120. Dordrecht, the Netherlands: Springer.
- Brander, M., D. Broekhoff, M. Gillenwater, and M. Trexler. 2013. 'Open Letter on Scope 2 GHG Reporting | For a "True and Fair" Representation of Corporate Actions and Emissions'. 10 December 2013. <http://scope2openletter.wordpress.com/>.
- Brander, M., D. Broekhoff, M. Gillenwater, and M. Trexler. 2015. 'Open Letter Rejecting the Use of Contractual Emission Factors in Reporting GHG Protocol Scope 2 Emissions', 2 February 2015. <https://scope2openletter.wordpress.com/>.
- Brander, M., M. Gillenwater, and F. Ascui. 2018. 'Creative Accounting: A Critical Perspective on the Market-Based Method for Reporting Purchased Electricity (Scope 2) Emissions'. *Energy Policy* 112 (January): 29–33. <https://doi.org/10.1016/j.enpol.2017.09.051>.
- Broekhoff, D. 2007. 'Guidelines for Quantifying Reductions from Grid-Connected Electricity Projects'. World Resources Institute, Washington D.C., USA. <https://wriorg.s3.amazonaws.com/s3fs-public/pdf/ghgprotocol-electricity.pdf>.
- Brown, J. A., and W. R. Forster. 2013. 'CSR and Stakeholder Theory: A Tale of Adam Smith'. *Journal of Business Ethics* 112 (2): 301–12. <https://doi.org/10.2307/23327206>.

- Bryman, A., and E. Bell. 2003. *Business Research Methods*. Oxford, UK: Oxford University Press.
- Bürger, V. 2007. 'Green Power Labelling - An Instrument to Enhance Transparency and Sustainability on the Voluntary Green Power Market'. Öko-Institut, Germany.
<https://www.oeko.de/oekodoc/1480/2007-230-en.pdf>.
- Busch, T., and J. Schwarzkopf. 2013. 'Carbon Management Strategies - A Quest for Corporate Competitiveness'. *Progress in Industrial Ecology* 8 (1–2): 4–29.
- Buyse, K., and A. Verbeke. 2003. 'Proactive Environmental Strategies: A Stakeholder Management Perspective'. *Strategic Management Journal* 24 (5): 453–70.
- Campbell, J. L. L. 2007. 'Why Would Corporations Behave in Socially Responsible Ways? An Institutional Theory of Corporate Social Responsibility.' *The Academy of Management Review* 32 (3): 946–67.
- Cannella, B., S. Finkelstein, and D. C. Hambrick. 2009. *Strategic Leadership: Theory and Research on Executives, Top Management Teams, and Boards*. Online edition. Oxford Scholarship Online.
<http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780195162073.001.0001/acprof-9780195162073-chapter-2>.
- Carbon Trust. n.d. 'About Us | Sustainability Specialists | Carbon Trust'. Accessed 13 September 2018a.
<https://www.carbontrust.com/about-us/>.
- Carroll, A. B. 2016. 'Carroll's Pyramid of CSR: Taking Another Look'. *International Journal of Corporate Social Responsibility* 1 (1): 3. <https://doi.org/10.1186/s40991-016-0004-6>.
- CDP. 2002. 'CDP1 (2002) Questionnaire'. CDP. http://cdp.cdproject.net/questionnaire_historic.asp.
- . 2007. 'CDP5 (2007) Greenhouse Gas Emissions Questionnaire'. CDP. 4th Floor Plantation Place South, 60 Great Tower Street, London EC3R 5AD, UK. Telephone +44 (0)203818 3900.
<https://www.cdp.net/en/info/contact>⁵⁴⁵
- . 2008. 'CDP6 Guidance'. CDP. May 16. Contact details as above.
- . 2009. 'Carbon Disclosure Project (CDP2009 (CDP7)) Reporting Guidance'. CDP. 18 March. Contact details as above.
- . 2021. Investor CDP 2011 Information Request. CDP. Contact details as above.
- . 2013. 'Accounting for Scope 2 Emissions - Technical Notes for Companies Reporting on Climate Change on Behalf of Investors and Supply Chain Members 2013'.
<http://www.iea.org/publications/freepublications/publication/name,32870,en.html>.
- . 2016a. 'CDP Climate Change Scoring Methodology 2016'. 2016.
<https://www.cdp.net/Documents/Guidance/2016/CDP-climate-change-scoring-methodology-2016.pdf>.
- . 2016b. 'CDP Technical Note Science-Based Targets'. 2016.
<https://www.cdp.net/Documents/Guidance/2016/CDP-technical-note-science-based-targets.pdf>.
- . 2016c. 'Accounting of Scope 2 Emissions 2016 - CDP Technical Note - Accounting of Scope 2 Emissions 2016'. <https://www.cdp.net/Documents/Guidance/2016/CDP-technical-note-Accounting-of-Scope-2-Emissions-2016.pdf>.

⁵⁴⁵ Some non-current CDP documents are no longer available on the CDP website. Therefore, contact details are given for readers who may wish to contact CDP requesting access to the cited documents.

- . 2016d. 'CDP2016 Climate Change Reporting Guidance'. April 2016. <https://www.cdp.net/Documents/Guidance/2016/CDP-2016-Climate-Change-Reporting-Guidance.pdf>.
- . n.d.a. 'Companies'. Accessed 22 March 2019a. <https://www.cdp.net/en/companies>.
- . n.d.b. 'Data - CDP'. Accessed 22 March 2019b. <https://www.cdp.net/en/data>.
- . n.d.c. 'Supply chain'. Accessed 22 March 2019e. <https://www.cdp.net/en/supply-chain>
- Chapple, W., A. Cooke, V. Galt, and D. Paton. 2001. 'The Determinants of Voluntary Investment Decisions'. *Managerial and Decision Economics* 22 (8): 453–63.
- Chatterji, A. K., and M. W. Toffel. 2010. 'How Firms Respond to Being Rated'. *Strategic Management Journal* 31 (9): 917–945. <https://doi.org/10.1002/smj.840>.
- Chatterji, A.K., R. Durand, D.I. Levine, and S. Touboul. 2016. 'Do Ratings of Firms Converge? Implications for Managers, Investors and Strategy Researchers'. *Strategic Management Journal* 37 (8): 1597–1614. <https://doi.org/10.1002/smj.2407>.
- Chen, J. 2019. 'Understanding Investors'. Investopedia. 21 January 2019. <https://www.investopedia.com/terms/i/investor.asp>.
- Christmann, P. 2000. 'Effect of "Best Practice" of Environmental Management on Cost Advantage: The Role of Complementary Assets'. *Academy of Management Journal* 43 (4): 663–80.
- . 2004. 'Multinational Companies and the Natural Environment: Determinants of Global Environmental Policy Standardization'. *Academy of Management Journal* 47 (5): 747–60.
- Coffey, B.S., and G.E. Fryxell. 1991. 'Institutional Ownership of Stock and Dimensions of Corporate Social Performance: An Empirical Examination'. *Journal of Business Ethics* 10 (6): 437–44.
- Cohen, W.M., and D.A. Levinthal. 1990. 'Absorptive-Capacity: A New Perspective on Learning and Innovation'. *Administrative Science Quarterly* 35: 128–52.
- Collins English Dictionary. 1998. Fourth Australian edition. Collins English Dictionary. Glasgow, UK: HarperCollins Publishers.
- Collison, D., G. Cobb, D. Power, and L. Stevenson. 2009. 'FTSE4Good: Exploring the Implications for Corporate Conduct'. *Accounting, Auditing and Accountability Journal* 22 (1): 35–58.
- Companies Act 2006. 2006. <http://www.legislation.gov.uk/ukpga/2006/46/part/10/chapter/2>.
- CORE Coalition. 2014. 'History of CORE Coalition'. CORE - Putting People and the Planet at the Core of Business. 2014. <https://corporate-responsibility.org/about-core/history/>.
- Cornett, M. M., O. Erhemjamts, and H. Tehranian. 2016. 'Greed or Good Deeds: An Examination of the Relation between Corporate Social Responsibility and the Financial Performance of U.S. Commercial Banks around the Financial Crisis'. *Journal of Banking and Finance* 70 (September): 137–59. <https://doi.org/10.1016/j.jbankfin.2016.04.024>.
- Crane, A., and D. Matten. 2010. *Business Ethics*. 3rd ed. Oxford: Oxford University Press.
- Crane, A., D. Matten, and L. Spence. 2013. 'Corporate Social Responsibility in a Global Context'. In *Corporate Social Responsibility: Readings and Cases in a Global Context*, 2nd ed., 3–26. Abingdon, UK: Routledge. <http://ssrn.com/abstract=2322817>.
- Creswell, J.W. 2015. *30 Essential Skills for the Qualitative Researcher*. Thousand Oaks, CA, USA: SAGE.
- Creswell, J.W., and J.D. Creswell. 2018. *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 5th ed. Los Angeles, USA: SAGE Publications, Inc.

- Creswell, J.W., and V.L. Plano Clark. 2018. *Designing and Conducting Mixed Methods Research*. 3rd ed. Los Angeles, USA, London, UK, New Dehli, India, Singapore, Washington DC, USA, Melbourne, Australia: Sage.
- Crilly, D. 2011. 'Predicting Stakeholder Orientation in the Multinational Enterprise: A Mid-Range Theory'. *Journal of International Business Studies* 42 (5): 694–717.
- Crossland, C. 2007. 'National Institutions and Managerial Discretion: A Taxonomy of 24 Countries'. *Academy of Management Proceedings* 2007 (1): 1–6. <https://doi.org/10.5465/ambpp.2007.26523622>.
- Cyert, R.M, and J.G. March. 1963. *A Behavioural Theory Of The Firm*. 2nd ed. Malden, Massachusetts, USA and Oxford, UK: Blackwell.
- Dam, L., and B. Scholtens. 2012. 'Does Ownership Type Matter for Corporate Social Responsibility?' *Corporate Governance* 20 (3): 233–52.
- Delmas, M., and M. J. Montes-Sancho. 2010. 'Voluntary Agreements to Improve Environmental Quality: Symbolic and Substantive Cooperation'. *Strategic Management Journal* 31 (6): 575–601. <https://doi.org/10.1002/smj.826>.
- Delmas, M., and I. Montiel. 2009. 'Greening the Supply Chain: When Is Customer Pressure Effective?' *Journal of Economics and Management Strategy* 18 (1): 171–201. <https://doi.org/10.1111/j.1530-9134.2009.00211.x>.
- Delmas, M., V. H. Hoffmann, and M. Kuss. 2011. 'Under the Tip of the Iceberg: Absorptive Capacity, Environmental Strategy, and Competitive Advantage'. *Business and Society* 50 (1): 116–54. <https://doi.org/10.1177/0007650310394400>.
- Delmas, M. and M. W. Toffel. 2012. 'Institutional Pressures and Organizational Characteristics: Implications for Environmental Strategy'. In *The Oxford Handbook of Business and the Natural Environment*. 1st ed. Edited by P. Bansal and A. Hoffman, 229–247. Oxford, UK: Oxford University Press.
- Department for Business, Energy and Industrial Strategy, UK. 2016. 'Building Energy Efficiency Survey, 2014-15: Overarching Report'. London, UK. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/565748/BEES_overarching_report_FINAL.pdf.
- _____. 2019. 'Environmental Reporting Guidelines: Including streamlined energy and carbon reporting guidance'. London, UK. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/791529/Env-reporting-guidance_inc_SECR_31March.pdf
- Department for Environment, Food and Rural Affairs, UK. 2007. 'Guidelines to Defra's GHG Conversion Factors for Company Reporting - Annexes Updated June 2007'. Department for Environment, Food and Rural Affairs, Seacole Building, 2 Marsham Street, London, SW1P 4DF, UK. Telephone +44 20 7238 6951. Email defra.helpline@defra.gov.uk⁵⁴⁶
- _____. 2008. 'Guidelines to Defra's Greenhouse Gas Conversion Factors for Company Reporting'. Department for Environment, Food and Rural Affairs. Contact information as per entry above.

⁵⁴⁶ Some non-current UK government documents are not available on GOV.UK website. Therefore, contact details are given for readers that who want to access the cited documents.

- . 2013. 'Environmental Reporting Guidelines: Including Mandatory Greenhouse Gas Emissions Reporting Guidance'. Department for Environment, Food and Rural Affairs. <https://www.gov.uk/measuring-and-reporting-environmental-impacts-guidance-for-businesses>.
- . 2014. 'GHG Reporting Guidelines - 2014 Update - Defra - Citizen Space'. 24 February 2014. <https://consult.defra.gov.uk/climate-change/ac04ad33/>.
- Department for Environment, Food and Rural Affairs, UK, and Department of Energy and Climate Change, UK. 2009. 'Guidance on How to Measure and Report Your Greenhouse Gas Emissions'. Department for Environment, Food and Rural Affairs. Contact information for Defra as per Defra (2007) entry.
- Department of Energy and Climate Change. 2014. 'Finalising CRC Simplification: Treatment of Renewable Energy and the Metallurgical and Mineralogical Sectors Government Response'. February 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/284568/Government_Response_-_CRC.pdf.
- Department of the Environment, UK. n.d. 'Making a Corporate Commitment'. London, UK: Department of the Environment. Accessed 10 October 2017. <http://www.cibse.org/getmedia/f27d4a26-ef30-4e19-9b98-c8752684d732/Making-a-Corporate-Committment-Chairmans-Check-List.pdf.aspx>.
- DiMaggio, P. J., and W. W. Powell. 1983. 'The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields'. *American Sociological Review* 48 (2): 147–60. <https://doi.org/10.2307/2095101>.
- Doda, B., C. Gennaioli, A. Gouldson, D. Grover, and R. Sullivan. 2016. 'Are Corporate Carbon Management Practices Reducing Corporate Carbon Emissions?' *Corporate Social Responsibility and Environmental Management* 23 (5): 257–70. <https://doi.org/10.1002/csr.1369>.
- Dögl, C., and M. Behnam. 2015. 'Environmentally Sustainable Development through Stakeholder Engagement in Developed and Emerging Countries'. *Business Strategy and the Environment* 24: 583–600. <https://doi.org/10.1002/bse.1839>.
- Donaldson, T., and Preston, L.E. 1995. 'The Stakeholder Theory of The Corporation: Concepts, Evidence and Implications'. *Academy of Management Review* 20 (1): 65–92.
- Draeck, M. 2009. 'The State of Implementation of Electricity Disclosure and Guarantees of Origin across Europe'. A report prepared as part of the Intelligent Energy Europe project 'A European Tracking System for Electricity – Phase II (E-TRACK II)'. <http://www.e-track-project.org/>.
- Dragomir, V.D. 2012. 'The Disclosure of Industrial Greenhouse Gas Emissions: A Critical Assessment of Corporate Sustainability Reports'. *Journal of Cleaner Production* 29–30: 222–37.
- Duggan. n.d. 'Indulgence | Roman Catholicism'. Encyclopaedia Britannica. Accessed 22 February 2019. <https://www.britannica.com/topic/indulgence>.
- Eesley, C., and M.J. Lenox. 2006. 'Firm Responses to Secondary Stakeholder Action'. *Strategic Management Journal* 27 (8): 765–81. <https://doi.org/10.1002/smj.536>.
- Elsayed, K. 2006. 'Re examining the Expected Effect of Available Resources and Firm Size on Firm Environmental Orientation: An Empirical Study of UK Firms'. *Journal of Business Ethics* 65 (3): 297–308.
- Endrikat, J., E. Guenther, and H. Hoppe. 2014. 'Making Sense of Conflicting Empirical Findings: A Meta-Analytic Review of the Relationship between Corporate Environmental and Financial Performance'. *European Management Journal* 32 (5): 735–51. <https://doi.org/10.1016/j.emj.2013.12.004>.
- ENDS Report. 2010. 'Consumer Goods Firms Act on HFCs and Forests', 31 December 2010. <https://www.endsreport.com/article/26640/consumer-goods-firms-act-on-hfcs-and-forests>.

