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# **Channelling Sensitivity: The production of justification for shale gas development through the English planning system**

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PhD in Science and Technology Policy Studies

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June, 2018

I hereby declare that all material in this thesis which is not my own work has been identified, and 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:.....

# THESIS SUMMARY

UNIVERSITY OF SUSSEX

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PHD IN SCIENCE AND TECHNOLOGY POLICY STUDIES

CHANNELLING SENSITIVITY: THE PRODUCTION OF JUSTIFICATION FOR SHALE GAS DEVELOPMENT  
THROUGH THE ENGLISH PLANNING SYSTEM

This thesis analyses the participation of the environmental NGO Friends of the Earth (FoE) in a planning inquiry into the company Cuadrilla's appeal against Lancashire County Council's decision to refuse planning permission to their proposed shale gas exploration sites at Roseacre Wood and Preston New Road. Participant observation, document analysis and video analysis were employed to chart the treatment of FoE's arguments at the inquiry. Conceptually, the thesis is interested in the notion of justification, and in particular Stirling's insight that appraisal processes can, through their design and conduct, be conditioned toward providing justification for particular options (Stirling 1994; Stirling 2008). Four such conditioning influences – termed 'forms of closure' here - are found to be operating through the design and conduct of this inquiry and channelling it toward the production of justification for the appeals in question and shale development more broadly. These forms of closure each render the inquiry insensitive to certain arguments and matters of concern raised by FoE by either blunt procedural exclusion or by displaying insensitivity in the conduct of appraisal itself. This thesis builds on existing work on the necessity of and capacity for planning appraisal processes on fracking in the UK to accommodate sceptical public views. In particular, this study contributes fine-grain detail on how participating publics and experts are treated in practice within planning, and makes clear the key influence of prior commitments at the broader level of Government policy. This study also extends the concept of justification by focusing on the 'downstream' location of planning appraisal and by considering the relationship between framings of fracking and planning decision-making.

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## LIST OF ACRONYMS

BEIS	Department for Business, Energy and Industrial Strategy
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
CE	Combustion Efficiency
CH <sub>4</sub>	Methane
CO <sub>2</sub> e	Carbon Dioxide equivalent
CoC	North and Western Lancashire Chamber of Commerce
CSG	Coal Seam Gas
DCLG	Department for Communities and Local Government
DECC	Department for Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DoE	(US) Department of Energy
EA	Environment Agency
ECCC	House of Commons Energy and Climate Change Committee
EFT	Extended Flow Testing

EIA	Environmental Impact Assessment
EiC	Evidence in Chief
EPA	(US) Environmental Protection Agency
ERA	Environmental Risk Assessment
ES	Environmental Statement
EY	Ernst and Young
FFB	Frack Free Balcombe
FFR	Frack Free Ryedale
FoE	Friends of the Earth
FOI	Freedom of information request
GHG	Greenhouse Gas
GWP	Global Warming Potential
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HSE	Health and Safety Executive
HVHF	High Volume Hydraulic Fracturing
IFT	Initial Flow Testing
IoD	Institute of Directors
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt hour
LCC	Lancashire County Council
Mg	Megagram
MPA	Mineral Planning Authority
NGO	Non-Government Organisation
NORM	Naturally occurring radioactive material
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Projects
NYCC	North Yorkshire County Council
PHE	Public Health England
PNR	Preston New Road
PNRAG	Preston New Road Action Group
PoE	Proof of Evidence
PPG	Planning Practice and Guidance
PPGM	Planning Practice and Guidance on Minerals
PPGW	Planning Practice and Guidance on Waste
QC	Queens Council
RAG	Roseacre Awareness Group
RECs	Reduced emissions completions
RW	Roseacre Wood
SoS	Secretary of State
STS	Science and Technology Studies
SWF	Shale Wealth Fund
tCH <sub>4</sub>	Tonnes of methane
tCO <sub>2</sub> e	Tonnes of carbon dioxide equivalent
UKERC	UK Energy Research Centre
UKOOG	UK Onshore Oil and Gas
UNFCCC	United Nations Framework Convention on Climate Change
WMP	Waste Management Plan
WMS	Written Ministerial Statement
WSCC	West Sussex County Council

# 1. INTRODUCTION

## 1.1 HYDRAULIC FRACTURING AND SHALE GAS DEVELOPMENT IN THE UK SO FAR

Hydraulic fracturing is a technique mainly associated with the extraction of oil and gas resources, particularly ‘unconventional’ hydrocarbons such as shale gas. This involves injecting high-pressure fluids into perforated, sometimes horizontal wells, releasing gas molecules trapped in the pores of shales so that the gas can flow to the surface. The process is commonly abbreviated to ‘fracking’, a term often used to include a broader set of practices associated with the exploitation of unconventional hydrocarbons – including site preparation and construction, drilling wells, dealing with waste fluids produced by the wells, flaring, well abandonment and site restoration, as well as ultimate use of the fuel. Fracking was first widely deployed to extract unconventional hydrocarbons in the US in the 2000s, where it was a key driver of a dramatic increase in domestic gas production (Stevens 2012; Trembath et al. 2012). This saw fracking described as a ‘game changer’ (Rao 2012; Yergin 2011, both quoted in Mazur 2014), a ‘revolution’ (IHS Cambridge Energy Research Associates 2010) and as potentially heralding a ‘golden age of gas’ (International Energy Agency 2011). In the US context, fracking has been credited with lowering prices, improving energy security, stimulating economic benefits, and helping to combat climate change (see, for example, Bellelli and Troszczynska-Van Genderen 2013). Other countries with domestic unconventional hydrocarbon resources have been keen to explore possibilities to repeat the US shale ‘revolution’ in their own territories. This is certainly the case in the UK, where fracking has enjoyed high levels of support and enthusiasm from governments since around 2010 (see, for example, Cameron 2013).

Fracking, however, has been highly controversial in the UK, as indeed it has been more-or-less wherever proposed (see Steger and Milicevic 2014 and Wood 2012 for summaries of controversy globally). The development of a shale gas industry in the UK has been promoted by supporters as bringing about economic, energy security and environmental benefits (see, for example, Department for Communities and Local Government (DCLG)/Department for Energy and Climate Change (DECC) 2015). However, the prospect of shale gas development has given rise to grassroots protest groups across the country. Concerns have been raised about the possible contamination of water resources, water consumption, waste disposal, seismicity, the industrialisation of rural landscapes, irreconcilability with climate change commitments, industry-academic relations, democratic deficits in decision-making, and more besides. Key early moments in the emergence of controversy have included two small seismic events caused by the company Cuadrilla when test-fracking at their Preese Hall site in the Fylde region of Lancashire in 2011, as well as ‘scare stories’ emanating from the United States, most notably from the documentary

*Gasland* (Fox 2010). The Government imposed a *de facto* moratorium on fracking after Preese Hall whilst the Royal Society and Royal Academy of Engineering conducted a joint report into the risks of fracking. That report concluded that the risks of fracking could be effectively managed if operational best practice was ensured through regulation, and was used to justify the Government considering proposals for new operations (DECC 2012; The Royal Society / Royal Academy of Engineering 2012). Expert assurances of manageable risk, however, appear to have had limited success in reassuring a largely ambivalent UK public. Polling had suggested that generally the British public was turning against fracking since high-profile protests in the West Sussex village of Balcombe in the summer of 2013 (O'Hara et al. 2015; O'Hara et al. 2016), although recently there has been a slight increase in support (Department for Business, Energy and Industrial Strategy (BEIS) 2018a). Opposition to proposed unconventional hydrocarbon sites has been apparent in those Balcombe protests, as well as in campaigns by local groups in Lancashire, North Yorkshire, and elsewhere, including efforts to resist developments through the planning system.