- European Commission. 2016. 'EU Legislation to Control F-Gases'. European Commission. 23 November 2016. https://ec.europa.eu/clima/policies/f-gas/legislation_en.
- . 2017. 'Fluorinated Greenhouse Gases | Climate Action'. European Commission. 2 November 2017. https://ec.europa.eu/clima/policies/f-gas_en.
- European Energy Exchange. 2013. 'EEX Launches Trading in Guarantees of Origin'. 6 June 2013. <https://www.eex.com/en/about/newsroom/news-detail/eex-launches-trading-in-guarantees-of-origin/19820>.
- European Parliament and European Council. 2000. *Directive 2000/2037/EC*. <http://data.europa.eu/eli/reg/2000/2037/oj/eng>
- . 2001. *Directive 2001/77/EC*. http://europa.eu/legislation_summaries/energy/renewable_energy/l27035_en.htm.
- . 2003. *Directive 2003/54/EC*. <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32003L0054>.
- . 2004. *Directive 2004/8/EC*. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32004L0008>.
- . 2009. *Directive 2009/28/EC*. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF>.
- . 2012. *Directive 2012/27/EU*. <http://data.europa.eu/eli/dir/2012/27/oj/eng>.
- . 2014. *Directive 2014/517/EC* <http://data.europa.eu/eli/reg/2014/517/oj/eng>.
- Evans, S. 2016. 'Timeline: The Past, Present and Future of Germany's Energiewende'. Carbon Brief. 21 September 2016. <https://www.carbonbrief.org/timeline-past-present-future-germany-energiewende>.
- Favotto, A., K. Kollman, and P. Bernhagen. 2016. 'Engaging Firms: The Global Organisational Field for Corporate Social Responsibility and National Varieties of Capitalism'. *Policy and Society* 35 (1): 13–27. <https://doi.org/10.1016/j.polsoc.2015.12.003>.
- Fifka, M. S., and D. Reiser. 2015. 'Corporate Social Responsibility in between Governmental Regulation and Voluntary Initiative: The Case of Germany'. In *Corporate Social Responsibility in Europe - Corporate Social Responsibility in Europe*, edited by S.O. Idowu, R. Schmidpeter, and M. S. Fifka. 125-135. Location of publisher not given: Springer International Publishing.
- Financial Times. 2015. 'FT 500 2015 Introduction and Methodology'. Financial Times. 19 June 2015. <https://www.ft.com/content/1fda5794-169f-11e5-b07f-00144feabdc0>.
- Fioretos, O. 2001. 'Varieties of Corporate Governance: Comparing Germany and the UK'. In *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, edited by P.A. Hall and D. Soskice, 337-360. Oxford, UK: Oxford University Press.
- Freeman, R.E. 1999. 'Divergent Stakeholder Theory'. *Academy of Management Review* 24 (2): 233–36.
- Friedman, A.L., and S. Miles. 2006. *Stakeholders - Theory and Practice*. New York: Oxford University Press Inc.
- Friedman, M. 1970. 'The Social Responsibility of Business Is to Increase Its Profits'. *New York Times Magazine*, 13 September 1970.
- FTSE. n.d. 'FTSE ESG Ratings Integrating ESG into Investments and Stewardship'. FTSE. Accessed 18 May 2015. <http://www.ftse.com/products/downloads/FTSE-ESG-Methodology-and-Usage-Summary-Short.pdf?814>.

- Furrer, B., J. Hamprecht, and V. H. Hoffmann. 2011. 'Much Ado About Nothing? How Banks Respond to Climate Change'. *Business and Society* 51 (1): 62–88. <https://doi.org/10.1177/0007650311427428>.
- General Secretariat of the Council. 2018. 'Proposal for a Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from Renewable Sources - Analysis of the Final Compromise Text with a View to Agreement - Interinstitutional File: 2016/0382 (COD)'. <http://data.consilium.europa.eu/doc/document/ST-10308-2018-INIT/en/pdf>.
- GHG Protocol. 2011. 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard - Supplement to the GHG Protocol Corporate Accounting and Reporting Standard'. World Resources Institute, Washington D.C., USA, and World Business Council for Sustainable Development, Conches-Geneva, Switzerland. <http://ghgprotocol.org/standards/scope-3-standard>.
- . 2016. 'Global Warming Potential Values'. GHG Protocol. https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf.
- GHG Protocol Initiative. 2004. 'GHG Protocol Corporate Accounting and Reporting Standard - Revised Edition'. World Resources Institute, Washington, DC, USA and World Business Council for Sustainable Development, Conches-Geneva, Switzerland. <http://www.ghgprotocol.org/standards/corporate-standard>.
- Giddens, A. 1979. *Central Problems in Social Theory: Action, Structure, and Contradiction in Social Analysis*. Berkeley: University of California Press.
- Gillenwater, M. 2008a. 'Redefining RECs—Part 1: Untangling Attributes and Offsets'. *Energy Policy* 36 (6): 2109–19.
- . 2008b. 'Redefining RECs—Part 2: Untangling Certificates and Emission Markets.' *Energy Policy* 36 (6): 2120–29.
- . 2013. 'Probabilistic Decision Model of Wind Power Investment and Influence of the Green Power Market'. *Energy Policy* 63 (October): 1111–25.
- Gjølberg, M. 2009. 'The Origin of Corporate Social Responsibility: Global Forces or National Legacies?' *Socio-Economic Review* 7 (4): 605–37. <https://doi.org/10.1093/ser/mwp017>.
- Gliedt, T., T. Berkhout, P. Parker, and J. Doucet. 2010. 'Voluntary Environmental Decision Making in Firms: Green Electricity Purchases and the Role of Champions'. *International Journal of Business Environment* 3 (3).
- Gliedt, T., and P. Parker. 2010. 'Dynamic Capabilities for Strategic Green Advantage: Green Electricity Purchasing in North American Firms, SMEs, NGOs and Agencies'. *Global Business and Economics Review* 12 (3): 171–95.
- Global e-Sustainability Initiative. n.d. 'SMART 2020 Enabling the low-carbon economy in the information age'. Accessed 12 April 2019. <https://gesi.org/report/detail/smart-2020-enabling-the-low-carbon-economy-in-the-information-age?cv=1>
- Global Reporting Initiative. n.d. 'About GRI'. Accessed 7 August 2015. <https://www.globalreporting.org/Information/about-gri/Pages/default.aspx>.
- Godfrey P. C., Merrill C. B., and Hansen J. M. 2008. 'The Relationship between Corporate Social Responsibility and Shareholder Value: An Empirical Test of the Risk Management Hypothesis'. *Strategic Management Journal* 30 (4): 425–45. <https://doi.org/10.1002/smj.750>.
- Gond, J-P., and A. Crane. 2010. 'Corporate Social Performance Disoriented: Saving the Lost Paradigm?' *Business and Society* 49 (4): 677–703. <https://doi.org/10.1177/0007650308315510>.

- Gouldson, A., and R. Sullivan. 2013. 'Long-Term Corporate Climate Change Targets: What Could They Deliver?' *Environmental Science and Policy* 27 (March): 1–10.
<https://doi.org/10.1016/j.envsci.2012.11.013>.
- . 2014. 'Understanding the Governance of Corporations: An Examination of the Factors Shaping UK Supermarket Strategies on Climate Change'. *Environment and Planning A* 46 (12): 2972–90.
- GOV.UK. 2017. 'Excise Notice CCL1: A General Guide to Climate Change Levy'. 4 April 2017.
<https://www.gov.uk/government/publications/excise-notice-ccl1-a-general-guide-to-climate-change-levy/excise-notice-ccl1-a-general-guide-to-climate-change-levy>.
- . 2018. 'ESOS'. GOV.UK. 2 July 2018. <https://www.gov.uk/guidance/energy-savings-opportunity-scheme-esos>.
- Graaf, F. J. de, and J. W. Stoelhorst. 2013. 'The Role of Governance in Corporate Social Responsibility: Lessons From Dutch Finance'. *Business and Society* 52 (2): 282–317.
<https://doi.org/10.1177/0007650309336451>.
- Graafland, J. J. 2004. 'Collusion, Reputation Damage and Interest in Codes of Conduct: The Case of a Dutch Construction Company'. *Business Ethics: A European Review* 13 (2/3): 127–42.
<https://doi.org/10.1111/j.1467-8608.2004.00359.x>.
- Greer, J., and Bruno, K. 1996. *Greenwash - the Reality behind Corporate Environmentalism*. Third World Network, Penang, Malaysia; The Apex Press, New York.
- Grekova, K., H.J. Bremmers, J.H. Trienekens, R.G.M. Kemp, and S.W.F. Omta. 2014. 'Extending Environmental Management beyond the Firm Boundaries: An Empirical Study of Dutch Food and Beverage Firms'. *Sustainable Food Supply Chain Management* 152: 174–87.
<https://doi.org/10.1016/j.ijpe.2013.12.019>.
- Haar, L., and L. N. Stanciu. 2002. 'Comment upon "Public Goods and Private Interests: Understanding Non-Residential Demand for Green Power"'. *Energy Policy* 30 (15): 1357–61.
[https://doi.org/10.1016/S0301-4215\(02\)00078-2](https://doi.org/10.1016/S0301-4215(02)00078-2).
- Hall, P.A., and D. Soskice. 2001. 'An Introduction to Varieties of Capitalism'. In *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, edited by P.A. Hall and D. Soskice. Preface and pp.1-70. Oxford, UK: Oxford University Press.
- Hall, P. A., and R. C. R. Taylor. 1996. 'Political Science and the Three New Institutionalisms*'. *Political Studies* 44 (5): 936–57. <https://doi.org/10.1111/j.1467-9248.1996.tb00343.x>.
- Hahn, T. and J. Pinkse. 2014. 'Private Environmental Governance Through Cross-Sector Partnerships: Tensions Between Competition and Effectiveness'. *Organization Environment*. 27 (2):140-160. DOI:10.1177/1086026614530996
- Hambrick, D. C., and S. Finkelstein. 1987. 'Managerial Discretion: A Bridge between Polar Views on Organizations.' In *Research in Organizational Behavior*, edited by L.L. Cummings and L. Staw, 9:369–406. Greenwich, CT, USA: JAI Press.
- Hamrick, K., and M. Gallant. 2017. 'Unlocking Potential - State of Voluntary Carbon Markets 2017'. Washington D.C., USA: Forest Trends' Ecosystem Marketplace. https://www.forest-trends.org/wp-content/uploads/2017/07/doc_5591.pdf.
- Hamrick, K., and A. Goldstein. 2016. 'Raising Ambition - State of the Voluntary Carbon Markets 2016'. Washington D.C., USA: Forest Trends' Ecosystem Marketplace. https://www.forest-trends.org/wp-content/uploads/imported/2016sovcm-report_10-pdf.pdf.
- Hart, S. L. 1995. 'A Natural-Resource-Based View of the Firm'. *Academy of Management Review* 20 (4): 986–1014.

- Hast, A., S. Syri, J. Jokiniemi, M. Huuskonen, and S. Cross. 2015. 'Review of Green Electricity Products in the United Kingdom, Germany and Finland'. *Renewable and Sustainable Energy Reviews* 42: 1370–84.
- Henriques, I., and P. Sadorsky. 1996. 'The Determinants of an Environmentally Responsive Firm: An Empirical Approach'. *Journal of Environmental Economics and Management* 30 (3): 381–95. <https://doi.org/10.1006/jeem.1996.0026>.
- HM Revenue and Customs. 2015a. 'Climate Change Levy: Removal of Exemption for Electricity from Renewable Sources - GOV.UK'. 8 July 2015. <https://www.gov.uk/government/publications/climate-change-levy-removal-of-exemption-for-electricity-from-renewable-sources/climate-change-levy-removal-of-exemption-for-electricity-from-renewable-sources>.
- . 2015b. 'Climate Change Levy: Transitional Period for Removal of Renewables Exemption'. GOV.UK. 9 December 2015. <https://www.gov.uk/government/publications/climate-change-levy-transitional-period-for-removal-of-renewables-exemption/climate-change-levy-transitional-period-for-removal-of-renewables-exemption>.
- Howard-Grenville, J. and S. Bertels. 'Organizational Culture and Environmental Action. In *The Oxford Handbook of Business and the Natural Environment*. 1st ed. Edited by P. Bansal and A. Hoffman, 194-210. Oxford, UK: Oxford University Press.
- Hufen, J.A.M. 2017. 'Cheat Electricity? The Political Economy of Green Electricity Delivery on the Dutch Market for Households and Small Business'. *Sustainability (Switzerland)* 9 (16). doi:10.3390/su9010016
- Intergovernmental Panel on Climate Change. n.d. 'IPCC — Intergovernmental Panel on Climate Change'. Accessed 23 February 2019. <https://www.ipcc.ch/>.
- Insight Exchange on behalf of Ofgem. 2013. 'Perceptions of Green Tariffs - Full Report'. <https://www.ofgem.gov.uk/publications-and-updates/research-consumers-perceptions-green-tariffs>.
- International Organization for Standardization (ISO). 2006. 'ISO 14064-1:2006 - Greenhouse Gases -- Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals'. <https://www.iso.org/standard/38381.html>
- . 2018a. 'ISO 14064-1:2018 - Greenhouse Gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals'. <https://www.iso.org/standard/66453.html>
- . 2018b. 'Energy Management Systems - Requirements with Guidance for Use (ISO 50001:2018)'. <https://www.iso.org/standard/69426.html>.
- International Renewable Energy Agency 2018. 'Corporate Sourcing of Renewable Energy: Market and Industry Trends - REMade Index 2018'. Abu Dhabi: International Renewable Energy Agency. <https://www.IRENA.org/publications/2018/May/Corporate-Sourcing-of-Renewable-Energy>.
- Investopedia. 2003. 'Institutional Investor'. Investopedia. 20 November 2003. <https://www.investopedia.com/terms/i/institutionalinvestor.asp>.
- IPCC. 2014. 'Summary for Policymakers'. In *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

- Isidro, H., and M. Sobral. 2015. 'The Effects of Women on Corporate Boards on Firm Value, Financial Performance, and Ethical and Social Compliance'. *Journal of Business Ethics* 132 (1): 1–19. <https://doi.org/10.1007/s10551-014-2302-9>.
- ISO - International Organization for Standardization. 2006. 'ISO 14064-2 Specification with Guidance at the Project Level for Quantification, Monitoring and Reporting of Greenhouse Gas Emission Reductions Or Removal Enhancements, Edition One'. <https://www.iso.org/standard/38382.html>.
- Jackson, G., and A. Apostolakou. 2010. 'Corporate Social Responsibility in Western Europe: An Institutional Mirror or Substitute?' *Journal of Business Ethics* 94 (3): 371–94.
- Jain, T., and D. Jamali. 2016. 'Looking Inside the Black Box: The Effect of Corporate Governance on Corporate Social Responsibility'. *Corporate Governance (Oxford)* 24 (3): 253–73. <https://doi.org/10.1111/corg.12154>.
- Jansen, J. 2017. 'Does the EU Renewable Energy Sector Still Need a Guarantees of Origin Market?' No 2017-27. CEPS Policy Insights. CEPS - Energy Climate House. <https://www.ceps.eu/publications/does-eu-renewable-energy-sector-still-need-guarantees-origin-market>
- . 2018. 'Should All Producers of Renewable Energy Automatically Receive GOs?' Centre for European Policy Studies. 12 March 2018. <https://www.ceps.eu/publications/should-all-producers-renewable-energy-automatically-receive-gos>.
- Jepperson, R.L. 1991. 'Institutions, institutional effects, and institutionalization.' In *The New Institutionalism in Organizational Analysis*, ed. W.W. Powell and P. J. DiMaggio (pp. 143–163). Chicago: University of Chicago Press.
- . 2000. 'Institutional Logics: On the Constitutive Dimensions of the Modern Nation-State Politics.' EUI RSC No. 2000/36. European Forum Series. Badia Fiesolana, Italy: Robert Schuman Centre for Advanced Studies, European University Institute. <http://hdl.handle.net/1814/1676>.
- . 2002. 'Political Modernities: Disentangling Two Underlying Dimensions of Institutional Differentiation'. *Sociological Theory* 20 (1): 61–85. <https://doi.org/10.2307/3108656>.
- Jo, H., M. H. Song, and A. Tsang. 2015. 'Corporate Social Responsibility and Stakeholder Governance around the World'. *Global Finance Journal* 27 (C): 18–45. <https://doi.org/10.1016/j.gfj.2015.05.001>.
- Johnson, R. A., and D. W. Greening. 1999. 'The Effects of Corporate Governance and Institutional Ownership Types of Corporate Social Performance.' *Academy of Management Journal* 42 (5): 564–76.
- Jones, G., and C. Lubinski. 2014. 'Making "Green Giants": Environment Sustainability in the German Chemical Industry, 1950s-1980s'. *Business History* 56 (4): 623–49.
- Kassinis, G. 2012. 'The Value of Managing Stakeholders'. In *The Oxford Handbook of Business and the Natural Environment*, edited by P. Bansal and A.J. Hoffman, 83-102. Oxford, UK: Oxford University Press.
- Kefi, H., 2012. 'Information Technology Codes of Ethics: An Analysis Proposal'. Presented at the 18th Americas Conference on Information Systems 2012, Seattle, Washington, USA. August 9-12. <http://aisel.aisnet.org/amcis2012/proceedings/PerspectivesIS/6>
- Khanna, M., and W. Anton. 2002. 'Corporate Environmental Management: Regulatory and Market-Based Incentives'. *Land Economics* 78 (4): 539–58. <https://doi.org/10.2307/3146852>.
- Kinderman, D.P. 2009. 'Why Do Some Countries Get CSR Sooner, and in Greater Quantity, than Others? The Political Economy of Corporate Responsibility and the Rise of Market Liberalism Across the OECD: 1977-2007.' SP III 2009-301. WZB Discussion Paper. Wissenschaftszentrum Berlin für

- Sozialforschung gGmbH, Berlin, Germany. <http://ssrn.com/abstract=1802467> or <http://dx.doi.org/10.2139/ssrn.1802467>.
- King, A.A., and M.J. Lenox. 2000. 'Industry Self-Regulation Without Sanctions: The Chemical Industry's Responsible Care Program.' *The Academy of Management Journal* 43 (4): 698–716.
- Klimscheffskij, M. 2011. 'Tracking of Electricity in the EU - from Directives to Practice'. PhD thesis, University of Aalto, Finland. https://libguides.aalto.fi/theses_dissertations
- Klimscheffskij, M., T. Van Craenenbroeck, M. Lehtovaara, D. Lescot, A. Tschernutter, C. Raimundo, D. Seebach, and C. Timpe. 2015. 'Residual Mix Calculation at the Heart of Reliable Electricity Disclosure in Europe—A Case Study on the Effect of the RE-DISS Project'. *Energies* 8 (6) <https://doi.org/10.3390/en8064667>.
- Kock, C. J., J. Santaló, and L. Diestre. 2012. 'Corporate Governance and the Environment: What Type of Governance Creates Greener Companies?' *Journal of Management Studies* 49 (3): 492–514.
- Koelble, T. A. 1995. 'The New Institutionalism in Political Science and Sociology'. *Comparative Politics* 27 (2): 231–43. <https://doi.org/10.2307/422167>.
- Kolk, A., D. Levy, and J. Pinkse. 2008. 'Corporate Responses in an Emerging Climate Regime: The Institutionalization and Commensuration of Carbon Disclosure'. *European Accounting Review* 17 (4).
- Koos, S. 2012. 'The Institutional Embeddedness of Social Responsibility: A Multilevel Analysis of Smaller Firms' Civic Engagement in Western Europe'. *Socio-Economic Review* 10 (1): 135–62. <https://doi.org/10.1093/ser/mwr027>.
- Kotchen, M., and J.J. Moon. 2012. 'Corporate Social Responsibility for Irresponsibility'. *B.E. Journal of Economic Analysis and Policy* 12 (1).
- Kuronen, A., and M. Lehtovaara. 2017. 'Development of the Guarantees of Origin Market - 2017 Update'. Helsinki, Finland: Grexel Systems Ltd. at request of RECS International. www.recs.org/news/report--development-of-the-guarantees-of-origin-market.
- Lauber, V., and E. Schenker. 2011. 'The Struggle over Support Schemes for Renewable Electricity in the European Union: A Discursive Institutional Analysis'. *Environmental Politics* 20 (4): 508–27.
- Lazarate, M. 2016. 'Does ISO 50001 Still Live up to Its Promise?' International Organization for Standardization (ISO). 7 November 2016. <http://www.iso.org/cms/render/live/en/sites/isoorg/contents/news/2016/11/Ref2135.html>.
- Lee, M-D. P., and M. Lounsbury. 2011. 'Domesticating Radical Rant and Rage: An Exploration of the Consequences of Environmental Shareholder Resolutions on Corporate Environmental Performance'. *Business and Society* 50 (1): 155–88. <https://doi.org/10.1177/0007650310394640>.
- Lee, S.-Y. 2012. 'Corporate Carbon Strategies in Responding to Climate Change'. *Business Strategy and the Environment* 21 (1): 33–48.
- Lockett, A., J. Moon, and W. Visser. 2006. 'Corporate Social Responsibility in Management Research: Focus, Nature, Salience, and Sources of Influence'. *Journal of Management Studies* 43 (1): 115–36.
- Logsdon, J.M., and K. Yuthas. 1997. 'Corporate Social Performance, Stakeholder Orientation, and Organizational Moral Development'. *Journal of Business Ethics* 16 (12–13): 1213–26. <https://doi.org/10.1023/A:1005741931995>.
- López-Gamero, M. D., E. Claver-Cortés, and J. F. Molina-Azorín. 2008. 'Complementary Resources and Capabilities for an Ethical and Environmental Management: A Qual/Quan Study'. *Journal of Business Ethics* 82 (3): 701–32. <https://doi.org/10.2307/25482321>.

- López-Gamero, M.D., E. Claver-Cortés, and J.F. Molina-Azorín. 2011. 'Environmental Perception, Management, and Competitive Opportunity in Spanish Hotels'. *Cornell Hospitality Quarterly* 52 (4): 480–500.
- Lyon, T.P., and J.P. Shimshack. 2015. 'Environmental Disclosure: Evidence From Newsweek's Green Companies Rankings'. *Business and Society* 54 (5): 632–75. <https://doi.org/10.1177/0007650312439701>.
- Mackenzie, C., W. Rees, and T. Rodionova. 2013. 'Do Responsible Investment Indices Improve Corporate Social Responsibility? FTSE4Good's Impact on Environmental Management'. *Corporate Governance: An International Review* 21 (5): 495–512. <https://doi.org/10.1111/corg.12039>.
- March, J.G., and J.P. Olsen. 1989. *Rediscovering Institutions: The Organizational Basis of Politics*. New York, USA: Free Press.
- Markard, J., and B. Truffer. 2006. 'The Promotional Impacts of Green Power Products on Renewable Energy Sources: Direct and Indirect Eco-Effects'. *Renewable Energy Policies in the European Union* 34 (3): 306–21. <https://doi.org/10.1016/j.enpol.2004.08.005>.
- Marty, M. 2017. 'Renewable Electricity in Germany: Support Scheme, Guarantees of Origin and the Prohibition of Double-Selling'. Presented at the International Forum on Renewable Energy Certificate Scheme 2017, GIS MOTC Convention Center, Taipei, Taiwan, March 29.
- Matten, D., and J. Moon. 2008. "Implicit" And "Explicit" CSR: A Conceptual Framework For A Comparative Understanding Of Corporate Social Responsibility.' *Academy of Management Review* 33 (2): 404–24.
- McWilliams, A., and D. Siegel. 2001. 'Corporate Social Responsibility: A Theory of the Firm Perspective'. *Academy of Management Review* 26 (1): 117–27.
- McWilliams, A., and D. S. Siegel. 2011. 'Creating and Capturing Value: Strategic Corporate Social Responsibility, Resource-Based Theory, and Sustainable Competitive Advantage.' *Journal of Management* 37 (5): 1480–95.
- Meyer, J. W., and B. Rowan. 1977. 'Institutionalized Organizations: Formal Structure as Myth and Ceremony'. *American Journal of Sociology* 83 (2): 340–63. <https://doi.org/10.2307/2778293>.
- Midttun, A., K. Gautesen, and M. Gjølborg. 2006. 'The Political Economy of CSR in Western Europe'. *Corporate Governance: The International Journal of Business in Society* 6 (4): 369–85. <https://doi.org/10.1108/14720700610689496>.
- Miras-Rodríguez, M. D. M., A. Carrasco-Gallego, and B. Escobar-Pérez. 2014. 'Has the CSR Engagement of Electrical Companies Had an Effect on Their Performance? A Closer Look at the Environment'. *Business Strategy and the Environment*. <https://doi.org/10.1002/bse.1848>.
- Moffat, K., J. Lacey, A. Zhang, and S. Leipold. 2016. 'The Social Licence to Operate: A Critical Review'. *Forestry* 89: 477–88. <https://doi.org/10.1093/forestry/cpv044>.
- Montiel, I., and J. Delgado-Ceballos. 2014. 'Defining and Measuring Corporate Sustainability: Are We There Yet?' *Organization and Environment* 27 (2): 113–39. <https://doi.org/10.1177/1086026614526413>.
- Mulder, M., and S.P.E. Zomer. 2016. 'Contribution of Green Labels in Electricity Retail Markets to Fostering Renewable Energy'. *Energy Policy* 99 (December): 100–109. <https://doi.org/10.1016/j.enpol.2016.09.040>.
- Nilsson, M., L. J. Nilsson, and K. Ericsson. 2009. 'The Rise and Fall of GO Trading in European Renewable Energy Policy: The Role of Advocacy and Policy Framing'. *Energy Policy* 37 (11): 4454–62. <https://doi.org/10.1016/j.enpol.2009.05.065>.
- Nordenstam, L., D. D. Ilic, and L. Ödlund. 2018. 'Corporate Greenhouse Gas Inventories, Guarantees of Origin and Combined Heat and Power Production – Analysis of Impacts on Total Carbon Dioxide

- Emissions'. *Journal of Cleaner Production* 186 (June): 03–214.
<https://doi.org/10.1016/j.jclepro.2018.03.034>.
- Norton Rose Fulbright. 2010. 'The Future of the Carbon Reduction Commitment Energy Efficiency Scheme (CRC)'. October 2010.
<http://www.nortonrosefulbright.com/knowledge/publications/32013/the-future-of-the-carbon-reduction-commitment-energy-efficiency-scheme-crc>.
- Ofgem. 2013a. 'Improving Consumer Protection in the Green and Renewable Energy Offers Market'.
<https://www.ofgem.gov.uk/publications-and-updates/update-our-review-green-supply-guidelines>.
- . 2013b. Open letter. 'Review of the Green Energy Supply Scheme Guidelines', 22 February 2013.
<https://www.ofgem.gov.uk/publications-and-updates/green-energy-supply-scheme-review-open-letter>.
- . 2016a. 'About the Climate Change Levy Exemption'. 22 July 2016.
<https://www.ofgem.gov.uk/environmental-programmes/ccl/about-climate-change-levy-exemption>.
- . 2016b. 'About the RO'. Ofgem. 6 July 2016. <https://www.ofgem.gov.uk/environmental-programmes/ro/about-ro>.
- van Oosterhout, J., and P.P.M.A.R. Heugens. 2009. 'Extant Social Contracts in Global Business Regulation: Outline of a Research Agenda'. *Journal of Business Ethics* 88 (SUPPL. 4): 729–40.
- Organisation for Economic Co-operation and Development. 2004. 'OECD Principles of Corporate Governance'. <http://www.oecd.org/daf/ca/oecdprinciplesofcorporategovernance.htm>.
- Ortas, E., I. Álvarez, J. Jaussaud, and A. Garayar. 2015. 'The Impact of Institutional and Social Context on Corporate Environmental, Social and Governance Performance of Companies Committed to Voluntary Corporate Social Responsibility Initiatives'. *Journal of Cleaner Production*.
<https://doi.org/10.1016/j.jclepro.2015.06.089>.
- Ortiz-de-Mandojana, N., J. Aguilera-Caracuel, and M. Morales-Raya. 2016. 'Corporate Governance and Environmental Sustainability: The Moderating Role of the National Institutional Context'. *Corporate Social Responsibility and Environmental Management* 23 (3): 150–64.
<https://doi.org/10.1002/csr.1367>.
- Peel, M.C., B.L. Finlayson, and T.A. McMahon. 2007. 'Updated World Map of the Koppen-Geiger Climate Classification'. *Hydrology and Earth System Sciences* 11 (October): 1633–44.
- Peters-Stanley, M., and G. Gonzalez. 2014. 'Sharing the Stage - State of the Voluntary Carbon Markets 2014'. State of the Voluntary Carbon Markets. Forest Trends' Ecosystem Marketplace.
https://www.forest-trends.org/wp-content/uploads/2014/05/doc_4841.pdf.
- Peters-Stanley, M., and D. Yin. 2013. 'Maneuvering the Mosaic - State of the Voluntary Carbon Markets 2013'. State of the Voluntary Carbon Markets. Forest Trends' Ecosystem Marketplace and Bloomberg New Energy Finance. <https://www.forest-trends.org/wp-content/uploads/imported/sovcm-full-report-aug-13-version-pdf.pdf>.
- Porter, M. E., and M. Kramer. 2006. 'Strategy and Society: The Link Between Competitive Advantage and Corporate Social Responsibility.' *Harvard Business Review* 84 (12): 78–90.
- Powell, W.W, and P.J. DiMaggio. 1991. *The New Institutionalism in Organizational Analysis*. Chicago, Illinois, USA.: Chicago University Press.
- Prakash, A. 2000. *Greening the Firm: An Introduction*. Cambridge, UK: Cambridge University Press.
<http://dx.doi.org/10.1017/CBO9780511491863.002>.
- Pratt, D. 2016. 'Chancellor Confirms the End of CRC'. Clean Energy News. 16 March 2016.
<https://www.cleanenergynews.co.uk/news/efficiency/chancellor-confirms-the-end-of-crc-7654>.