Nonetheless, encouraging the development of a shale gas industry remains UK Government policy (DCLG/DECC 2015). Progress towards this goal has been somewhat slow and stuttering. At the time of writing the first hydraulic fracturing treatment in the UK since the ill-fated test fracking at Preese Hall in 2011 is yet to occur. The companies Cuadrilla and Third Energy do however have both planning permission and environmental permits in place for sites at Preston New Road (PNR) and Kirby Misperton respectively. Both sites are expected to be fracked in 2018. In fact, 2018 is expected by some to be a breakthrough year for the industry in England (see Vaughan 2017), with the likes of the large petrochemicals multinational INEOS in particular primed to submit several applications. In other words, after one or two false starts there is the sense that the 'ramp-up' to a domestic shale gas industry might finally be about to begin.

## 1.2 CUADRILLA'S PLANS AT ROSEACRE WOOD AND PRESTON NEW ROAD

Two key sites in the early stages of this prospective 'ramp-up' are the Cuadrilla sites at Roseacre Wood (RW) and PNR in the Fylde region of Lancashire. They remain the most ambitious fracking sites so far proposed in the UK, with each site planned to house four wells, each of which is comprised of a vertical and horizontal section (Arup 2014a; Arup 2014b). Cuadrilla initially applied for planning permission for the two sites in February 2014. The Environment Agency (EA) granted the two sites environmental permits in early 2015. At around the same time Lancashire County Council's (LCC) planning officer, Stuart Perigo, recommended that LCC's development control committee should refuse both sites planning permission - on noise grounds in the case the of Preston New Road and noise and traffic grounds in the case of RW. In response, Cuadrilla asked for a deferment of the decisions and put

forward new plans for acoustic noise barriers. This response was felt by Perigo to deal with the noise issue at both sites, however the traffic issue at RW remained unacceptable. Therefore, Perigo changed his recommendation on PNR to now advocate granting permission, but continued to recommend that RW be refused permission. In late June 2015, LCC's development control committee refused both sites permission, going against their officer's recommendation in the case on PNR, which was refused permission because of unacceptable noise and visual impacts. RW was more predictably refused permission on traffic grounds in line with Perigo's recommendation.

Cuadrilla announced they would appeal against both decisions and in November 2015 Greg Clark, then the Secretary of State (SoS) for Communities and Local Government, confirmed that he was 'recovering' the appeals. This meant that instead being determined by a planning inspector, the appeals would be determined by the SoS for Communities and Local Government. The SoS's decision would be informed but not bound by a recommendation from a planning inspector. The Government had made clear that they would consider recovering planning appeals and calling-in applications (where applications are decided by the SoS without initially being considered and rejected by a local authority) on shale gas development in August 2015 (DCLG/DECC 2015). The appeals were heard at a public inquiry during February and March 2016 and it is this planning inquiry that constitutes the empirical focus of this thesis. The Inspector ultimately recommended that PNR be granted permission and that RW be refused permission, again on traffic grounds. The SoS (who by this point was Sajid Javid) accepted the recommendations and reasoning of the Inspector and duly granted PNR permission on October 6 2016. On RW, whilst he agreed with the Inspector's conclusion that the site would give rise to unacceptable highway safety impacts, he decided to re-open the inquiry to provide Cuadrilla an opportunity to revise their traffic management plans. This re-opening of the inquiry has recently occurred, but at the time of writing its outcome is yet to be announced. Cuadrilla began work on the PNR site in January 2016 and the site has consistently been the scene of protests ever since (see Hayhurst 2018a and Hayhurst 2018b for useful timelines summarising key events relating to the two sites). Cuadrilla have completed the first horizontal well drilled in the UK at PNR, and have started work on a second. The company recently applied to BEIS for permission to frack the completed well at PNR - the final consent required before fracking can commence – and at the time of writing the decision is pending (see Cuadrilla 2018)

### 1.3 PARTICIPATION AND POWER IN TECHNOLOGY POLICY- AND DECISION-MAKING

Whilst empirically this thesis focuses on the case of planning decision-making on shale gas in the UK there is a conceptual interest in the broader themes of participation and power in decision-making on technology and innovation. These themes have received much attention in the field of Science and Technology Studies (STS). The normative programme to democratise science and technology, pursued

by many in STS, has consistently argued for greater participation from a wider diversity of views, values and voices in decision-making about science and technology (de Vries 2007; Durant 2011; Lovbrand, Pielke, and Beck 2010; Thorpe 2007). This programme is underpinned by concerns about technocratic styles of governance that marginalise publics, overlook alternative technological trajectories and unaccountably promote particular normative visions of progress (Grove-White, Macnaghten, and Wynne 2000; Irwin and Wynne 1996; Jasanoff 2005; Macnaghten and Chilvers 2014; Stirling 2008). As well as these issues with decision-making over science governance and innovation pathways, concerns have also revolved around the depoliticising impacts and overstated authority of scientism in the use of knowledge in decision-making more generally, especially the dominance of risk discourse and risk assessment and management practices (Felt et al. 2007; Jasanoff 1990; Sarewitz 1996; Stirling 2009; Stirling 2014a; Stirling and Mayer 2000; Wilsdon and Willis 2004; Wynne 1992a). Partially in response to such issues and concerns, various forms of public engagement aimed at enabling greater public input in decision-making have been designed and experimented with, including citizen juries, consensus conferences and deliberative polls (Braun and Schultz 2009; Carter 2005; Dryzek et al. 2009; Irwin 2006; Laurent 2011; Lezaun and Soneryd 2007; Pallett, Chilvers, and Hargreaves 2017). However, such processes have increasingly provoked scepticism and critique, often centred around issues like their restrictive framing and unclear impact (Irwin 2001; Jasanoff 2003; Wynne 2005; Wynne 2006; Wynne 2007).

This thesis casts planning as a site of downstream technological decision-making, and the themes of participation and power in decision-making have also received a great deal of attention in planning studies. Mirroring their colleagues in STS, many planning scholars hold a commitment to democratisation. This commitment is particularly evident in various strands of participatory planning theory and practice, including, perhaps most influentially, Habermas -inspired 'communicative' or 'collaborative' planning (Allmendinger and Tewdwr-Jones 2002; Forester 1999; Healy 1993; Healy 1997; Innes and Booher 1999). Again, similarly to STS, this communicative turn in planning was in part provoked by dissatisfaction with the technocratic or rationalist view of planning, which has been characterised by some as possessing 'top-down' and exclusionary tendencies (Campbell and Marshall 1999; Sandercock 1998; N. Taylor 1999). Many studies have used Habermas' theory as a normative yardstick against which the assess planning practice (e.g. Kemp 1985), whilst others have assessed the challenges of putting theory into practice (Bedford, Clark, and Harrison 2002; Legacy, Curtis, and Neuman 2014; Legacy, March, and Mouat 2014). Criticisms of communicative planning have, amongst other things, focused on the role of power in planning. On a practical level, doubts have been raised about whether the communicative turn can even be practically achieved within existing power structures – for instance the politico-administrative institutional context of the English planning system (Tewdwr-Jones and Allmendinger 1998). Furthermore, the extent to which deliberative procedures can actually equalise power differences between participants or eradicate strategic behaviour in practice has been questioned (Bickerstaff and Walker 2005). Finally, on a more fundamental level, critics have questioned the possibility and desirability of achieving consensus (Tewdwr-Jones and Allmendinger

1998; McGuirk 2001), questioned the possibility of evacuating decision-making processes of power (Flyvbjerg 1998; Huxley 2000), and argued for an approach based on the irreducibility of conflict and difference (Gunder 2003; Hillier 2003; Pløger 2004). It is within this broad thematic sweep, spanning both STS and planning studies, that the present study is located.