- Principles of Responsible Investment. n.d. 'About the PRI'. PRI. Accessed 23 February 2019. <https://www.unpri.org/pri/about-the-pri>.
- Pulver, S. 2007. 'Importing Environmentalism: Explaining Petroleos Mexicanos' Cooperative Climate Policy'. *Studies in Comparative International Development* 42 (3–4): 233–55.
- Pulver, S. 2011. "Corporate Responses". In *The Oxford Handbook of Climate Change and Society*, 1st edition, edited by J.S. Dryzek, R.B. Norgaard, and D. Schlosberg, 581–93. New York, USA: Oxford University Press Inc.
- PwC. 2014. 'Retail Banking 2020 Evolution Or Revolution'. 20 January 2014. <https://www.pwc.com/gx/en/banking-capital-markets/banking-2020/assets/pwc-retail-banking-2020-evolution-or-revolution.pdf>.
- Raadal, H. L. 2012. 'Exam Report: Guarantees of Origin (GOs) Applications in LCA'. Ostfoldforskning. 15 May 2012. <https://www.ostfoldforskning.no/media/1173/ar0312.pdf>.
- Raadal, H. L., E. Dotzauer, O. J. Hanssen, and H. P. Kildal. 2012. 'The Interaction between Electricity Disclosure and Tradable Green Certificates'. *Energy Policy* 42 (March): 419–28. <https://doi.org/10.1016/j.enpol.2011.12.006>.
- Rahbauer, S., L. Menapace, K. Menrad, and H. Lang. 2018. 'Determinants for the Adoption of Green Electricity by German SMEs – An Empirical Examination'. *Energy Policy* 123: 533–43.
- Ramus, C. A., and I. Montiel. 2005. 'When Are Corporate Environmental Policies a Form of Greenwashing?' *Business and Society* 44 (4): 377–414. <https://doi.org/10.1177/0007650305278120>.
- RE100. 2018. 'RE100 Progress and Insights Report'. <http://media.virbcdn.com/files/97/8b2d4ee2c961f080-RE100ProgressandInsightsReport2018.pdf>.
- RECS International. 2012. 'The Success of the Voluntary Market Creates New Power'. *RECS Magazine*, November 2012. <http://www.recs.org/cover-stories/the-successes-of-the-voluntary-market-creates-new-power>.
- Re-Diss. 2012a. '218-RE-DISS_Country_Profile_GBv2.0.Pdf'. Country Profile. Reliable Disclosure Systems for Europe (Phase I). http://phase1.reliable-disclosure.org/upload/218-RE-DISS_Country_Profile_GBv2.0.pdf.
- . 2012b. '206-RE-DISS_Country_Profile_AT_2012.Pdf'. Country Profile. Reliable Disclosure Systems for Europe (Phase I). http://phase1.reliable-disclosure.org/upload/206-RE-DISS_Country_Profile_AT_2012.pdf.
- . 2012c. '216-RE-DISS_Country_Profile_NO_2012.Pdf'. Country profile. Reliable Disclosure Systems for Europe (Phase I). http://phase1.reliable-disclosure.org/upload/216-RE-DISS_Country_Profile_NO_2012.pdf.
- . 2012d. '234-RE-DISS_Country_Profile_DE_2012-10-15.Pdf'. Country profile. Reliable Disclosure Systems for Europe (Phase I). http://phase1.reliable-disclosure.org/upload/234-RE-DISS_Country_Profile_DE_2012-10-15.pdf.
- Reid, E. M., and M. W. Toffel. 2009. 'Responding to Public and Private Politics: Corporate Disclosure of Climate Change Strategies'. *Strategic Management Journal* 30 (11): 1157–78. <https://doi.org/10.1002/smj.796>.
- Rickard, G. 2018. 'What Exactly Is a Science-Based Target? - Carbon Trust'. Carbon Trust. 17 September 2018. <https://www.carbontrust.com/news/2018/09/what-exactly-is-a-science-based-target/>.
- RobecoSAM. n.d. 'Sustainability Indices Homepage'. Pure Play Asset Management | Robeco.Com. Accessed 21 March 2019. <https://www.sustainability-indices.com/>.

- Rossouw, G.J., and L.J. Van Vuuren. 2003. 'Modes of Managing Morality: A Descriptive Model of Strategies for Managing Ethics'. *Journal of Business Ethics* 46 (4): 389–402.
- Russo, M.V., and P.A. Fouts. 1997. 'A Resource-Based Perspective on Corporate Environmental Performance and Profitability'. *Academy of Management Journal* 40 (3): 534–59.
- Russo, M.V. and A. Minto. 2012. 'Competitive Strategy and the Environment: A Field of Inquiry Emerges.' In *The Oxford Handbook of Business and the Natural Environment*. 1st ed. Edited by P. Bansal and A. Hoffman, 29–49. Oxford, UK: Oxford University Press.
- Schendler, A. 2007. 'When Being Green Backfires.' *Harvard Business Review* 85 (10): 35–38.
- Scherer, A., and G. Palazzo. 2007. 'Toward a Political Conception of Corporate Responsibility: Business and Society Seen from a Habermasian Perspective.' *Academy of Management Review* 32 (4): 1096–1120.
- Schneider, C.Q., and C. Wagemann. 2006. 'Reducing Complexity in Qualitative Comparative Analysis (QCA): Remote and Proximate Factors and the Consolidation of Democracy'. *European Journal of Political Research* 45 (5): 751–86. <https://doi.org/10.1111/j.1475-6765.2006.00635.x>.
- Science Based Targets initiative. n.d.a. 'Companies Taking Action | Science Based Targets'. Accessed 12 May 2018a. <http://sciencebasedtargets.org/companies-taking-action/>.
- . n.d.b. 'FAQ | Science Based Targets'. Accessed 12 May 2018b. <http://sciencebasedtargets.org/faq/>.
- Scott, W.R. 2014. *Institutions and Organizations: Ideas, Interests, and Identities*. 4th edition, Kindle version. Los Angeles, USA: Sage.
- Searcy, C., and D. Elkhawas. 2012. 'Corporate Sustainability Ratings: An Investigation into How Corporations Use the Dow Jones Sustainability Index'. *Journal of Cleaner Production* 35: 79–92. <https://doi.org/10.1016/j.jclepro.2012.05.022>.
- Sharkey, A.J., and P. Bromley. 2015. 'Can Ratings Have Indirect Effects? Evidence from the Organizational Response to Peers' Environmental Ratings'. *American Sociological Review* 80 (1): 63–91. <https://doi.org/10.1177/0003122414559043>.
- Sharma, S. 2000. 'Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy'. *Academy of Management Journal* 43 (4): 681–97.
- Sharma, S., and I. Henriques. 2005. 'Stakeholder Influences on Sustainability Practices in the Canadian Forest Products Industry'. *Strategic Management Journal* 26 (2): 159–80. <https://doi.org/10.2307/20142213>.
- Shehabi, A., S. J Smith, E. Masanet, and J. Koomey. 2018. 'Data Center Growth in the United States: Decoupling the Demand for Services from Electricity Use'. *Environmental Research Letters* 13 (12): 124030. <https://doi.org/10.1088/1748-9326/aaec9c>.
- Short, J. L., and M.W. Toffel. 2010. 'Making Self-Regulation More Than Merely Symbolic: The Critical Role of the Legal Environment.' *Administrative Science Quarterly* 55 (3): 361–96.
- Simon, F. 2018. 'Over 100 Corporate Giants Align with UN Climate Goals'. *Euractiv.Com* (blog). 17 April 2018. <https://www.euractiv.com/section/energy-environment/news/over-100-corporate-giants-align-with-un-climate-goals/>.
- Smith, A. 1776. *An Inquiry Into The Nature And Causes Of The Wealth of Nations*. London, UK: W. Strahan and T. Cadell.
- Smith, A.C.H. 2016. 'Methodology Options in Greenhouse Gas Accounting Practices at an Organizational Level and Their Implications for Investors'. *Carbon Management* 7 (3–4): 221–32. <https://doi.org/10.1080/17583004.2016.1214517>.

- Solomon, J. 2013. *Corporate Governance And Accountability*. 4th ed. Chichester, UK: John Wiley and Sons.
- Solli, C. 2014. 'Comment Page'. Open Letter on Scope 2 GHG Reporting. 14 March 2014. <http://scope2openletter.wordpress.com/2013/12/10/scope-2-contractual-emissions-factors-put-corporate-ghg-reporting-at-risk/#comments>.
- Sorrell, S., O'Malley, E., J. Schleich, and S. Scott. 2004. *The Economics of Energy Efficiency Barriers to Cost-Effective Investment*. Cheltenham, UK, and Northampton, MA, USA: Edward Elgar Publishing Limited.
- Sotos, M. 2015a. 'GHG Protocol Scope 2 Guidance - An Amendment to the GHG Protocol Corporate Standard'. World Resources Institute, Washington D.C., USA. https://wriorg.s3.amazonaws.com/s3fs-public/Scope_2_Guidance_Final.pdf.
- . 2015b. 'GHG Protocol Scope 2 Guidance'. World Resources Institute. January 2015. <http://www.wri.org/publication/ghg-protocol-scope-2-guidance>.
- Starik, M. 1995. 'Should Trees Have Managerial Standing? Toward Stakeholder Status for Non-Human Nature'. *Journal of Business Ethics* 14 (3): 207–17.
- Suchman, M. 1995. *Managing Legitimacy: Strategic and Institutional Approaches*. *Academy of Management Review*, 20, 571–611. Vol. 20. <https://doi.org/10.2307/258788>.
- Sullivan, R., and A. Gouldson. 2012. 'Does Voluntary Carbon Reporting Meet Investors' Needs?' *Journal of Cleaner Production* 36 (November): 60–67. <https://doi.org/10.1016/j.jclepro.2012.02.020>.
- . 2013. 'Ten Years of Corporate Action on Climate Change: What Do We Have to Show for It?' *Energy Policy* 60: 733–40. <https://doi.org/10.1016/j.enpol.2013.05.025>.
- . 2016. 'Comparing the Climate Change Actions, Targets and Performance of UK and US Retailers'. *Corporate Social Responsibility and Environmental Management* 23 (3): 129–39. <https://doi.org/10.1002/csr.1364>.
- . 2017. 'The Governance of Corporate Responses to Climate Change: An International Comparison'. *Business Strategy and the Environment* 26 (4): 413–25. <https://doi.org/10.1002/bse.1925>.
- SustainAbility. 2010. 'Projects: Rate the Raters'. SustainAbility. 2010. <https://sustainability.com/rate-the-raters/>.
- Talbot, D., and O. Boiral. 2013. 'Can We Trust Corporates GHG Inventories? An Investigation among Canada's Large Final Emitters'. *Energy Policy* 63: 1075–85. <https://doi.org/10.1016/j.enpol.2013.09.054>.
- The Climate Group on behalf of Global e-Sustainability Initiative. 2008. 'SMART 2020 Enabling the Low-Carbon Economy in the Information Age'. <https://www.theclimategroup.org/sites/default/files/archive/files/Smart2020Report.pdf>.
- The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013*. 2013. <http://www.legislation.gov.uk/ukSI/2013/1970/contents/made>.
- 'The Prince of Wales's Corporate Leaders Group'. n.d. Accessed 21 November 2017. <https://www.corporateleadersgroup.com/>.
- Tricker, B. 2012. *Corporate Governance: Principles, Policies and Practices*. Oxford, UK.: OUP Oxford. <http://books.google.co.uk/books?id=6ogq3a6VOoC>.
- United Nations. n.d. 'Sustainable Development Goals - United Nations'. United Nations Sustainable Development. undated. <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

- United Nations Framework Convention on Climate Change Secretariat. n.d. 'COP 21 | UNFCCC'. Accessed 24 February 2019. <https://unfccc.int/process-and-meetings/conferences/past-conferences/paris-climate-change-conference-november-2015/cop-21>.
- United Nations Global Compact. n.d. 'What Is the UN Global Compact | UN Global Compact'. Accessed 23 February 2019. <https://www.unglobalcompact.org/what-is-gc>.
- Vasiljeviene, N. 2014. 'Development of Pro-Eco Activities: Possible Malfunctions and Searching Integrity for Responsible Business Performance'. *Transformations in Business and Economics* 13 (1): 175–95.
- Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten e.V. - VfU. n.d.a 'Historie'. Contentpage. VfU - Verein für Umweltmanagement und Nachhaltigkeit in Unternehmen e.V. Accessed 7 December 2018a. <https://vfu.de/ueber-uns/historie>.
- . n.d.b. 'VfU Kennzahlen Tool'. Contentpage. VfU - Verein für Umweltmanagement und Nachhaltigkeit in Unternehmen e.V. Accessed 7 December 2018b. <https://vfu.de/ressourcen/tools/vfu-kennzahlen-tool>.
- Vertigans, S. 2015. 'Corporate Social Responsibility in the United Kingdom'. In *Corporate Social Responsibility in Europe: United in Sustainable Diversity*, edited by S.O. Idowu, R. Schmidpeter, and M. S. Fifka, 36–56. Location of publisher not stated.: Springer International Publishing.
- Vidal, J. 2017. "'Tsunami of Data" Could Consume One Fifth of Global Electricity by 2025'. Climate Home News. 11 December 2017. <http://www.climatechangenews.com/2017/12/11/tsunami-data-consume-one-fifth-global-electricity-2025/>.
- Villiers, C. de, V. Naiker, and C.J. van Staden. 2011b. 'The Effect of Board Characteristics on Firm Environmental Performance'. *Journal of Management* 37 (6): 1636–63.
- Vitols, S. 2001. 'Varieties of Corporate Governance: Comparing Germany and the UK'. In *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, edited by P.A. Hall and D. Soskice, 337–360. Oxford, UK: Oxford University Press.
- Walker, H., L. Di Sisto, and D. McBain. 2008. 'Drivers and Barriers to Environmental Supply Chain Management Practices: Lessons from the Public and Private Sectors'. *Journal of Purchasing and Supply Management* 14: 69–85.
- Wartick, S.L., and P.L. Cochran. 1985. 'The Evolution of the Corporate Social Performance Model'. *Academy of Management Review* 10 (4): 758–69.
- Weber, M. 2014. 'European Eco-Labels For Electricity - Presentation by M. Weber of GreenStream Network'. presented at the RECS Market Meeting, Düsseldorf, Germany, March 17.
- Wikipedia. 2018. 'German Public Bank'. Wikipedia. 27 June 2018. https://en.wikipedia.org/w/index.php?title=German_public_bank&oldid=847755022.
- Willman, J. 2007. 'UK Business to Tackle Climate Change'. *Financial Times*, 11 January 2007. <https://www.ft.com/content/549739da-a154-11db-8bc1-0000779e2340>.
- Windolph, S. E., D. Harms, and S. Schaltegger. 2014. 'Motivations for Corporate Sustainability Management: Contrasting Survey Results and Implementation'. *Corporate Social Responsibility and Environmental Management* 21 (5): 272–85. <https://doi.org/10.1002/csr.1337>.
- Winston, A. 2010. 'The Most Powerful Green NGO You've Never Heard Of'. Harvard Business Review. 5 October 2010. <https://hbr.org/2010/10/the-most-powerful-green-ngo>.
- Wiser, R., M. Fowlie, and E.A. Holt. 2001. 'Public Goods and Private Interests: Understanding Non-Residential Demand for Green Power'. *Energy Policy* 29 (13): 1085–97.
- Wiser, R., M. Fowlie, and E. Holt. 2004. 'Authors' Response to the Critique of "Public Goods and Private Interests: Understanding Non-Residential Demand for Green Power", by L. Haar and L.N. Stanciu'. *Energy Policy* 32 (5): 705–8. [https://doi.org/10.1016/S0301-4215\(02\)00333-6](https://doi.org/10.1016/S0301-4215(02)00333-6).

- World Business Council for Sustainable Development, and World Resources Institute. n.d. 'Users of the Corporate Standard'. Greenhouse Gas Protocol. Accessed 5 February 2019.
<https://ghgprotocol.org/companies-and-organizations>.
- World Resources Institute. 2010. 'Brief Summary from GHG Protocol Workshop on Accounting for Green Power Purchases'. 2010. <https://slideplayer.com/slide/1602155/>.
- World Resources Institute and World Business Council for Sustainable Development. 2005. 'The GHG Protocol for Project Accounting'. World Resources Institute, Washington D.C., USA, and World Business Council for Sustainable Development, Conches-Geneva, Switzerland
<https://ghgprotocol.org/standards/project-protocol>
- Wüstenhagen, R., and M. Bilharz. 2006. 'Green Energy Market Development in Germany: Effective Public Policy and Emerging Customer Demand'. *Energy Policy* 34 (13): 1681–96.
<https://doi.org/10.1016/j.enpol.2004.07.013>.
- Yin, R.K. 2014. *Case Study Research - Design and Methods*. 5th ed. Applied Social Research Methods Series. Los Angeles, London, New Dehli, Singapore, Washington DC: Sage Publications, Inc.
- Zhuang, L., and D. Synodinos. 1997. 'Legislation for the Environment: Does It Work? - an Empirical Study into Selected UK-based Chemical Manufacturing Firms'. *Management Decision* 35 (7): 508–18.
<https://doi.org/10.1108/00251749710170475>.