## 1.4 THE STRUCTURE OF THE THESIS

The following chapter deals with the academic interests of the thesis, honing in to a greater level of specificity than the broad thematic terrain sketched immediately above. The chapter is split into three sections covering theory, concepts and literature. In section 2.1 three normative theories of decision-making are reviewed to establish two key consistent concerns in theorising about decision-making. They are, first, the issue of regulating the role of interests, power and strategy in decision-making; and, second, the potential for ‘frontstage/backstage’ dynamics that may give decisions an undeserved and misleading air of legitimacy. This paves the way for the adoption of a particular approach to the concept of justification which is introduced in section 2.2. Boltanski and Thevenot’s ‘sincere’ conceptualisation is initially considered (see Boltanski and Thevenot 2006). This approach is rejected in favour of the more power-sensitive rendering that emerges from Stirling’s engagement (Stirling 1994; Stirling 2008) with the work of Collingridge (Collingridge 1980; Collingridge 1982; Collingridge 1983). This latter view of justification is argued to better recognise the problematic susceptibilities of decision-making highlighted in the prior theoretical review. This section establishes a conceptual interest in the ‘production of justification’ through the design and conduct of decision-making processes. The term ‘production of justification’ refers, most simply, to the generation of support for a favoured outcome. Section 2.3 then considers the relevant literature. The three literatures surveyed concern ‘framing fracking’, ‘closure through planning’ and ‘participation in the planning of shale development’. A growing number of studies now catalogue the diversity of ways in which fracking is framed by various groups, with many authors expressing concern about the possible marginalisation of public frames within decision-making processes where they differ from dominant policy frames. At the same time, there has been much work on the ways in which public and expert participation in the planning of various forms of energy development have been curtailed through a range of what this study will call ‘forms of closure’. These first two literatures establish planning decision-making processes on shale gas development as potentially fertile ground for studying the production of justification through the closure-oriented design and conduct of such processes. The final section of the literature review considers the studies that have so far covered this ground in the UK context and highlights a number of gaps where this thesis aims at making a contribution.

Chapter 3 details the methodological approach through which the prior academic concerns were initially developed and then explored empirically. Having already established the case (planning

decision-making on shale gas in the UK) as fertile ground for producing insights on the production of justification, the rationale behind and a brief guide to the 'field-site' (the inquiry into RW and PNR) is offered. Section 3.2 discusses the 'theory of method' underpinning the study and introduces Glynos and Howarth's 'retroductive' approach to explaining and theorising in the social sciences (Glynos and Howarth 2007), before clarifying the slight adaptation to that approach taken here. Moving on to the 'practice of method', section 3.3 then covers both the methods of data collection and the approach to analysis deployed. Finally, the thesis' research questions are formally stated. Chapter 3 establishes the failure of the case of Friends of the Earth (FoE) at the inquiry as the empirical problem to be explained by this study, and that in doing so will shed light on the conceptual interests established in chapter 2.

The first empirical chapter, chapter 4, gives a rich descriptive account of the case of FoE at the inquiry, detailing their arguments, the counter-arguments of rival parties, and whether FoE succeeded in influencing the decision. This chapter is split into four sections, organised according to the four key issues that FoE participated on at the inquiry. They were: climate change, public health, waste disposal, and economic impacts. The second empirical chapter, chapter 5, analyses how and why FoE's case came to fail at the inquiry. This explanation is built around four 'forms of closure'. Collectively, these forms of closure - namely 'double compartmentalisation', 'vertical deference', 'horizontal deference' and 'selective scepticism and credulity' - are argued to have prevented FoE's case from receiving serious consideration at the inquiry through a mix of procedural exclusion and insensitive conduct. It is therefore the central contention of this thesis that these forms of closure channelled the inquiry toward both the granting of permission for these specific applications and the production of justification for UK shale policy. Finally, in chapter 6 the implications and limitations of the study are discussed and conclusions are drawn. Turning back to the academic interests from chapter 2, a series of contributions to the literature and insights into the production of justification are elaborated. The conceptual and methodological approaches are then critically reflected upon, and a series of implications from the research are offered to both academic and non-academic audiences. Finally, the entire argument of the thesis is briefly summarised before the study's conclusions are presented.

## 2. THEORY, CONCEPTS AND LITERATURE

## 2.1 THREE THEORIES OF DECISION-MAKING

The following review considers three normative decision-making theories and their critiques.

Considered first is the analytic-rational model of decision-making, which is followed by two approaches that were born, at least in part, in response to dissatisfaction with that approach – namely, partisan and deliberative decision-making. The review will sketch out the key features of each model, but primarily of interest here is the purpose of these normative prescriptions about how decisions should be made. The simple answer is of course that these theories promise better, more rational or legitimate decision outcomes. To make good on these promises, however, they share a common concern. They are all concerned by the potentially distorting influence of power on and through decision-making, and how this influence can be regulated if not eradicated entirely by following their prescriptions. The implication of this, I will suggest, is that just as power is a key consideration in the elaboration of normative decision-making theory it must also be a key consideration in the study of decision-making in practice. This is especially so given that the normative prescriptions put forward by these theoretical models are rarely explicitly used as a blueprint for practice, let alone faithfully or successfully so. In other words, they – with the possible exception of partisan decision-making - are typically preached more than they are practiced. As such, they may not operate as the bulwarks against power that their advocates imagine them to be.

### 2.1.1 ANALYTIC-RATIONAL

The term ‘analytic-rational’ decision-making is employed here to describe the shift toward an increasingly central role for scientific knowledge as an input to decision-making, and the attempt to formalise the process of decision-making into something akin to a scientific technique. This attempt is associated in particular with the field of economics, the quantitative revolution in the social sciences more broadly, and the application of related techniques to real-world policy issues usually referred to as ‘policy analysis’ or ‘policy science’. Within this combination of academic theory and practical experimentation resides a series of assumptions and prescriptions about how decisions should be made which I collectively refer to as the analytic-rational model of decision-making.

This approach to decision-making is built on an instrumental model of rationality. Decisions are rational to the extent that they identify and pursue the optimum means to achieve a given end (Albæk 1995). The process involves specifying goals, comprehensively reviewing options, evaluating the consequences of each, and establishing the optimum option (Albæk 1995; Tribe 1973). A decision problem of any complexity therefore requires access to or the production of a great deal of knowledge, and the aid of

experts, analysts and advisors. To the extent that there are either multiple decision makers or a decision maker aspires or represent a broader constituency, collective values must be elicited and pursued.

The analytic-rational approach to decision-making concerns itself with a truncated decision process. The development of input values that precedes the process is viewed as non-rational, and thus falls outside of the theory's scope (Torgerson 1986; Tribe 1972; Tribe 1973). Any subsequent efforts of the decision maker to persuade a broader audience of the optimality of the identified option are also beyond the scope of the theory (Majone 1989). In between the provision of values and persuasion lies the purely technical process of identifying alternative options, comparing consequences and selecting the optimum way forward.

As well as process, the model prescribes the role of particular forms of knowledge, particularly probabilistic knowledge about the consequences of various options (Collingridge 1982). This restricts the application of the model to situations where sufficient knowledge is either already available; or can be produced, where the pay-offs of the optimum option outweigh the costs of both delaying the decision and producing the knowledge (Collingridge 1982). This calculation itself may require knowledge not possessed - i.e. how long will it take to produce the necessary knowledge, how much will it cost to delay the decision (Collingridge 1982).