14 APPENDICES

14.1 DETAIL ON USE OF CDP DATA SETS

This appendix explains:

1. How the CDP datasets were used to identify firms using RECI and when they started to do so.
2. What sections of each year's data set were examined to answer the research questions.

Firms could respond to early CDP questionnaire in a free-form format. CDP later steered firms towards an online form. Useful information was often found in the "Further Information" section. This was a text box at the foot of each webpage that firms used to elaborate their answers to preceding questions or if they wanted to supply information that did not fit the format prescribed by CDP. Attachments could also be uploaded. Where I say in subsequent sections that "questions were read", I am using this as shorthand for saying the answers to all questions were read.

Please note that the year identifying each dataset e.g. CDP1 (2003) refers to the year in which the deadline for firms to reply to the questionnaire fell. Some non-current CDP documents e.g. questionnaires are no longer available via the CDP website. CDP may be able to assist with copies of archived documents (CDP, 4th Floor Plantation Place South, 60 Great Tower Street, London EC3R 5AD. Telephone +44(0) 203818 3900. <https://www.cdp.net/en/info/contact>).

14.1.1 CDP1 (2003)

14.1.1.1 Identifying RECI users

This was sent to the FT500 firms. Note in this dataset firms are not assigned industrial sectors. These were filtered on country of incorporation. All of the answers to the questions: "What is your firm's current emissions reduction strategy? How much investment have you committed to its implementation, what are the costs/ profits, what are your emissions reduction targets and time frames to achieve them?" (sic) from German-/UK-incorporated firms were read and answers that mentioned current or imminent low-carbon electricity purchases were identified. The whole dataset was then searched for the following words: "green energy", "green electricity", "low-carbon energy", "low carbon energy", "low-carbon electricity", "low carbon electricity", "renewable electricity", "renewable energy". Firms purchasing RECI/LCECI or installing low-carbon electricity generation were noted.

14.1.1.2 Questions read to answer qualitative aspects of research questions

All questions were read.

14.1.2 CDP2 (2004)

14.1.2.1 Identifying RECI users

This was sent to the FT500. Note in this database firms are not assigned industrial sectors. The same search process was carried out as for CDP1 (2003).

14.1.2.2 Questions read to answer qualitative aspects of research questions

All questions were read.

14.1.3 CDP3 (2005)

14.1.3.1 Identifying RECI users

This was sent to the FT500. Note in this dataset firms are not assigned industrial sectors. The same search process as applied at was used for CDP1 (2003) and CDP2 (2004).

14.1.3.2 Questions read to answer qualitative aspects of research questions

All questions were read.

14.1.4 CDP4 (2006)

14.1.4.1 Identifying RECI users

This was sent to the FT500 and the 200 largest German firms. The same search procedure was used as for the previous three data-sets.

14.1.4.2 Questions read to answer qualitative aspects of research questions

All questions were read.

14.1.5 CDP5 (2007)

14.1.5.1 Identifying RECI users

This is the first dataset with industry sectors included. CDP sent the CDP5 questionnaire to the same firms as the CDP4 was sent plus firms from other stock market indices and countries (CDP5 (2007)). Firms were filtered on country of incorporation. Firms were noted that provided an answer to question 2(b)(i)(y)(g)

“Total global MWh of purchased electricity from renewable sources” and/or question 2(b)(i)(y)(h) *“Total MWh of purchased electricity from renewable sources for Annex B countries”* and/or question 2(h)(iii) *“What percentage of energy costs are incurred on energy from renewable sources?”* and/or relevant information in one of the additional information fields.

The questions in CDP5 (2007) and also CDP6 (2008) (see below) were phrased in such a way that firms could base their response on the proportion of renewable electricity in a standard or default offer from their electricity suppliers. Unless there was subsequent deliberate purchase of RECI/LCECI, responses from these two years were not taken as the initial data of RECI/LCECI purchase.

14.1.5.2 Questions read to answer qualitative aspects of research questions

The introduction, 1(a)(i) and (iii) on climate change-related risks, 1(b)(i) and (iii) on climate change-related opportunities, 1(c) on strategy, 1(d)/4(a) on reduction targets and actions, 5(a) and (b) on governance.

14.1.6 CDP6 (2008)

14.1.6.1 Identifying RECI users

This data-set is in largely the same format as CDP 2007, so the same procedure was used. There is one exception; there is a table in the data-set that breaks electricity consumption down by country. I checked to see if any German-/UK-incorporated firm was reporting its renewable electricity consumption in MWh on a by country basis when it was not doing so on an aggregate basis.

14.1.6.2 Questions read to answer qualitative aspects of research questions

1(a)(i)/1(b)(i) on identification of regulatory risks/opportunities, 1(a)(iii)/1(b)(iii) on identification of general risks/opportunities, 1(a)(iv)/1(b)(iv) on risk management/maximising opportunities, 1(a)(v)/1(b)(v) on financial effects of identified risks/opportunities, 3(a) reduction targets and plans, 4(a) and (b) on governance.

14.1.7 CDP7 (2009)

14.1.7.1 Identifying RECI users

Firm responses were filtered on country of incorporation. Question 12.1 was used to identify firms using RECI/LCECI (*“If you consider that the grid average factor used to report Scope 2 emissions in question 11 does not reflect the contractual arrangements you have with electricity suppliers, (for example, because you purchase electricity using a zero or low carbon electricity tariff), you may calculate and report a contractual Scope 2 figure in response to this question, showing the origin of the alternative emission*

factor and information about the tariff”). All responses were read as sometimes firms said the question was not applicable but went to give additional information that was useful e.g. how they have accounted for low-carbon contractual instrument purchases in the past. The same approach was taken with question 12.2 “If you retire any certificates (eg: Renewable Energy Certificates) associated with zero or low carbon electricity, please provide details.”

14.1.7.2 Questions read to answer qualitative aspects of research questions

1.1 and 3.1 on regulatory and general risks, 4.1 and 6.1 on regulatory and general opportunities, 23.1-23.8 on targets and mitigating activities, 25 on governance, and 28 on engagement with policy-makers.

14.1.8 CDP2010

14.1.8.1 Identifying RECI users

Firm responses were filtered on country of incorporation. In CDP 2010 there is a more structured version of the previous year’s question 12.1, which is numbered 14.1. “14.1. Do you consider that the grid average factors used to report Scope 2 emissions in question 13 reflect the contractual arrangements you have with electricity suppliers?” is answered via a drop-down menu of “Yes”, “No”, and “Don’t know”. This is followed by a question “14.2. You may report a total contractual Scope 2 figure in response to this question. Please provide your total global contractual Scope 2 GHG emissions figure in metric tonnes CO₂-e” and “14.3. Explain the origin of the alternative figure including information about the emission factors used and the tariffs.” (These questions were not triggered by a specific answer to 14.1.) Firms were added to the list based on answers that indicated they were purchasing RECI/LCECI. A subsequent question is “14.4. Has your organization retired any certificates, e.g. Renewable Energy Certificates, associated with zero or low carbon electricity within the reporting year or has this been done on your behalf?” Firms that said they did were added to the list.

14.1.8.2 Questions read to answer qualitative aspects of research questions

Question 0 on introduction, 1 on governance, 3 and 5 on regulatory and general risks, 6 and 8 on regulatory and general opportunities, 9.1 on strategy, 9.2 on targets, 9.10 on engagement with policy-makers.

14.1.9 CDP2011

14.1.9.1 Identifying RECI users

Firm responses were filtered by country of incorporation and by response to “11.1. *Do you consider that the grid average factors used to report Scope 2 emissions in Question 8.3 reflect the contractual arrangements you have with electricity suppliers?*”, the same question as in CDP 2010. This is answered via a drop-down menu of options: “Yes”, “No”, “Don’t know”. Only “No” triggers the following questions “11.1a. *You may report a total contractual Scope 2 figure in response to this question. Please provide your total global contractual Scope 2 GHG emissions figure in metric tonnes CO₂e*” and “11.1b. *Explain the basis of the alternative figure (see guidance)*”. All “No” answers were added to the list, including those firms that did not go on to provide an answer for 11.1a or 11.1b on the basis that firms may be RECI/LCECI users and so answered “No”, but did not have the capacity or inclination to calculate an alternative figure.

This dataset also includes the question 11.2 “*Has your organization retired any certificates, e.g. Renewable Energy Certificates, associated with zero or low carbon electricity within the reporting year or has this been done on your behalf?*” This is answered via a drop-down menu of “Yes” and “No”. The selection of “Yes” triggers the question “11.2a. *Please provide details including the number and type of certificates.*” This is a question in table format. Column one of the table is headed “*Type of certificate*” and is answered via a drop-down menu. This has pre-set options of certificate scheme, but also allows firms to select “Other” and provide a text answer.

Answers to 11.2a were filtered on country of incorporation. Then all firms providing an answer to 11.2a “*Type of certificate*” were added to the list except for blank cells and these were only excluded after checking there was no useful data in the “*Comments*” column.

14.1.9.2 Questions read to answer qualitative aspects of research questions

Question 0 the introduction to firm, 1 on governance, 2.2 on business strategy, 2.3 on engagement with policy-makers, 3.1 on targets, 3.3b on methods driving investment in emission reduction activities, 5 and 6 on regulatory and general risks and opportunities.

14.1.10 CDP2012

14.1.10.1 Identifying RECI users

The search of this dataset was carried out in the same way as CDP 2011.

14.1.10.2 Questions read to answer qualitative aspects of research questions

Question 0 the introduction to the firm, 1 on governance, 2.2 on business strategy, 2.3 on engagement with policy-makers, 3.1 on targets, 3.3c on methods driving investment in emission reduction activities, 5 and 6 on regulatory and general risks and opportunities.

14.1.11 CDP2013

14.1.11.1 Identifying RECI users

Firm responses were filtered on country of incorporation and question 11.4 *“Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor”*. 11.4 is answered via a drop-down menu. The following menu selections triggered addition to the list of RECI/LCECI users: *“Power Purchase Agreement, not backed by instruments”*, *“Supplier specific, backed by instruments”*, *“Supplier specific, not backed by instruments”*, *“Tracking instruments, Guarantees of Origin”*, *“Tracking instruments, RECS (USA)”*, *“Other”*. RECS (USA) were included because a German-/UK-incorporated firm may have a US operation purchasing these certificates.

Questions read to answer qualitative aspects of research questions

Question 0 the introduction to firm, 1 on governance, 2.2 on business strategy, 2.3 on engagement with policy-makers, 3.1 on targets, 3.3c on methods driving investment in emission reduction activities, 5 and 6 on regulatory and general risks and opportunities.

14.1.12 CDP2014

14.1.12.1 Identifying RECI users

Firm responses were filtered on country of incorporation and on question CC11.4: *“Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the Scope 2 figure reported in CC8.3.”* Then there was a table with the first column headed *“Basis for applying a low carbon emission factor.”* This was answered via a drop-down menu. The following menu selections triggered addition to the list of RECI/LCECI users: *“Power Purchase Agreement, not backed by instruments”*, *“Supplier specific, backed by instruments”*, *“Supplier specific, not backed by instruments”*, *“Tracking instruments, Guarantees of Origin”*, *“Tracking instruments, RECS (USA)”*, *“Other”*.

14.1.12.2 Questions read to answer qualitative aspects of research questions

Question 0 the introduction to firm, 1 on governance, 2.2 on business strategy, 2.3 on engagement with policy-makers, 3.1 on targets, 3.3c on methods driving investment in emission reduction activities, 5 and 6 on regulatory and general risks and opportunities.

14.1.13 CDP2015

14.1.13.1 Identifying RECI users

Firm responses were filtered on country of incorporation and on answers to question CC11.4 *“Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the Scope 2 figure reported in CC8.3”*. CC11.4 is answered via a drop-down menu. The following menu selections triggered addition to the list of RECI/LCECI users: *“Power Purchase Agreement, not backed by instruments”*, *“Supplier specific, backed by instruments”*, *“Supplier specific, not backed by instruments”*, *“Tracking instruments, Guarantees of Origin”*, *“Tracking instruments, RECS (USA)”*, *“Other”*.

14.1.13.2 Questions read to answer qualitative aspects of research questions

Question 0 the introduction to firm, 1 on governance, 2.2 on business strategy, 2.3 on engagement with policy-makers, 2.4 on board’s position international climate change agreement, 3.1 on targets, 3.3c on methods driving investment in emission reduction activities, 5 and 6 on regulatory and general risks and opportunities.

14.1.14 CDP2016

This CDP dataset became available to me after I had systematically gathered qualitative data from the other data-sets. I used it to follow-up on points from the examination of earlier datasets to answer qualitative aspects of research questions. Its use is noted in the sections for individual case studies.

14.1.15 CDP2017

The comment for CDP2016 also applies to CDP2017.

14.1.16 CREATING GROUPS OF FIRMS

Using the above data, I drew up a timeline showing in which years firms purchased RECI. Some firms have not provided data to CDP for some years or have chosen not to make it publicly available. In these cases, the earliest record of buying RECI/LCECI was used. This date then had to be checked through corporate publications, such as corporate responsibility reports, and as a last resort at the interview stage to see if this was the date when the firm started buying RECI/LCECI.

Firms were grouped on certain variables according to the process described in the methodology chapter. These variables were sourced from:

Number of employees – Taken from the Reuters Fundamentals summary sheet within the Thomson One database

Available finance - Operationalised as Net Income Before Extraordinary Items. Taken from the Reuters Fundamentals sheets within the Thomson One database. According to Thomson Reuters helpdesk, net income figure on the summary sheet is Net Income Before Extraordinary Items (NIBX) (email from Emil Austria on the Thomson Reuters helpdesk dated 29 January 2016). Within the database, there is a Reuters Fundamentals glossary which gives accounting changes and discontinued operations as examples of extraordinary items. NIBX can also be found on the income statements within Reuters Fundamentals and from these it can be seen interest and taxes have been deducted before arriving at the NIBX figure. A check on the results of using NIBX was made using *Cash flows from operations* (OTLO). OTLO was taken from the Cash Flow Statement in the Reuters Fundamental sheets in Thomson One. For NIBX and OTLO, I used the option in Thomson One to convert monetary values to a standard currency (millions of GB Pound).

Sometimes data was missing from the summary sheet. This was likely to be due to the firm using a length of reporting period that was outside of the parameters set for inclusion on the summary sheet (email from Emil Austria of Thomson Reuters helpdesk dated 16 February 2016). In these cases, it was sourced from the balance sheet instead. As precise matching was not considered necessary, I did not consider it problematic that the figure may relate to more than a 12-month period.

14.2 USE OF QUANTITATIVE DATA FOR EACH CASE

I used quantitative data from CDP and corporate publications to create data series for absolute and relative emissions and electricity/energy consumption and also RECI/LCECI use. I also made graphs of data about mitigation projects, showing figures of tCO₂e mitigated over the lifetime of the mitigation project versus cost savings minus investment costs. In the following section, I detail how I used the data before going on to reference the sources of the data used. As described in the research case chapter, CDP requests on how firms should report scope 2 emissions changed over time and attention is required to identify the approach used.

14.2.1 ABSOLUTE EMISSIONS DATA

A note on absolute emissions data, a question in all but the earliest CDP datasets asks for the reasons for year-on-year changes in S1+S2 emissions (the question number varied between CDP questionnaires). This was a key question in creating the figures. CDP2011 onwards also asked for reasons for year-on-year changes in scope 3 emissions. Another source of quantitative information was the CDP question set that asked for scope 1, 2 and 3 mitigation actions and their estimated annual emissions savings. Again, the question number varied between questionnaires. However, these mitigation actions may not have been in place for a full year, so the effect of the mitigation action will not be fully reflected in the emissions figures for the year. A second point is that mitigation actions vary in duration. Some have a one-off use e.g. the use of carbon offsets and RECI; others may produce benefits for decades e.g. energy-efficient building design. Information about the duration of a mitigation measure was not consistently available in the CDP datasets. Therefore, data from the first question set was used for the figures showing how emissions had changed and why.

14.2.2 COST AND BENEFITS OF MITIGATING GHG EMISSIONS

I used data from CDP2013-2017 (3.3b) of the monetary costs and savings and GHG emission reductions of individual mitigation measures, so I could make graphs of the tCO₂e mitigated over the lifetime of a project versus its monetary savings minus investment costs. Prior to CDP2013, this question was less structured, so these earlier responses have not been analysed.

Lifetime tCO₂e saving and lifetime monetary savings were calculated by multiplying the estimated annual tCO₂e savings and monetary savings by the project lifetime in years. Investment costs were a requested data.

In the case of the estimated lifetime of the mitigation project, firms were asked to select from a range of years given in a drop-down menu in the CDP online questionnaire. I used the upper end of the range of years to present the best case for non-RECI measures compared to RECI measures. Where “Ongoing” was selected from the drop-down menu for lifetime of the project or no lifetime figure was given, I used the upper end of the payback period as the lifetime of the project because the lifetime of the project would be expected to be at least the maximum payback period. However, discretion was used in some instances e.g. a project lifetime of one year was assigned if it was clear from other comments that the data supplied related to one year e.g. Geode’s incentive schemes for workers to use public transport instead of cars (CDP2016 CC3.3b). Another example was Gravadlax’s use of offsets for train travel. This had no lifetime figure attached and payback was given as greater than 25 years. As emission and financial data seemed

to relate to a single year, this was used as the lifetime of the project. The cost of RECI/LCECI use was annualised if it seemed to represent the cost of a multi-year contract.

Emission savings were given on a yearly basis. Some firms reported zero tCO₂e savings, presumably because they did not have an estimate to give. These mitigation projects were removed as they would skew the results.

14.2.3 GAMETE'S QUANTITATIVE DATA

Figure 5: Emission figures based on data or calculated by me based on data in: corporate responsibility report for 2007 PDF pp.40-41, 2010 PDF pp.14-15, 2011 p.50, 2012 p.17, CDP2011 3.3, 8.2a, 8.3a, 11.1b, 13.1a, 14, 15.1, 15.3a, CDP2012 3.3b, 3.1a, 8.1, 8.2, 14.2a, 15.1, 15.3, CDP2013 3.3, 8.2, 8.3, 12.1a, 13.2a, 14, CDP2014 3.3, 8.2, 8.3, 12.1a, 14, CDP2015 CC3.3, CC8.2, CC8.3, CC12.1a, CC14.1, CC14.3a, CDP2016 CC8.2a, CC8.3a, CC12.1a, CC14.1, CC14.3a. Target data from CDP2011-CDP2016 3.1a. Data labels: 2005 corporate responsibility (CR) report p.12, 2009 CR report p.6, CPD2011 0.1, 2011 annual report, 2013 CR report and national newspaper article 24 January 2013, 2015 annual report PDF p.3.

Figure 6: Electricity consumption figures were based on data from: 2005 CR report p.34, 2007 CR report p.41, 2009 CR p.71, 2009 CR p.72, 2010 CR report p.15, CDP2011 12.2, 2011 CR report p.111, 2012 CR report p.1, p.18, CDP2012 11.2a, 12.2, CDP2013 11.2, 11.4, CDP2014 11.2, 11.4. CDP2015 11.2, 11.4. 2015 Global Reporting Initiative G4 format report, CDP2016 11.5, 11.4. The figures from the 2009, 2010, 2011 CR reports include "green" electricity, the proportion of renewable energy in the electricity mix and district heating aggregated in a single figure. They have been used on the assumption that district heating consumption is significantly smaller than RECI use. The 2010 CR report p.15 had district heating use at 14% of overall energy use which includes gas and heating oil too and electricity consumption at 52%.

Figure 8: Emission figures are based on the data used for Figure 5. FTE employee figures were calculated by me based on data in: corporate responsibility reports for 2005 PDF p.46, 2007 PDF p.52, 2009 p.80, 2010 PDF p.18, 2011 pp.121-122, 2014 PDF pp. 13-14; 2008 annual report p.11 and p.112, and 2015 Global Reporting Initiative-format report indicator G4-10. The emission intensity metrics were calculated by me. See the text on Gamete in section 14.2.14 for information on the electricity/energy consumption per FTE employee data series. The source of the percentage of consumed electricity covered by RECI is the same as for Figure 6.

Figure 11: Estimated lifetime tCO₂e savings and estimated lifetime cost savings minus initial cost in Euros were calculated by me using data in CDP2013-CDP2017 CC3.3b. The RECI purchase data detailed in CDP2014 has a duration of at least four years. However, I think this is the period of years over which Gamete intends to buy RECI and that the associated data relates to one year. I have therefore used one

year and this puts the cost and emissions benefit closer to the information given in for RECI purchase in CDP2013. It does not change any findings.

14.2.4 GRANGE'S QUANTITATIVE DATA

Figure 12: Emissions data from corporate responsibility reports: 2012 p.49; 2014 p.86, 2015 p.9, 2016 p.83, 85, 87.

Figure 14: Emissions based on data in corporate responsibility reports: 2012, p.49 and p.80; 2014, p.87; 2015, p.19; 2016, p.83, 85 and 87. FTE employee numbers from CSR reports 2007 p.38, 2008 p.36, 2009 p.34, 2011 p.46 and corporate responsibility reports 2012 p.80, 2013 p.88, 2014 p.86, 2015 p.18, 2016 p.83. See the text on Grange in section 14.2.14.1 for sources of data for electricity consumption per FTE employee data series. The source of the RECI data was CSR reports 2008 p.38, 2009 p.34, corporate responsibility reports 2012 p.80, 2013 p.86, 2014 p.87, 2015 p.19, 2016 p.87. This includes some figures for energy consumption that I thought mainly related to electricity consumption.

Figure 15: See Grange entries in section 14.2.14.2 for sources of data for energy consumption per FTE employee data series. Sources of data for consumed energy covered by RECI: 2007 report p.38, 2008 CSR report p.36 and p.38, 2010 CSR report p.44 and p.54, 2011 CSR report p.44, 2012 CSR report p.80, 2013 CR report p.86, 2014 CR report p.87, 2015 CR report p.19, 2016 CR report pp.86-87.

14.2.5 URBAN'S QUANTITATIVE DATA

Figure 16: Urban's S1+S2 emissions: emission figures based on data or calculated by me based on data in: CDP5 (2007) 2(a)(iii), 2(b)(i)(y) and 2(b)(ii), CDP6 (2008) 2(b)(i)(y), 3(a)(vi) and 2(g); CDP7 (2009) 9.5, 10.1, 10.6, 11.1, 12.1, 17.1, 23.8 and 23.10, CDP8 (2010) 19.1, CDP2011 13.1a, CDP2012 13.1a, CDP2013 3.3b, CDP2014 CC12.1a, CDP2015 CC12.1a, CDP2016 CC8.2, CC8.3a, CC12.1a.

Figure 18: Emission intensity figures calculated by me for y/e 2006-2008 and y/e 2015-2016 using emission data from CDP5 (2007) 2(b)(i)(y), CDP6 (2008) 2(b)(i)(y), CDP7 (2009) 10.1 and 11.1, CDP2016 and CDP2017 CC8.2 and CC8.3a. Full-time equivalent employee numbers were found in Urban's filings to the US Securities and Exchange Commission (Form 20-F). Firm-calculated S1+S2 emissions/FTE employee intensity figures were sourced from CDP2019 18.1, CDP2011 13.1, CDP2012 13.3, CDP2013 12.3, CDP2014 CC12.3, CDP2015 CC12.3. See sections 14.2.14.1 and 14.2.14.2 for the sources of electricity consumption (MWh)/FTE employee and energy consumption (MWh)/FTE employee. The percentage of consumed electricity covered by RECI/LCECI was sourced from CDP2008 2(b)(y)(i), CDP2010 further information section to 14.1, CDP2013 11.4, CDP2014 10.1a, CDP2015 11.4, CDP2016 11.4, CDP2017 CC11.5.

14.2.6 UMBRELLA'S QUANTITATIVE DATA

Figure 19: Emissions data from: CDP1 (2003) emissions question, CDP3 (2005) questions on emissions, emissions reduction strategy, risks and opportunities from climate change, CDP4 (2006) question on emissions, CDP5 (2007) 2(b)(i)(y), 2(f) and 3a, CDP6 (2008) 2(a)(iii), 2(b)(i)(y), 2(f) and 3(a), CDP7 (2009) 7.1, 10.1, 11.1, 12.1, 17.1, 23.10 and 23.11, CDP2010 0.2, 9.7, 12.1, 13.1, 19.1 and 14.1a, CDP2011 0.2, 3.1a, 8.2a, 8.3a, further information section to question 11 and 13.1a, CDP2012 0.2, 8.2a, 8.3a and 13.1a, CDP2013 0.2, 3.1a, 12.1a, 8.2, 8.3 and 12.1a, CDP2014 CC0.2, CC8.2, CC8.3 and CC12.1a, CDP2015 CC0.2, CC8.2, CC8.3 and CC12.1a, CDP2016 CC3.1a, CC8.1 and CC8.3a, 2006 sustainability report p.31, 2008 sustainability report p.30, 2011 sustainability report p.38, 2012 sustainability report p.36 and p.38.

Figure 21: S1+S2/FTE employee data-series were sourced from: CDP6 (2008) 3(b)(i), CDP7 (2009) 16.2, CDP2010 18.1b, CDP2011 13.3, CDP2012 13.3, CDP2014 CC12.3, CDP2015 CC12.3, CDP2016 CC12.3 and Umbrella's 2015 sustainability report p.36. The percentage of consumed electricity covered by RECI data-series: CDP4 (2006) emission reduction strategy question, 2007 sustainability report p.26, CDP2009 12.1, 2011 sustainability report p.37-38, 2012 sustainability report p.37, CDP2014 CC11.2 and CC11.4, CDP2015 CC11.2 and CC11.4, CDP2016 CC11.4 and CC11.5.

Figure 22: See the text on Umbrella in section 14.2.14.1 for the source of electricity consumption (MWh) /FTE employee. The data-series – the percentage of consumed electricity covered by RECI - is the same as for Figure 21.

Figure 23: See the text in section 14.2.14.2 for the source of energy consumption MWh/FTE employee. The sources of data for the percentage of consumed energy covered by RECI were: 2007 sustainability report p9 and pp.25-26, 2008 sustainability report p.30, 2010 sustainability report p.37, 2011 sustainability report p.37, CDP2012 11.2a, 2012 sustainability report p.37, CDP2013 11.2, CDP2014 CC11.2 and CC11.4, CDP2015 CC11.2 and CC11.4, CDP2016 CC11.2 and CC11.4.

14.2.7 URSA'S QUANTITATIVE DATA

Figure 24: Emissions data from: CDP2008 Q2(b)(i)(y), CDP2009 10.1 and 11.1, CDP2010 12.1, 13.1 and 15.1, CDP2011 13.1a, CDP2012 3.3b, 8.2a, 8.3a, 13.1a and 15.3a, CDP2013 8.2, 8.3, 12.1a, 14.1 and 14.3a, CDP2014 CC11.4, CC12.1a, CC14.1 and CC14.3a; CDP2015 CC8.2, CC8.3, CC11.4, CC12.1a, CC14.1T and CC14.3a, CDP2016 CC7.1, CC8.2, CC8.3, CC12.1a, CC14.1 and CC14.3a. Some of the data-points in Figure 24 were based on calculations by me using the cited data.

14.2.8 GEODE'S QUANTITATIVE DATA

Figure 26 Emissions data from: CDP2010 12.1 and 13.1, CDP2011 7.1, CDP2012 7.1, CDP2011 8.2a, 8.3a and 13.1a, CDP2012 3.3c, 8.2a, 8.3a and 13.1a; CDP2013 3.3b, 8.2, 8.3 and 12.1a, CDP2014 CC8.2, CC8.3, CC12.1a, CDP2015 CC8.2, CC8.3 and CC12.1a, CDP2016 CC8.2, CC8.3 and CC12.1a. Y/e 2013 and y/e 2014 location-based S2 figures were calculated using data from CDP2014 and CDP2015.

Figure 28: S1+S2 emissions tCO₂e/FTE employee data-series from: CDP201 18.1b, CDP2011 13.3, CDP2012 13.3, CDP2013 12.3, CDP2014 12.3, CDP2015 12.3, CDP2016 12.3 (y/e 2015 location-based S2 figure calculated by me). For the electricity consumption MWh/ FTE employee data-series, electricity consumption (MWh) was from: CDP2011 12.2, CDP2012 12.2, CDP2013 11.2, CDP2014 CC11.2, CDP2015 CC11.2, CDP2016 CC11.4 and CC11.5. FTE employee numbers were from Geode's corporate publications and CDP responses: CDP 2011 13.4, CDP2012 introduction, CDP2013 introduction, 2014 annual report, and CDP2016 CC12.3. For the energy consumption MWh/ FTE employee data-series, the energy consumption (MWh) was from: CDP2012 12.2, CDP2013 11.2, CDP2014 CC11.2, CDP2015 CC11.2, CDP2016 CC11.2, CC11.5. FTE employee were sourced as per previous data-series.

Figure 29: The data-series for Geode's electricity consumption MWh/FTE employee is the same as for Figure 28. To calculate Ursa's electricity consumption (MWh)/employee intensity figures, I used CDP electricity consumption data (CDP2009 20.3, CDP2012 12.2, CDP2013 11.2 and 11.4, CDP2014 CC11.2 and CC11.4, CDP2015 CC11.2 and CC11.4, CDP2016 CC11.4 and CC11.5) and the average number of employees in a year sourced from annual reports (2009 p.67, 2011 p.78, 2012 p.89, December 2014 p.133, 2015 p.115).

14.2.9 GOSHAWK'S QUANTITATIVE DATA

Figure 30: Emissions data was taken from: CDP4 (2006) 6, CDP6 (2008) 2(b)(ii), CDP2010 12.1, 13.1 and 15.1, CDP2011 8.2a, 8.3a, 11.2 and 13.1a, CDP2012 8.2a, 8.3a, 11.2, 13.1a and 15.1, CDP2013 8.2, 8.3 and 12.1a, CDP2014 CC3.3b, CC8.2, CC8.3 and CC12.1a, CDP2015 CC3.3b, CC8.2, CC8.3 and CC12.1a, CDP2016 CC8.1, CC8.3a, CC14.1T and CC14.3a.

Figure 32: GHG emissions per m² of sales area were sourced from: corporate publication y/e 2015 PDF p.2 and corporate responsibility report y/e 2016 p.41. The data-series of LCECI as a percentage of purchased electricity was calculated by me using data from: CDP2011 11.2a and 12.2, CDP2012 11.2a and 12.2, CDP2013 11.2 and 11.4, CDP2014 CC11.2 and CC11.4, CDP2015 CC11.2 and CC11.4, and CDP2016 CC11.4 and CC11.5.

Figure 33: Energy consumption per m² of sales area was sourced from sustainability reports 2010 p.14 and 2012 p.48, corporate responsibility report y/e 2015 p.36 and y/e 2016 unnumbered page. The data-series of LCECI as a percentage of purchased electricity was as per Figure 32.

14.2.10 UPSILON'S QUANTITATIVE DATA

Figure 34: Emissions figures were sourced from: CDP3 (2005) 5, CDP4 (2006) 4 and 6, CDP5 (2007) 2(a)(iii), 2(b)(i)(y) and More Information section for this question, CDP6 (2008) 2(b)(i)(y) and 3(a)(vi), CDP2009 10.1 and 11.1, CDP2010 12.1, 13.1 and 9.7, CDP2011 3.3a, 8.2a and 8.3a, CDP2012 3.3b, 8.2a, 8.3a, 15.1 and 15.3a, CDP2013 8.2, 8.3, 12.1a and 14.3a, CDP2014 CC8.2, CC8.3, CC12.1a, CC14.1, CC14.3a, 15.1 and 15.3a, CDP2015 CC8.2, CC8.3, CC12.1a, CC14.1 and CC14.3a, CDP2016 CC8.1, CC8.3a, CC12.1b, CC14.1 and CC14.3a, CDP2017 CC8.1, CC8.3, CC12.1a, CC14.1 and CC14.3a.