The model at least implicitly envisages a small decision-making elite – a single decision maker, or a small group, and their advisors (Majone 1989). The model focuses on this closed relationship between decision maker and advisor, with criticism or disagreement from the outside not typically considered (Majone 1989). Where decision makers aspire to represent public values, these are typically produced by means of eliciting and aggregating individual preferences into some benefit maximising yet fair distribution (Collingridge 1982). Although – as a question of values – the elicitation of social values falls outside of the purview of the model, the tendency has been to at least implicitly be satisfied with delegative and aggregative modes of value elicitation (Campbell and Marshall 2002). Within the decision-making elite roles are split sharply between the representative decision maker who provides the evaluative inputs – whether personal or as a conduit for social values; and the expert who employs the neutral machinery prescribed by the analytic-rational model, embodying scientific ideals of objectivity, neutrality and disinterestedness (Tribe 1972).

The analytic-rational model is objectivist, which is to say that decision-making as a science consists of a single and universally applicable set of procedures for the unambiguous establishment of the optimum option (see Dryzek 1993). As such, disagreement, argument, and persuasion are largely ignored by the model. Once revealed, the objectively compelling optimum option will be recognised as such by all rational onlookers. Given the same value inputs, all analysts – barring error – will reach the same optimum option. Disagreement over value inputs, which precedes the decision-making process, is beyond the scope of the model. As such, those evaluative inputs are not questioned through the process (Tribe 1972), and all experts ought to be able to agree on factual matters during the process. All of this

makes for an implicitly envisaged smooth process producing objectively compelling decisions. The analytic-rational model, at least in the minds of its early, bold advocates sought to replace power and politics in decision-making with objective knowledge (Torgerson 1986).

The normative decision theory presented above, and attempts to apply it by turning real world decision-making into a scientific technique, are closely associated with the increasing use of and reliance on scientific knowledge and expert advice in public decision-making. In fact, some have argued that the analytic-rational model's supposedly neutral technique has a bias in favour of technical, 'hard' forms of knowledge (see Tribe 1973). In the linear model of science advice, the role of science in public policy has been best captured in the slogan 'speaking truth to power' (Wildavsky 1979). In this view, science produces objective knowledge which is then unproblematically translated into action, decisions and policy.

It is the positing of an objectively optimum decision outcome and the claimed elaboration of a rigorous and neutral technique through which it can be unambiguously identified that position the model as a bulwark against power. The objectively compelling best option is the objectively compelling best option irrespective of whether it happens to be expedient to powerful interests or not. In other words, the power of rationality keeps other, less legitimate forms of power (e.g. sectional material interests) in check. Archetypal examples of this analytic-rational power constraint would include public policy decisions over smoking or climate change. For instance, policy-makers pursuing the objective of improving public health would be instructed to introduce specific policies aimed at reducing smoking rates as they emerge from the rational-analytic process as the objectively compelling best means to pursue the given ends. No amount of lobbying or obfuscation from the tobacco industry could bend the truth to become more expedient to their material interests.

In truth, however, even during the 1960s heyday of social scientific positivism, the analytic-rational model was only ever aspired to as an ideal rather than fully or successfully implemented (Albæk 1995). The model has been subjected to sustained critique for several decades now – the most relevant arguments of which will be considered next.

Perhaps the most obvious issue with the analytic-rational decision-making model is that it requires a decision maker to possess unrealistic levels of knowledge, particularly concerning the future consequences of various options. This makes the model an unrealistic aspiration in practice. An early and influential critique of the analytic-rational decision-making model comes from Charles Lindblom (Lindblom 1959; Lindblom 1965). Lindblom's critique identifies, in what he terms the 'synoptic ideal', an unrealistically demanding intellectual task, ill-suited to complex and open-ended decision problems, and likely to prove a strain on resources.

Building on Lindblom's work, David Collingridge identifies and critiques what he terms the justificationist model of decision-making (Collingridge 1982 especially; but also Collingridge 1980; Collingridge 1983). The ambitious aim of decision justification is to demonstrate a particular option to be the best of all

open options. This apparently common-sense aspiration turns out to require such exacting levels of knowledge, particularly about the future, as to exclude the possibility of its full application on many quite typical knowledge-intensive decisions concerning, for example, environmental and technological regulation. The daunting epistemic and axiomatic requirements include knowing the full range of options, knowing the consequences of each, reconciling all interpretations, and eliciting and establishing the relevant values and preferences (Collingridge 1982). Collingridge concludes that “justification calls for such extensive knowledge of options, states of the world, pay-offs and so on, that it has little reality beyond the covers of textbooks” (Collingridge 1982, 32). In other words, the establishment of the optimum option on which the model’s ability to regulate power is based, is, according to Lindblom and Collingridge, routinely unachievable.

A second issue with the analytic-rational model is its naivety or silence about the institutional contexts and political realities in which decisions are actually made. For instance, Albaek suggests that:

“Many researchers had the notion that, if they were involved in the political-administrative decision-making process, they would be able, given the scientific insight afforded by their respective disciplines, to make other decisions than the existing decision-makers. This notion itself reveals an abysmal lack of insight into and respect for the nature of the political-administrative process” (Albaek 1995, 82–83).

In other words, despite the attempted implementation of an analytic-rational approach to decision-making, the same decisions can be expected to be made as if the decision was left to nakedly political, non-rational processes such as lobbying and horse-trading. In this somewhat dispiriting view, politics and power remain the actual driving force behind the decision-making process, with the analytic-rational process relegated to a misleading presentational smokescreen.

Collingridge suggests that the analytic-rational model neglects questions about the institutional setting of the decision maker, where the potential for various forms of bias and distortion exist. These biases and distortions present the opportunities through which power and politics can continue to drive outcomes (i.e. make the same decisions) despite an analytic-rational approach ostensibly being taken. Options may be neglected, analysis may focus on a feature where the favoured option is felt to be superior, information may be suppressed or not sought, objectives and values may go unquestioned with dissent discouraged or ignored, and the problem may be framed in ways that shape and constrain the likely outcome (Collingridge 1982). Of course, these biases and distortions deviate from a consummate implementation of the ideal (i.e. it is not a criticism of the model itself, but its misapplication). However, given that the ideal is only possible in the simplest of decision problems, the door is opened for it to operate not only, or even not at all, as the actual basis of decision-making, but also as a political tool for justification. In other words, a decision maker may appeal to the caste-iron justification provided in theory (i.e. ‘this is objectively the best option’) without the decision-making process actually having faithfully followed the prescriptions that supposedly enable such a claim in practice (if for no other reason than they’re typically impossible).

As Torgerson (1986) points out, the issue here is as much about the influence of analytical-rational decision-making on politics, as it is politics distorting attempts to apply the ideal. In other words, as the apparent objectivity of the analytic-rational style and imagery “become part of political rhetoric”, “irrational claims and expectations are advanced under the banner of reason” (Torgerson 1986, 39). So not only is analytic-rational decision-making susceptible to distortions in real world institutional contexts enabling essentially the same decisions to be made, but it may lend those same decisions a veneer of rational respectability. In other words, there is what Erving Goffman (Goffman 1959) would describe as a frontstage/backstage relationship between the imperatives actually underpinning decisions and the altogether more respectable rational process through which a decision is presented as having been arrived at (see also Flyvbjerg 2003 who suggests such a frontstage/backstage relationship is often the case between ‘rationality’ and ‘rationalisation’). In this case, far from acting as a bulwark regulating illegitimate forms of power, the analytic-rational model is seen as being susceptible to being subverted by power - to becoming a strategic tool for the pursuit and justification of favoured outcomes that obscures that pursuit behind ‘frontstage’, presentational rationality. By ‘presentational rationality’, I refer to a serviceable impression of rationality, the purpose of which is not to instruct the identification of the rationally best decision option but rather to present an outcome as if it had been selected in that manner.

A third issue is that the procedures and methods prescribed by the analytic-rational model are not a neutral technique, but display a tendency to favour particular sorts of knowledge over others. For example, the approach privileges smoothly commensurable factors at the expense of ‘softer’, ethical, uncertain, qualitative and other more elusive concerns (Tribe 1972; Tribe 1973). A fourth and related issue is the permissive approach to the provided evaluative inputs. The truncation of the decision-making process considered by the analytic-rational model leaves key questions over values and purposes to the powerful interests capable of sponsoring such analysis, with no prescribed provision for input from a broader set of actors. Fifth, the model reifies a simple-minded distinction between facts and values. The model mistakenly assumes that analysis can be entirely evacuated of ‘values’, ignoring the norms and assumptions involved in all analytic work (see Felt et al. 2007). In all three cases, normative and political commitments are either separated from or obscured within a supposedly technical process, and so potentially shape the outcome without public acknowledgement, scrutiny or contestation. In this view, power and politics are being obscured and eluded, rather than regulated or eradicated.

Finally, the field of STS has comprehensively critiqued the linear model of science advice and the role of scientific knowledge in decision-making. First, science is not the only legitimate source to inform public decision-making, and factual answers to propositional questions fail to address normative questions over purposes and direction (Felt et al. 2007). Here the concern again is that an overly technical framing of the content of policy processes hides and so fails to regulate key normative and political aspects of policy issues. This obscured politics has been referred to as “science”-protected politics (Wynne 2007).

Second, this overly technical framing also marginalises the role the public play and restricts the sorts of arguments raised during the process. This raises questions about public alienation from decision-making processes and compounds concerns about the existence of a democratic deficit in knowledge-intensive policy issues (Wynne 2001). Here the concern is the marginalisation of certain voices and concerns in decision-making processes involving science, which are then typically dominated by certain actors and interests.

Third, the linear model overestimates the smoothness with which scientific knowledge is translated into public policy and underestimates the role of political-administrative processes in procuring scientific advice and interpreting its policy implications (Sarewitz 2000; Stirling 2008). Here the concern centres on the scope for non-rational processes, again potentially dominated by certain actors and interests, to influence the production and use of policy-relevant scientific knowledge in potentially unaccountable and obscured ways. Fourth and finally, the model routinely under emphasises the extent of incertitude in relevant areas of scientific knowledge, the extent of expert disagreement over complex issues that cross disciplinary boundaries, and the propensity of scientific knowledge to fuel rather than settle policy disputes (Funtowicz and Ravetz 1993; Sarewitz 1996; Sarewitz 2004; Stirling 2014b). Again, the criticism stresses scepticism over the plausibility of science furnishing policy processes with a compellingly optimum option. 'Speaking truth to power', according to this critique, may in practice routinely fail to provide policy processes with the unambiguous facts required to regulate power. Moreover, as well as not necessarily providing the envisaged bulwark, it may present opportunities for the subtle operation of power over and through policy processes.

The analytic-rational model of decision-making, then, proposes to regulate if not entirely eradicate the role of power in decision-making by elaborating a technique to identify the objectively best means to pursue given ends. The above critique, however, identifies a series of issues with this approach to the regulation of power. First, the knowledge requirements are unrealistic in many typical decision situations. Furthermore, the expectation that the evidence base of a given policy issue will in practice unambiguously point to a particular option appears fanciful for issues of any complexity. Second, the analytic-rational process, and the prior process of value establishment, present ample scope for inadvertent bias and intentional action to influence the outcome. These first two points open the door for the model to be preached more than practiced in such a way as to lend the justification of 'presentational rationality' to decisions arrived at through the old imperatives of power and politics. In this case, ironically, the imperatives supposedly regulated by the model either inadvertently elude or intentionally subvert the process to secure a favoured preference whilst lending it the justificatory credibility of a decision arrived at rationally. The model becomes a tool for power rather than a bulwark against.

Third, the models supposed neutrality is undermined by its preference for certain forms of knowledge and its permissive attitude to supplied values. In both cases, the outcome of a process may be shaped by values and normative commitments that go unacknowledged and unchallenged. Furthermore, the

simpleminded distinction between ‘facts’ and ‘values’ at the heart of the model obscures the norms and assumptions entailed in all analytical work, and an overly technical framing of the policy process may overlook broader questions over values and purpose. In all cases, normative and political commitments made by a potentially narrow set of actors are hidden within a supposedly purely technical exercise and so denied a public airing through a proper political process. In short, the model is susceptible to various forms of ‘cryptonormativity’ (see Kolodny 1996; see also Evensen 2015 for a discussion in relation to the use of science in policy decisions on shale development). Fourth, and closely related, the model is elitist and potentially marginalises the role of publics in decision-making processes, leaving decision-making in the hands of a relatively small group of actors and interests.

### 2.1.2 PARTISAN

Charles Lindblom (1959) viewed the analytic-rational model as a poor description of real-world decision-making, an unrealistic ideal, and as normatively suspect (Wandling 2011). A poor description because real world decision-making rarely satisfies the prescriptions of the restricted view of rationality stipulated by the analytic-rational model. An unrealistic ideal because in complex decision-making contexts these prescriptions simply cannot be fully satisfied. And, finally, normatively suspect because of its technocratic and authoritarian proclivities (Albæk 1995). His alternative model, disjointed incrementalism, or as I’ll refer to it the partisan model, is, he argued, both a better description of how decisions actually get made, and, happily, this is as it should be, with incrementalism being both more rational and normatively acceptable in pluralist political systems.

Lindblom’s decision-making method, in stark contrast to the analytic-rational approach, treats analysis and values as intertwined. There is no discrete, preceding phase of value establishment, followed by a purely technical assessment of the best means to pursue the afore-established objective. That is because, so Lindblom argues, there is likely to be widespread disagreement over both broad values and specific objectives, and public preferences are often not registered on a given issue, or at best are only imperfectly captured. In other words, ‘social values’ often don’t exist, or cannot be authoritatively established. Even when merely imposing their individual values, decision makers will often not be able to rank values in some abstract way, but will clarify them in choosing in concrete circumstances.

Therefore, administrators:

“[C]hoose directly among alternative policies that offer different marginal combinations of values. Somewhat paradoxically, the only way to disclose one’s marginal values even to oneself is to describe the policy one chooses to achieve them” (Lindblom 1959, 82).

In this way, decision makers focus on marginal or incremental values as expressed in a restricted subset of options. This of course violates the instrumental rationality underpinning the analytic-rational model. Instead of the optimum means to achieve established ends, the test of a good policy is agreement on the policy itself.

A second key feature of disjointed incrementalism is its explicit satisfaction with non-comprehensiveness. The analytic-rational model's requirement of a synoptic view is itself irrational, ignoring as it does the unrealistic expectations it places on a decision maker's intellect and resources. The partisan model does this by limiting ambition in two directions. Firstly, limiting alternatives to those only marginally different from those policies currently in place – thus reducing both the number of alternatives to be investigated and the complexity of that investigation. Secondly, “ignoring important possible consequences of possible policies, as well as the values attached to the neglected consequences” (Lindblom 1959, 77). This provocative idea is tempered by the diverse and distributed nature of participants in policy-making processes across government agencies and beyond to civil society pressure groups and industry lobbies. In this way, each facet of a policy problem, each possible consequence and set of values and interests has its ‘watchdog’. This system, argues Lindblom, “often can assure a more comprehensive regard for the values of a whole society than any attempt at intellectual comprehensiveness” (Lindblom 1959, 77). This is the crux of Lindblom's claim that the partisan model is normatively preferable to the analytic-rational model – that this fragmented process can give a voice to a wider range of interests in public policy processes than a single, centralised authority could.