Figure 36: Emission intensity figures were sourced from: CDP2013 12.4, CDP2014 CC12.4, CDP2015 CC12.4, CDP2016 CC12.3 and CDP2017 CC12.3.

14.2.11 UMBRA'S QUANTITATIVE DATA

Figure 37: Emission figure sourced from: CDP1 (2003) emissions question, CDP4 (2006) emissions questions, CDP5 (2007) 2(b)(i)(y)(a) and (b), CDP6 (2008) 2(b)(i)(y)(a) and (b), CDP2009 10.1 and 11.1, CDP2010 12.1 and 13.1, CDP2011 8.2a, 8.3a and 8.4a, CDP2012 8.2a, 8.3a, 8.4a and 13.1, CDP2013 3.3a, 8.2, 8.3 and 12.1a, CDP2014 CC8.2, CC8.3 and CC12.1a, CDP2015 CC8.2, CC8.3 and CC12.1a, CDP2016 CC3.3b, CC8.2, CC8.3a, CC11.4 and CC12.1a.

Figure 39: GHG emissions per unit area were sourced from: environment reports 1996 pp.12-14, 1998 p.31, 2000 p.8, 2005 p.19, corporate responsibility reports 2006 p.28, 2007 p.34, 2008 p.20, 2009 p.17, 2010 p.41, 2011 p.54, annual reports 2014 p.49, 2015 p.52, 2016 p.60. Figure 39 shows series of emission intensity data from successive corporate publications. The metric uses unit area as a denominator. Unit area of what was not always specified, but it was per unit area of sales floor in the 2011 corporate report p.54, 2014 annual report p.49 and 2015 annual report p.52.

Figure 40 Scatterplot and trendline of Umbra's emission intensity figures from 1999-2009 the 2005 environment report p.5 and the following corporate responsibility reports: 2006 p.28, 2007 p.34, 2008 p.20, 2009 p.17.

14.2.12 GRAVADLAX'S QUANTITATIVE DATA

Figure 41: Emissions data were sourced from: CDP2 (2004) emission reduction strategy, CDP3 (2005) emissions data and emissions reduction strategy, CDP4 (2006) emission reduction strategy and products,

CDP2008 2(a)(iii) and 2(b)(i), CDP2009 11.1, 22.3 and 23.8, CDP2010 12.1, 13.1, 14.1, 19.2 and 21.5, CDP2011 11.1a and 13.1a, CDP2012 11.1a, 13.1a and 14.2a, CDP2013 8.2, 8.3, 12.1a and 13.2a, CDP2014 CC8.2, CC8.3, CC12.1a and CC13.2a, CDP2015 CC8.2, CC8.3, CC12.1a and CC13.2a, CDP2016 CC7.1, CC8.2, CC8.3 and CC12.1a, CDP2017 CC8.2, CC8.3, CC12.1a, CC13.2a and CC14.1. Scope 3 business travel emissions were taken from the CDP datasets presented on Bloomberg business information terminals. Data on methodological changes were taken from 2015 corporate responsibility report p.150. Interviewee said the figures from y/e 2003 onwards were based on location-based S2 numbers (email dated 3 November 2019 from Interviewee).

I was not certain when Gravadlax stopped using lifecycle emission factors. Use of lifecycle emission factors would mean in the case of electricity that emissions associated with the extraction and production of the fuel burnt to make electricity and emissions associated with transmission and distribution losses would be aggregated into a single emission factor, making it larger than an emission factor for scope 2 alone. A further point to note is that for y/e 2003-2005, 2007, and 2009, no business travel figures were reported, although business travel emissions were typically 1-2% of total, so were insignificant.

Figure 42: Electricity consumption figures and the percentage of consumed electricity covered by RECI were sourced from: CDP3 (2005) emissions reduction strategy, energy intensity measurement, CDP4 (2006) products, CDP2007 2(b)(y)(i), CDP2008 2(b)(y)(i), CDP2009 12.2, 20.3, 20.6 and 23.8, CDP2010 13.6 and 14.5, CDP2011 11.2a and 12.2, CDP2013 11.2 and 11.4, CDP2014 CC11.2 and CC11.4, CDP2015 CC11.2 and CC11.4, CDP2016 CC11.4 and CC11.5, CDP2017 CC11.4 and CC11.5.

Figure 44: The sources of the emissions figures were as per Figure 41. Revenue was taken from the summary sheet from the Thomson One Reuters Fundamentals database accessed on 18 January 2018. The intensity figures were calculated by me.

Figure 45: The sources of the data for electricity consumption and the percentage of consumed electricity covered by RECI were the same as for Figure 42. The sources of the revenue figures were as per Figure 44. The intensity figures were calculated by me. Data for energy consumption in thousands of MWh/ revenue in billions € were taken from Gravadlax reports: 2012 p.237, 2015 p.147, 2016 p.162.

14.2.13 UPWIND'S QUANTITATIVE DATA

Figure 46: Emissions data was sourced from: 2012 corporate publication PDF p.61, 2015 environmental publication - no page number, 2016 environmental publication - no page number.

Figure 47: Electricity consumption figures were based on: CDP1 (2003) - strategy, CDP2007 2(b)(i)(y), CDP2008 2(b)(i)(y) and 2(h), 2009 corporate publication, CDP2010 14.5. CDP2011 3.3a and 11.2a, CDP2012 11.2a, CDP2013 11.2, 11.4, CDP2014 CC11.2 and CC11.4, CDP2015 11.2 and 11.4, CDP2016 CC11.4 and CC11.5.

Figure 49: The data-series - emissions normalised by revenue - was calculated by me. The sources of the emissions data were as per Figure 46. Revenue data was taken from Thomson One Reuters Fundamentals database accessed on 24 May 2017. The percentages of purchased and consumed electricity covered by RECI/LCECI were taken from or calculated by me based on data from: CDP 1 strategy question, CDP5 (2007) 2(b)(i)(y) and 2(g), CDP6 (2008) 2(b)(i)(y) and 2(h), 2009 environment publication PDF p.15, CDP2011 3.3a and 11.2a, CDP2013 5.1a, 11.2 and 11.4, CDP2014 CC11.2 and CC11.4, CDP2015 CC5.1a, CC11.2, CC11.4 and CC14.5, CDP2016 CC11.4 and CC11.5, 2016 environmental publication – no page number.

Figure 50: The data-series - consumed electricity normalised by revenue - was calculated by me. The sources of the electricity consumption figures were the same as per Figure 47. Revenue data and the percentage of purchased and consumed electricity covered by RECI/LCECI was as per Figure 49.

Figure 51: The figures for this were calculated by me using data from CDP2013-CDP2017 CC3.3b.

14.2.14 BANKS' ELECTRICITY/ENERGY INTENSITIES

This section describes the construction of series of electricity/energy intensity metrics for banks to compare their performance. Firstly, I consider generic issues related to comparability, numerators and denominators before focussing on the data for individual banks.

Comparability of metrics in terms of comparing year-on-year figures for the same firm and comparing firms could be affected by different choices of organisational boundaries and excluded equipment. CDP asks firms to detail organisational boundary choice used for GHG emission reporting and excluded emission sources within that. I would assume these choices apply to the data underlying emissions figures such as energy and electricity consumption. Information reported by the banks to CDP is given in Table 35 Banks' organisational boundary and excluded sources– CDP data. It can be seen from the table that by y/e 2015 – which please note is the first row in the table - all the banks were using the same organisational boundary and there are no excluded sources, giving a good degree of comparability between banks. There is also a high degree of internal consistency between different years of reporting for Grange and Umbrella banks particularly.

Table 35 Banks' organisational boundary and excluded sources– CDP data

Legend: Org. boundary – organisational boundary OC – operational control FC – financial control

Note: Only excluded sources relevant to energy and electricity figures are included in table; both UK banks reported that some types of GHG were not reported. This table is reproduced in the accompanying A3 portfolio.

Year-end	Sources Org. boundary and excluded sources in that order	Gamete		Grange		Urban		Umbrella	
		Org. boundary	Excluded S1+S2 sources	Org. boundary	Excluded S1+S2 sources	Org. boundary	Excluded S1+S2 sources	Org. boundary	Excluded S1+S2 sources
2015	CDP2016 CC8.4a	OC	No	OC	No	OC	No	OC	No
2014	CDP2015 CC8.4a	OC	Foreign sources accounting for 10% of total employees	OC		OC		OC	
2013	CDP2014 CC8.4a	OC	Foreign sources accounting for 10% of total employees	OC	No	OC	No	OC	No
2012	CDP2013 8.4a	OC	Foreign sources excluded	OC	No	OC	Sites where bank does not pay the energy bills and does	OC	No

							not have access to consumption data.		
2011	CDP2012 8.4a	Bespoke boundary: only German offices representing 90% of employees.	Foreign sources excluded.	OC	No	FC	No	OC	Cash machines
2010	CDP2011 8.4	Bespoke boundary: only German offices representing 90% of employees.	Foreign sources excluded.	OC	No	FC	No	OC	Cash machines
2009						FC	Only UK sources, representing 95% business activities.		
2008						FC	Only UK sources, representing 95% business activities.		
2007						FC	Only UK sources, representing 97% business activities.		
2006						Not given.	Only UK sources, representing 95% business activities.		

For the denominator, I chose Full-Time Equivalent (FTE) employee number. CDP had requested use of this denominator by all responding firms for several years e.g. from the CDP2011 questionnaire (CDP 2011), dropping the request in the CDP2016 questionnaire (CDP2016d) while maintaining the request for firms to provide a metric of their choosing. This was expected to yield data-series of reasonable lengths, especially as two of the banks chose to continue using this metric from CDP2016.

Another candidate for the denominator was work station numbers. This is a robust metric as it captures contractors that can form a significant part of a firm's labour force. However, I did not find the necessary data to use metric. Emissions normalised by revenue was requested by CDP for several years (see CDP6 (2008) and CDP2016d), but normalising using a common currency would introduce the complicating effect of exchange rate fluctuations. Unit area had been used by two of the banks. However, unit area figures were not commonly found in the corporate publications of the other two banks, preventing me from calculating the metric. Therefore, I chose Full-Time Equivalent (FTE) employee as the denominator.

In some instances, I had to calculate the intensity metric. I used Full-Time Equivalent (FTE) employee data from corporate publications and CDP. Sometimes I used Thomson One Reuters Fundamentals (TORF) data, which has a readily-available and lengthy time series of number of employees. However, this represents only full-time employees and not Full-time Equivalents (FTE) employees, according to an email response from Thomson Reuters Helpdesk (23 November 2016), although I noticed that sometimes the TORF numbers were the same as those given in bank corporate publications for FTE employee.

There is potential for numerators and denominators to have mismatched boundaries and differing excluded sources of data. Steps taken to reduce this issue are described in the following sections for individual banks. I had a specific problem with the denominator in the case of Grange as two successive years of corporate reports have two parallel, but different sets of employee numbers in corporate responsibility reports for 2012 and 2013 with no explanation given. I used the employee figures located in the reports with the emissions data as the boundaries of the two types of data may be more likely to match.

14.2.14.1 Electricity consumption/employee intensity metrics

There is a distinction between purchased and consumed electricity. Purchased electricity could include electricity that is bought to be traded, although I assumed that did not apply with the banks. Consumed electricity could include electricity that the bank has generated itself. Purchased and consumed electricity would be bought electricity sourced from the grid or via a private connection with a generator. For Urban, some figures were labelled as "purchased" electricity, which I interpreted as purchased and consumed electricity. For Umbrella, most figures are described as "purchased and consumed"; the rest are described as "consumed". For Gamete, the figures are predominantly for consumed electricity except for y/e 2012-2014 where the figures are for purchased and consumed. All Grange's figures are consumption only and it

does have some PV panels (Interviewee). Therefore, there is not full consistency on what has been measured. However, I would expect that in the case of banks, purchased electricity is a sub-set of consumed electricity. Therefore, I have standardised to the term “consumption”. The effect on the findings would be that Grange which consistently reported electricity consumption figures could have higher intensities than banks reporting purchased and consumed electricity intensities as its figures would include self-generated electricity and theirs would not.

Gamete

I found only one electricity/employee metric calculated by the bank in the 2005 Corporate Responsibility Report (p.30). The figure of 5.675 kWh/employee for 2004 is derived from a 141,075 MWh electricity consumption figure that relates bank's Germany premises only. I have assumed the kWh should be MWh. Otherwise the bank would have more than 24 million employees. The type of employee is not specified. This data-series is labelled Gamete ElecB. Given this is the only bank-calculated metric, I constructed an alternative data-series.

Corporate publications were the source of my electricity figures for y/e 2003-2014 (corporate responsibility reports: 2005 PDF p.34, 2007 p.41, 2009 p.71, 2010 p.15, 2012 p.1, Global Reporting Initiative-format report for 2015, indicator G4-EN3). Although this case is a group of firms, I clarified with the group that the reported electricity and energy data was for the parent bank in Germany only. Figures in CDP data-bases exactly matched these figures except for y/e 2015 when the CDP figure is higher (CDP2016 CC11.5). This may be due to different boundaries. The CDP figures generally excluded sources of scope 1 and scope 2 emissions outside Germany, but not in y/e 2015 (see Table 35) when all sources were included. However, the Global Reporting Initiative (GRI) report suggests that its lower electricity consumption figure was for Germany only.

To normalise these figures, I needed employee data for the parent bank in Germany only. These are given in some corporate publications e.g. corporate responsibility reports for 2007 p.52, 2010 PDF p.18, 2011 p.122, 2014 PDF p.13, 2015 GRI-format report indicator G4-10. In other cases, for y/e 2007, 2008, re-stated 2008, 2009, I have calculated numbers based on figures in the 2008 annual report p.112 and the 2010 corporate responsibility report p.18. The Global Reporting Initiative indicator G4-10 figures exclude trainees. However, I have included trainees where the data is available as they would have consumed electricity.

To facilitate comparison with other banks, I then converted these figures to FTE employee numbers, either using the fraction of part-time employees given in corporate publications (corporate responsibility reports 2005 PDF p.46, 2009 p.80, 2011 p.121, 2014 PDF p.14, 2008 annual report p.11, 2015 GRI-format report, indicator G4-10). If this was not available, I used a mean average fraction based on the figures for the years either side of the gap. I have assumed part-time staff work exactly half full-time hours. This process

was laborious to conduct with different sources giving different figures and no clear reason for divergence e.g. 2013 number of employees 36,719 (CDP2015 CC12.1a), 36,037 (2014 Annual Report p.272), 35,875 (2015 GRI-compliant report). These differences could make a noticeable change to the resulting intensity figures. The resulting data-series Gamete ElecF is fairly robust, except that the FTE employees figures for y/e 2014 and 2015 do not include trainees, which would increase the intensity figures.

Grange

Electricity consumption figures were intermittently reported to CDP, so I calculated electricity consumption per employee figures using data from corporate reports. Sources of electricity consumption data were: a 2007 report unnumbered page, 2008 report unnumbered page, 2009 CSR report p.34, 2011 CSR report p.44, 2012 CR report p.80, 2013 CR report p.86, 2014 CR report p.87, 2015 CR report p.19, 2016 CR report p.86. Sources of FTE employee numbers were CSR reports (2007, p.38, 2008 p.36, 2009 p.34, 2011 p.46) and CR reports (2012 p.80, 2013 p.88, 2014 p.86, 2015 p.18, 2016 p.83). This bank's CSR reports have two sets of FTE employee figures for years 2012 and 2013, one set is presented with "eco-efficiency" data. The second set is not. The first set in the 2012 report produces a spike in electricity consumption intensity figures. The second set of FTE employee figures reduces this spike. However, I have not been able to find out from the bank which are the correct set of FTE figures to use, so have taken a conservative approach, using the FTE figures presented with the eco-efficiency data. All employee numbers are FTE employees. Not every publication has a figure for electricity consumption disaggregated from other energy use e.g. the 2010 corporate responsibility report only has energy figures. Therefore, these have not been used. Instead I have taken figures from the most recent restatement of electricity consumption.