A third and final key feature of the partisan model is its serial, iterative nature. Rather than labour futilely on establishing the optimum means to pursue stated ends, the partisan model is a process of ‘successive approximation’, in which policy is endlessly remade and objectives may periodically be reconsidered. Proceeding through a succession of incremental changes, serious and lasting errors are avoided. Grand predictions are not required because of short lag times between interventions; and these short lag times provide regular opportunities to ‘test’ the intervention and to feed the experience back into subsequent decisions, so enabling errors to be remedied quickly.

The partisan model, then, envisages a much broader set of actors as potentially implicated in decision-making processes, going beyond the implicit small decision-making elite of the analytic-rational model. Distinct constituencies emerge as ‘watchdogs’ for particular interests, values and preferences. The requirement for scientific disinterestedness is replaced by the partisan pursuit of interests, and the search for the objectively compelling optimum option is replaced by pragmatic satisfaction with agreement over action.

Regarding legitimate inputs to the decision-making process, scientific knowledge is just one kind. In fact, if anything, in certain contexts it is subordinated to more tacit forms of know-how (established norms and procedures, rules of thumb, professional judgement, so on - Lindblom and Cohen 1979), because pressing issues can rarely wait for decisive scientific proof (Albæk 1995). Values and interests are also explicit, central and entirely proper inputs to the process. ‘Partisan analysis’, not some ‘objective’ version, “is the most characteristic analytical input into politics and also the most productive” (Lindblom 1979, 524). It is more or less a matter of ‘anything goes’ when it comes to the conduct of a partisan contest over a particular policy decision. Different forms of ‘partisan mutual adjustment’ are the

techniques of partisan contest. They may be adaptive or manipulative, where the former involves adapting to the decisions of others and the latter involves active attempts to shape the decisions of others through negotiation, bargaining, manipulation, authoritative prescription, and so on (Lindblom 1965). In other words, there is an explicit and sanctioned role for power in decision-making.

The partisan model, then, takes a rather different approach to the regulation of the role of power in decision-making compared to the analytic-rational model above. Far from attempting to regulate or even eradicate power with rationality, rationality is redefined and located within the interactions of competing powers. Power is not regulated but allowed to run free with the only limit on each individual 'watchdog' arising from the existence of other partisans and the pressure to mutually adjust toward a single course of action.

Lindblom's partisan decision-making model has been criticised on three main fronts. First, some have questioned its account of the role of scientific knowledge in decision-making. For instance, it has been suggested that the model has a tendency to reduce scientific and technical knowledge to mere instruments "which can be used and are used more or less at will to further one's own ends" (Albæk 1995, 89). Second, its marginal, incremental nature limits the range of options considered to those only marginally different from recent policies and decisions. This discourages radical, deep and rapid shifts in approach and would seem to encourage path-dependency, myopia and tunnel-vision.

Third, it is inherently conservative, favouring powerful and incumbent actors and helping to preserve business-as-usual. Collingridge, for instance, argues that all methods of partisan mutual adjustment – save for partisan discussion – lead to decisions being determined by "the relative strength, power and pockets of the partisans" (Collingridge 1982, 182). Similarly, Stirling suggests that the decision-making process is, in effect, reduced to a situation of political "might is right" (Stirling 1994, 87). The partisan model is therefore likely to tend towards decision outcomes that preserve the status quo. Furthermore, as Stirling points out, Lindblom's dual normative and descriptive case for the partisan model seems to imply a satisfaction with how things are currently done (Stirling 1994). In Lindblom's account, the partisan model is how decisions are already largely made, including those presented as having been underpinned by the analytic-rational model. In this way, the partisan model's ambitions are limited to the accurate description of decision-making processes, rather than any fundamental shift in how decisions are actually made. Contrary to the analytic-rational model's presentational smokescreen, the partisan model argues that there is nothing to hide.

In fairness to Lindblom, he himself did at least partially recognise some of these issues from the outset, admitting that "the method is without a built-in safeguard for all relevant values" and that "it also may lead the decision-maker to overlook excellent policies for no other reason than that they are not suggested by the chain of successive policy steps leading up to the present" (Lindblom 1959, 79–80). He defended the explication of a decision-making method that he fully expected to produce as many foolish decisions as wise ones for three reasons. Because it is how many decisions are actually made, because it

is superior to the analytic-rational model for complex problems, and because decision-makers becoming more reflective about a method they currently use largely tacitly might be expected to improve their use of it.

The main issue for the partisan model's approach to the regulation of power is its positing of a kind of 'rationality of power' (as opposed to the analytic-rational model's reliance on the power of rationality - see Flyvbjerg 2003). The idea that this rationality of power(s) produces better decisions relies on there being a state of equilibrium, with power relatively equally distributed amongst a plurality of partisans. The notion of justification is also expanded and redefined in ways unlikely to be acceptable to audiences in practice. According to its critique, the analytic-rational approach is used as a tool to justify the existing preferences of powerful actors to broader audiences. The actual rationale behind a choice – for example that it was in the interests of powerful actors – is implicitly not seen as a sufficiently compelling reason to garner the support of a broader audience. The partisan model however, with its anything goes approach to 'adjustment', sanctions 'might is right' reasoning unlikely to be acceptable in practice. For example, citizens are unlikely to accept a change in a country's energy policy on the grounds that the fossil fuel lobby is powerful and has deep pockets. Even if that were the underlying reason for the change, policy-makers would at least have to be seen to have made the decision according to other imperatives. The biases, distortions, and role of power in decision-making shift from *crypto* to *psilo*<sup>1</sup> but ultimately remain unacceptable, leaving decision makers with little help in persuading a broader audience of the wisdom of their decision.

### 2.1.3 DELIBERATIVE

Deliberative democracy emerged as the preeminent force in democratic theory from around 1990 (Dryzek 2000). It is an approach to democracy that locates legitimacy in the capacity of those subject to decisions to participate in preceding deliberations (Dryzek 2000). That is to say, it is a theory of democracy with a central focus on collective decision-making processes.

Habermas turns from subjectivity to intersubjectivity and communication in his search for a universal rational foundation for modern institutions (Flyvbjerg 2001). Habermas' theory of communicative action presumes a rational basis to mutual understanding on the grounds that it is unavoidable (Habermas 1984). Communicative rationality entails "a noncoercively unifying, consensus-building force of a discourse in the which the participants overcome their at first subjectively biased views in favour of a rationally motivated agreement" (Habermas 1987, 315). For Habermas, communicative rationality occurs to the extent that mutual understanding enables coordinated action (Habermas 1979; Habermas

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<sup>1</sup> *Psilo* is the antonym of *crypto*. Where the latter means concealed, the former literally means bare or naked. In other words, in Lindblom's approach these questionable aspects of decision-making may no longer be hidden but are no more acceptable for this.

1987). Rational communication entails the free acceptance of the consequences of a claim or norm by all affected, known as the universalisation principle of discourse ethics (Habermas 1990). The result is consensus achieved through the ‘forceless force of the better argument’ (Habermas 1984; Cohen 1989), which is to say without coercion or power. The purpose of communicative rationality is understanding, as opposed to the success-oriented instrumental rationality and partisan strategies underpinning the analytic-rational and partisan models (Pellizzoni 2001).

The establishment of pure communicative rationality requires an exacting list of procedural requirements to be satisfied – if and when they are an ‘ideal speech situation’ is said to emerge (Habermas 1990). No viewpoint and no affected party can be excluded; there should be equal opportunity amongst participants to present and criticise claims; participants must be willing to empathise with each other’s claims; power differences between participants must be neutralised; participants must be honest and sincere with themselves and others (Flyvbjerg 2001; Kemp 1985). Habermas is prescriptive about process, whereas the proper content and outcome of deliberation is determined by participants’ interactions through the process. Full and successful adherence to these procedural requirements produces universal moral truth or normative rightness (Habermas 2003).

The democratic theory inspired by Habermas’ critical project is therefore a model of legitimate decision-making. Decision-making is collective, interactive, talk-centric, and perhaps implicitly face-to-face<sup>2</sup> (Chambers 2003); and decision outcomes ought to be the result of a process of inclusive, open, non-coercive, reflective and sincere deliberation. Inclusive because all those affected by a decision ought to have the opportunity (not the obligation) to participate in its making (Benhabib 1996; Cohen 1989; Dryzek 2000). Open because all participants should have the opportunity to put forward arguments and criticise those of others, because the extension of this opportunity is not dictated by status or qualification, and because the relevant arguments and perhaps admissible forms of communication are not *a priori* circumscribed<sup>3</sup>. Non-coercive because ‘cognitive’ persuasion is the only acceptable route to consensus. Reflective because participants can change their judgements, preferences and views in the course of deliberations. Sincere because deliberations should be authentic rather than strategic or symbolic.

Advocates argue that a series of benefits flow from deliberative decision-making. As a model of decision-making derived from democratic theory, more democratically legitimate decisions is a central normative claim. More instrumentally, decisions that are widely viewed as having been arrived at through a legitimately democratic process are perhaps likely to be adhered to and respected. The experience of participating in deliberation is also expected to produce citizens who are more informed,

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<sup>2</sup> Although Dryzek outlines the more distributed, systematic notion of ‘deliberative capacity’ (Dryzek 2009), many attempts to experiment in practice with deliberative democratic theory have brought together ‘mini-publics’ for a limited duration, and often as a one-off, to deliberate about a given issue or decision problem (Dryzek et al. 2009).

<sup>3</sup> Habermas would privilege reasoned argument (Habermas 1996), Dryzek on the other hand would allow rhetoric, humour and storytelling – the only requirement being that communication induces reflection on preferences non-coercively (Dryzek 2000; Dryzek 2009).

co-operative, understanding, and who give a fair hearing to the arguments of others and are willing to alter their views (Bohman 1996; Cohen 1989; Warren 1992). Broad participation may bring new perspectives and knowledge to bear on a decision problem (i.e. the political rationality of pluralism – Popper 1966). The process may help participants refine and better articulate their arguments and reflect on the arguments of others, and the transformation of views may produce new points of view which transcend an old impasse (Fearon 1998; Miller 1992).

A role in decision-making is therefore theoretically open to anyone ‘affected’ by a decision. How this is reconciled with notions of competence, specialisation and expertise is an ongoing debate. This issue is felt to be particularly acute for public issues involving technology or domains of science, and as a result involving high levels of technical information. Fischer suggests that deliberative democratic theory has neglected the issues of expertise and complexity, which have largely been taken on by those experimenting with deliberative processes in practice (Fischer 2009).

The content of deliberation is largely determined through the interaction of participants but there are some tendencies and limits. As already seen (see footnote 3), whether reasoned argumentation should be privileged is a matter of debate. Furthermore, theorists tend to prohibit ‘intrinsically anti-deliberative’ forms of communication such as lies, threats, commands, manipulation, propaganda, the expression of mere self-interest, the imposition of ideological conformity, so on (Dryzek 2000; Dryzek 2009). It is a matter of debate as to how this is to be policed – whether through the work of an authority or as a tendency inherent to the procedure. For instance, Dryzek suggests that expressions of self-interest, for example, are disadvantageous as a consequence of ‘mechanisms endogenous to deliberation’, which “promote the expression of interests in public interest terms, and the crafting of proposals sensitive to interests so expressed” (Dryzek 2000, 169). Preventing crypto-self-interest being smuggled in duplicitously as if it were the public interest, though, presumably relies on ensuring the authenticity and sincerity of communication. Although prescribed in theory, this seems far from a straightforward accomplishment in practice. More generally, Dryzek prefers the use of ‘endogenous mechanisms’ to change views and behaviours than forbidding them through preconditions for entry (Dryzek 2000).

Decisions are settled through arriving at consensus, though again there is disagreement over the required depth of consensus. This centres on whether consensus needs to be grounded in shared principles, or whether convergence on ‘what is to be done’ is sufficient. For Habermas, at least in his early work, there must be agreement over the solution and why that solution is preferable (Pellizzoni 2001). Dryzek and Bohman, on the other hand, take the shallower view, necessitated they argue by the complexity of problems and the existence of irreducible differences (Bohman 1996; Dryzek 1990). Consensus is reached through the satisfaction of the universalisation principle in the first case, and the resumption of co-operative action in the second.

The deliberative model, then, makes a series of procedural prescriptions designed to ensure the opportunity of free and equal participation in a decision-making process by those subject to its consequences, where consensus emerges through the power of the better argument alone. As such, deliberative decision-making delivers on its promise to regulate the role of power to the extent that its prescriptions are truly able to equalize or eradicate all other forms of power in practice.

The most obvious and common criticism of the deliberative model is the implausibility of its full realisation. To do so - particularly the early, 'strong' Habermasian version - may require unlimited time, an unmanageable number of participants, and the equalisation of all inequalities between them (knowledge, resources, etc.). Some argue that this is a poor criticism (Kemp 1985; Pellizzoni 2001). Habermas himself does not expect the ideal speech situation to actually be achieved, and it can operate successfully as a regulative ideal without ever being so. It can be "a critical standard", says Habermas, "against which every actually realized consensus can be called into question and checked" (Habermas 1973, 258). The charge of impracticality has less traction for the more pragmatic approach of Dryzek and others who compromise on key points to improve real-world feasibility.

Other criticisms are raised by constructivists, agonists, feminists and others concerning impartiality, reason and power. These criticisms concern the tensions between difference and consensus in collective decision-making, and the extent to which pure, forceless, reasoned communication can bridge differences, or even be achieved. The goal of an impartial (general) public reason and rational consensus in the interests of all raises suspicions about the flattening and marginalisation of difference (Young 1996). The impartiality of the deliberative procedure has been questioned as it privileges a particular form of political action (public debate) and even particular forms of communication within that (reasoned argument) (Marres 2005; Mouffe 1999). The unity of reason – agreement over why to favour a particular outcome by all subject to its consequences – is viewed as impossible in many circumstances as there are differences (situations of incommensurability, or fundamental clashes of identity, for instance) that simply cannot be resolved through rational debate (Bernstein 1992; Pellizzoni 2001; Pellizzoni 2003). Finally, there are doubts over whether pure, forceless rational debate can actually be achieved, and both whether power can and conflict should be eliminated from the public sphere (Flyvbjerg 2001; Mouffe 1999).

Here, in ways that interestingly parallel the critique of the analytic-rational model above, the issue of justification as a political tool emerges once again. Like the analytic-rational model, the deliberative model converges on a single decision outcome in a way that is said to be neutral and above the distortions of interests and power. Like the objectively best option supposedly highlighted by the analytic-rational model, the deliberative model is said to elevate an outcome to, in its strongest form, universal moral truth. Though if power is not and cannot be eliminated from deliberative processes, then it can operate in perhaps subtle ways to pursue favoured outcomes through them. Again, the

potential is there to be a tool for advancing whilst obscuring the role of power in public decision-making. As Pellizzoni puts it:

“In these situations the force of the best argument is only a myth. A dangerous myth, the constructivists contend. As a regulatory ideal, it may legitimate nothing but expressions of external power, thereby enabling the strongest party to impose its reasons as objectively the best” (Pellizzoni 2001, 72)<sup>4</sup>.