Urban

No firm-calculated electricity consumption/employee were found. Electricity consumption figures were sourced from CDP reports and corporate publications (e.g. CR report for 2007 p.15, CDP2008 2(b)(y)(i), CDP2013, CDP2014 and CDP2015 all 11.2, CDP2016 and CDP2017 both 11.5). The figures for y/e 2008-2011 (CDP2009 20.3, CDP2010 13.6, CDP2011 12.2, CDP2012 12.2) are aggregated with sources of other scope 2 emissions i.e. purchased and consumed heat, steam and cooling. However, there is no indication in the bank's responses that it bought heat, steam and cooling, so over-estimation is unlikely. Energy consumption figures in CSR publications for y/e 2014 and y/e 2015 are significantly less than the electricity consumption given in CDP for those years, but it is not clear exactly what these figures covered, so the electricity consumption figures in CDP were used. In y/e 2012 some emission sources were excluded – see Table 35. This was due to gaps in energy consumption data. I assume that these gaps are also present in the electricity consumption data. Apart from this instance, whole group figures appear to have been presented.

FTE employee numbers were found in the filings to the US Securities and Exchange Commission (Form 20-F) for y/e 2002-2016. The figures are for the group. I calculated an electricity intensity data-series (Urban ElecC).

Umbrella

No firm-calculated electricity consumption/employee were found. Consumed electricity figures were sourced from CDP reports (CDP4 emission reduction strategy question, CDP5 (2007) 2(b)(i)(y) and 3a, CDP6 (2008) 2(b)(i)(y), CDP2009 20.3, CDP2010 13.6, CDP2011 12.2, CDP2012 12.2, CDP2013 CC11.2, CDP2014 CC11.2, CDP2015 CC11.2, CDP2016 CC11.2) and corporate publication (2005 sustainability report). In y/e 2011 and 2012 some electricity-using equipment was excluded from emissions reporting and were presumably absent from the electricity consumption figures too. Other than that, there is no indication that whole group figures have not been reported. I took FTE employee figures from annual reports (2005-2016) to form data-series Umbrella ElecB.

Table 36 Summary of data sources for electricity consumption (MWh) /employee

	Gamete ElecB	Gamete ElecF	Grange ElecA	Urban ElecC	Umbrella ElecB
Who calculated the data-series?	Bank	Me	Me	Me	Me
Numerator	Electricity consumption figure for Germany only. Corporate publications.	Electricity consumption figure for Germany only. Corporate publications and CDP datasets for y/e 2010-2015 (CDP2011-2016 which are public. CDP2006-2010 are not public).	Electricity consumption data given for German and overseas sites from earliest report used. Corporate publications.	Whole group electricity consumption Mainly CDP responses.	Whole group electricity consumption Corporate publication and CDP responses.
Denominator	Type of employee number not specified. Corporate publications.	FTE employee numbers calculated from corporate publications for parent bank in Germany only. Subsidiaries excluded.	FTE employee numbers from corporate publications.	FTE employees from SEC Form 20-F.	FTE employees from corporate publications.
Advantage	I have assumed the bank has matched the sources of consumption data and employee numbers.	11 years' data	Sources of consumption data and employee numbers are similar.	13 years' data	11 years' data
Disadvantage	One data-point. Numerator is number of employees, not FTE.	FTE employee data-series calculated by me using some assumptions.	In CR reports for 2012 and 2013 have 2 sets of FTE employee figures. It is not clear why, but one is co-located with environmental data, so I have used that one.	None identified.	None identified

14.2.14.2 Energy consumption/employee

Gamete

I have two data-series for energy consumption/employee. The first data series for y/e 2005-2015 uses total energy consumption data sourced from bank publications (corporate responsibility reports: 2007 p.41, 2009 "About this report" page, 2010 p.15, 2011 p.111, 2012 p.19, 2013 "Selected Key Figures" page, 2014 p.12, 2015 Global Reporting Initiative-format report, indicator G3-EN3. This is data series Gamete EnergyI. The second data-series, Gamete EnergyJ, uses summed electricity, heat, steam and cooling (EHSC) and fuel data from CDP data-sets for y/e 2010-2015 (CDP 2011 12.2, CDP2012 12.2, CDP2013 11.2, CDP2014 CC11.2, CDP2015 CC11.2, CDP2016 CC11.2, CC11.5 and CC11.3). Although the figures are close, they are not identical. I did not investigate the source of the differences as it did not seem to warrant the time it would take to find the cause. The two are used together as their similarity validates each other. Both sets of energy consumption figures are normalised with FTE employee number figures for the parent bank in Germany that I calculated using data in corporate publications, which is explained in the preceding section on electricity consumption/employee data-series for this bank.

Grange

Grange EnergyA uses energy consumption/employee metrics calculated by me using energy consumption and FTE employee data from corporate reports. The energy figures include fuels, electricity, district heat and cooling (2011 CSR Report p.44, 2012 CSR Report p.80, and corporate responsibility reports (2013 p.86, 2014 p. 87, 2015 p.19, 2016 p.86). FTE employee numbers are the same as those used for the electricity intensity figures. As with the electricity consumption/employee intensity metrics, the 2012 and 2013 corporate responsibility reports have two sets of FTE employee figures. I have used those located with the energy consumption data. Some figures are very close or the same as the figures in the second data-series, Grange EnergyB, which is composed of energy consumption (kWh)/FTE employee metrics published by Grange. In other cases, the differences between Grange EnergyA and Grange EnergyB are greater. However, the way the re-stated years fall, the years with the larger differences are excluded from the data-series.

Urban

There are no firm-calculated energy/employee metrics. So, I have used data from 2007 Corporate Responsibility Report (for y/e 2002, 2005-7) and CDP data-sets for y/e 2008-2015, adding electricity or EHSC consumption figures to fuel consumption figures, where this had not already been done (CDP2009 20.4 and 20.3, CDP2010 12.8 and 13.6, CDP2011 12.2, CDP2012 12.2, CDP2013 11.2, CDP2014 CC11.2, CDP2015 CC11.2). Energy and fuel consumption data was not requested in CDP2007 and

CDP2008, only electricity consumption. A 2016 corporate environmental publication (p.3) has three years of energy data, but it excludes data centres and other sources, so these figures have not been used.

FTE employee numbers were taken from US SEC Form 20-F as per the electricity intensity data-series for this bank described in the preceding section.

Umbrella

Three sustainability reports (2005-2008) have property-based energy use figures. FTE employee numbers from the 2005 sustainability report (p.30) are used to calculate intensity metrics for y/e 2004 and y/e 2005. FTE employee numbers are not in the 2006 and 2008 sustainability reports, so for y/e 2006 I have used the FTE employee figures from 2006 annual report (p.104). I could not calculate an energy intensity figure for y/e 2008 due to corporate restructuring and a consequent mismatch between the boundary of the numerator and denominator.

The 2009-2015 sustainability reports contain the energy consumption/FTE employee metrics calculated by the bank. The 2010 Sustainability Report (p.37) and 2011 Sustainability Report (p.38) say that figures include offices and data centres and energy use include electricity, gas, oil and other sources used for heat or power. The 2009 and post-2011 reports do not specify what the term energy includes. My assumption is that a comprehensive set of energy sources continued to be included. So, there may be a widening of sources between the 2005-2008 reports and subsequent ones.

Table 37 Summary of data sources of energy consumption (MWh) /employee

	Gamete EnergyI	Gamete EnergyJ	Grange EnergyA	Grange EnergyB	Urban EnergyC	Umbrella EnergyA
Calculated by me or bank	Me	Me	Me	Bank-calculated intensities.	Me	Mostly bank-calculated intensities, but some calculations by me.
Numerator	Energy data from bank publications for y/e 2005-2015.	Summed EHSC and fuel consumption data from CDP datasets for y/e 2010-2015 (CDP2011-2016 which are public).	Electricity, heat, cooling and fuel from bank publications.	Bank publications	Electricity or EHSC consumption figures added to fuel use figures. 2007 corporate publication provided data for 2002, 2005-2007 and CDP data for 2008-2015	Property-based energy use figures for 2005-2008. 2010 and 2011 figures specify coverage of offices and data centres and that energy use includes electricity, gas, oil and other sources used for heat or power. No specification for 2009 and post-2011 reports. Bank publications
Denominator	Calculated FTE employee numbers for parent bank only in Germany based on data in bank publications.	Calculated FTE employee numbers for parent bank only in Germany based on data in bank publications.	Bank publications give FTE employee.		FTE employee from US SEC Form 20-F	FTE employee figures given in bank publications. p
Advantage	Long data-series.	Long data-series.	Long data series of 12 years. The method that I used to calculate this data series is validated by the match with Grange	I assume the bank has matched the sources of consumption data and employee numbers.	12 years' data	I assume the bank has matched the sources of consumption data and employee numbers and majority of intensity metrics are bank-calculated.

			Energy B which are bank-calculated figures.			
Disadvantage	FTE employee data-series calculated by me using some assumptions.	FTE employee data-series calculated by me using some assumptions.	2012 and 2013 corporate responsibility reports have 2 sets of FTE figures. It is not clear why. One is located with environmental data, so I have used that one.	None	None	None

14.3 ASSESSMENT OF FINANCIAL OPPORTUNITY COST OF RECI USE

This is an explanation of Table 33.

Sources of RECI cost data:

Gamete - Gamete has given the extra cost of buying “green” electricity as 590,000 € in y/e 2012 (CDP2013 CC3.3b). For y/e 2013 “100 % green electricity with proof of origin from the EECS system” was bought at a cost of 551,700 € (CDP2014 3.3b). Additional costs of sourcing “green electricity” were 603,860 € in y/e 2014 and 700,000 € in y/e 2015 (Gamete’s 2014 GRI-format report indicator G3-EN30 and 2015 GRI-format report indicator G4-EN31).

Goshawk - CDP2014-2016 CC3.3b.

Gravadlax - CDP2013 3.3b.

Upwind - CDP2013 3.3b, CDP2014-2017 CC3.3b.

Geode –CDP2012 3.3b, CDP2013 3.3b, 11.4.

Umbra - CDP2013 3.3b, CDP2014-2017 CC3.3b.

Sources of details of mitigating actions:

CDP2013 3.3b, CDP2014-2017 CC3.3b.

Sources of mean S1+location-based S2 emissions tCO₂e:

See sources of absolute emissions data listed under each firm. Umbra’s absolute emissions figures were taken from CDP2017 CC8.1 and CC8.3a as Umbra’s absolute emissions graph does not extend to y/e 2017, the year for which I have RECI cost data.

Sources of exchange rates

Exchange rates from XE currency converter on 28 November 2018. 1€ = US\$ 1.13852. 1 GB£ = US\$ 1.28354.

14.4 FEEDBACK ON QUESTIONS FROM CSR PROFESSIONALS

Table 38 Feedback on questions from CSR professionals

Nature of feedback	Description of professional
Review	A former sustainability manager at a Dutch multi-national electronics firm, he was working at an international business organisation focussed on CSR.
Mock interview using questions	A consultant with many years' experience of advising a range of Portuguese stock market-listed firms on climate change-related issues. She answered from the perspective of a telecommunications firm.
Review	A sustainability director at a Scandinavian paper firm.
Mock interview using questions	A sustainability director at a US energy-from-waste firm.
Review	A former sustainability manager at a global electronics firm with experience of working in more than one European country. He was working for a German engineering firm.

14.5 CONSENT FORM



University of Sussex

CONSENT FORM FOR PROJECT PARTICIPANTS

PROJECT TITLE: How Does Corporate Governance Influence Company Voluntary Greenhouse Gas (GHG) Mitigation Activities?

Project Approval
Reference: ER/AS664/3

I agree to take part in the above University of Sussex research project. I have had the project explained to me and read and understood the Information Sheet, which I may keep for my records. I understand that agreeing to take part means that I am willing to:

- Be interviewed by the researcher;
- Allow the interview to be audio-recorded and/or for notes to be taken during the interview;
- Consider providing follow-up information/clarifications should this be requested.

I give permission for information that I provide to be used in publications and linked with (please tick as appropriate)

☐ my company

☐ my role or job title

☐ my name.

☐ If my company and/or myself are not to be identified, I will agree an alternative description with the researcher that will be used in publications.

I consent to the use of any personal information that I give for the purposes of this research study. I understand that such information will be treated as strictly confidential unless I have given permission

above for it to be used in publications. Information will be handled in accordance with the Data Protection Act 1998.

Name:

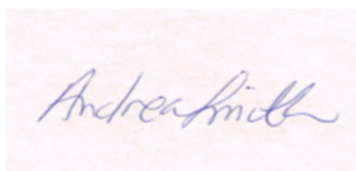
Job title/role:

Company:

Signature:

Date:

Researcher name and signature: Andrea Smith

A rectangular area containing a handwritten signature in blue ink. The signature is written in a cursive style and appears to read "Andrea Smith". The background of this area is a light pink color.

14.6 INFORMATION SHEET

Participant Information Sheet**How Does Corporate Governance Influence Company Voluntary Greenhouse Gas (GHG) Mitigation Activities?****Overview**

This is a Ph.D. research project being undertaken by Andrea Smith and funded by the UK Economic and Social Research Council. It examines voluntary GHG mitigation undertaken by firms, specifically whether they enter into contracts or purchases to support renewable electricity. The research will examine any consequent impact on a firm's other GHG mitigation activities and seeks to understand the reasons for the mitigation actions undertaken by the firm by looking at its corporate governance and the factors that influence this. Taking part will further understanding of the role that businesses play in society in particular regarding climate change mitigation.

Method

I will use data from corporate publications and databases such as CDP supplemented by interviews. As the project spans different areas of corporate life, I envisage interviewing a number of representatives of a company. Interviews will last about an hour, but may be ended at any time by the interviewee. Interviewees do not have to be identified when the research is published. They can choose the degree of anonymity that suits them from using a pseudonym to not having their role or job title used and to not identifying their company. If you or one of your colleagues within your company does not want the company to be identified, then this will be respected by applying this level of anonymity to all interviewees from that company. Interviewees will be asked to sign a form giving consent to be identified or specifying the level of anonymity that they want. With the interviewee's permission, the interview will be recorded to supplement notes taken of the interview. Participants can have the information they have given removed from the project provided there is time for a replacement to be found before the Ph.D. funding runs out in January 2018.

PUBLICATION

The thesis will be published online via Sussex Research Online (<http://sro.sussex.ac.uk/>) and Electronic Theses Online Service (Ethos) run by the British Library (<http://ethos.bl.uk>) and placed in the university library. Other opportunities for disseminating the research findings will be pursued.

Safeguards

This proposal has been reviewed by my supervisors and approved by the university's Research Ethics Committee. If you have any concerns about the conduct of the research, please contact my supervisors. The University of Sussex has insurance in place to cover its legal liabilities in respect of this study.

Thank you very much for your time,

Andrea Smith

Contact details:

Andrea Smith, doctoral researcher, as664@sussex.ac.uk, phone [phone number deleted]

Supervisors: Professor Gordon MacKerron (gordon.mackerron@sussex.ac.uk, [phone number deleted]);
Dr Karoline Rogge (k.rogge@sussex.ac.uk, [phone number deleted]).

Postal address: Science Policy Research Unit, School of Business, Management and Economics, Jubilee Building, University of Sussex, Falmer, BN1 9QE, UK.