The extent to which these criticisms trouble Dryzek’s more pragmatic view is questionable. Dryzek’s satisfaction with a plurality of reason – agreement over an outcome for different reasons – and permissiveness over forms of communication partially insulate him. Dryzek and Niemeyer note that even agonists don’t propose eradicating communication in the name of difference, which implies some level of agreement and consensus no matter how fragile and contestable (Dryzek and Niemeyer 2006). Avoiding the misuse of deliberative processes to advance whilst obscuring power would be more of a practical achievement than procedural guarantee and would involve paying close attention to the conditions of the production of an agreement (i.e. symbolic politics in the service of partisans or hegemonic actors, or relatively authentic dialogue – Dryzek and Niemeyer 2006). Dryzek and Niemeyer seem implicitly confident that these ‘conditions of production’ will be visible, clearly discernible from one another, and not a matter of disagreement themselves.

Finally, as Pellizzoni points out, the all-affected principle will often lead to unrealistic demands for knowledge about the future. In situations of radical uncertainty, “the impossibility of establishing with mutually acceptable approximation what the outcomes of a choice will be prevents a justification in terms of its being in the interest of everyone affected” (Pellizzoni 2003, 209). In other words, the deliberative model’s partial consequentialist mode of justification necessitates degrees of knowledge about the future hard to come by on issues of any complexity<sup>5</sup>.

The deliberative model arouses the same ‘frontstage/backstage’ suspicions as the analytic-rational model. As a normative ideal its full realisation is implausible, especially on policy issues of any complexity or depth of disagreement. If power cannot be eradicated from deliberative processes, but rather operates subtly through them, then such processes may be channelled towards particular outcomes. Once selected, these outcomes may enjoy the illusory justificatory resource associated with being the subject of rational consensus and the outcome of a democratically legitimate process. Again, the scope is clear for the deliberative model to in practice work as a tool for rather than bulwark against the role of power in decision-making.

In sum, the deliberative model seeks to eradicate power and private interests from decision-making processes through a series of prescriptions aimed at the creation of an ‘ideal speech situation’ in which

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<sup>4</sup> By ‘external power’ Pellizzoni means all forms of power other than the purely cognitive power of the best argument, which in Pellizzoni’s terms is internal, i.e. internal to communication (Pellizzoni 2001).

<sup>5</sup> As a procedural approach, part of the justification of the outcome of a deliberative process is the legitimacy of the process itself. However, references to the acceptance of those affected by the consequences of a decision necessitate levels of knowledge about the future often not possible at the time of the decision.

the only power at play is the forceless force of the best argument. However, much like the analytic-rational model, as a distant regulative ideal implementations of the model are unlikely to successfully realise this power constraint. As such, scope exists for power and interests to distort such processes and influence their outcomes in ways that may be obscured or overlooked. This lends a misleading ‘presentational legitimacy’ to decision outcomes actually arrived at in a less acceptable fashion.

#### 2.1.4 SUMMARY AND IMPLICATIONS

Three normative theories of decision-making have been reviewed, with particular attention paid to the promise each made to regulate the role of power, interests and politics in decision-making. The key features of each are summarised in table 1 below.

*Table 1: The three normative theories of decision-making summarised*

<b>Model</b>	<b>Details</b>	<b>Power Constraint</b>	<b>Issues</b>
<i>Analytic-rational</i>	The elaboration of a scientific technique of decision-making to reveal the optimum option, as well as the central role of technical knowledge therein	The identification of the objectively compelling optimum option	Unrealistic knowledge requirements; relies on existence and demonstration of an objectively ‘best’ option; ample scope for bias and distortion in the design and execution of processes; potential to be (mis)used as a tool for justification; susceptible to various cryptonormativities; potentially marginalises the role of publics
<i>Partisan</i>	The partisan pursuit of favoured options amongst groups representing a non-comprehensive range of different preferences, values and views; an anything goes approach to ‘adjustment’ towards pragmatic agreement over action	Partisans inter-regulate one another with very little ‘external’ constraint on permitted behaviour within the process	Potentially views scientific knowledge as too malleable; wilfully blind to many options and consequences; inherently conservative and preservative of the status quo; relies on a relatively well-balanced power distribution amongst partisans to prevent policy processes being dominated by a small number of powerful actors and interests; would often fail to provide credible decision justification in practice
<i>Deliberative</i>	Inclusive and open deliberation in which all affected by a decision have the opportunity to participate and through which consensus emerges around an	The deliberative procedure which eradicates or equalizes all power but the forceless force of the better argument	Unrealistic resource requirements; suspicions over consensus’ tendency to marginalise difference and dissent and the impartiality of the procedure; relies on eliminating power from the public sphere; potential to be (mis)used

	option whose consequences can be non-coercively accepted by all		as a tool for justification; consensus may be impossible and consequences unknown in 'intractable problems'
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The purpose here is not to use these models as ideals against which to assess decision-making in practice. Instead, the above theory will play the more limited role of highlighting particular phenomena of interest in a given social context (see Chapter 3 for a discussion of the role of theory as adopted in this study). The three theories above demonstrate that a consistent concern for normative theorists of decision-making is the problem of how to regulate the potentially distorting effect of power on decision-making. The role of power therefore emerges as a phenomenon of central interest in the study of decision-making.

A second key implication of the review above concerns the distinction between the actual process of choice through which an option is selected, and the process of decision justification through which a broader audience is persuaded of the apparent wisdom of that option and/or the legitimacy of the process that selected it. Critics suggest that the models that in their ideal form furnish decision-makers with authoritative means of decision justification are at risk of becoming a tool for rather than bulwark against power, especially if the ideal is likely to be unachievable in practice. In other words, that the actual method of decision selection fails to consummately apply the ideal does not necessarily prevent the decision being presented as if it had. Similarly, if power works through decision processes subtly, then it may shape them towards particular options. In these ways, decision-making has repeatedly been suspected – by critics of the analytic-rational and deliberative models in particular – of being susceptible to frontstage/backstage dynamics. Here, a presentational smokescreen obscures the continuing distorting influence of the very ulterior imperatives supposedly being regulated. Again, this relatively consistent concern marks out possible frontstage/backstage dynamics between the influences driving selection and the image presented for the purposes of justification as a phenomenon of interest in the study of decision-making.

## 2.2 THE CONCEPT OF JUSTIFICATION

In the previous section a consistent concern with the role of power in decision-making was identified in the normative decision-making theories reviewed. Furthermore, where theories claimed that their approach provided compelling decision justification – whether as the objectively compelling optimum option or as the subject of rational consensus – concerns regarding the distinction between the actual basis of choice and the way decisions are justified arose. Critics pointed to the possibility of innocently flawed or deliberately manipulated implementations of these approaches misleadingly supplying decisions with ‘presentational’ justification. In this section I will explore the concept of justification in greater detail, and will argue that these two concerns necessitate a sceptical approach to the concept. Firstly, because even if the models reviewed in the previous section would in theory regulate the role in power in decision-making in the way they recognise is necessary, they are unlikely to be fully or successfully adhered to in practice. Secondly, because, as will be made clear in an engagement with the work of Boltanski and Thevenot below, only a sceptical approach to the concept of justification can recognise the potential for a discrepancy between the actual basis of choice and the presented justification. By a sceptical approach to the concept of justification I refer to one sensitive to the possibility of the existence of scope for inadvertent bias or intentional action to secure and justify a particular decision outcome, even through ostensibly rational or legitimate decision-making processes. This idea will be fleshed out more fully in what follows.

### 2.2.1 JUSTIFICATION AS A CONSTRAINING FORCE

Before elaborating a sceptical approach to the concept of justification, Boltanski and Thevenot’s ‘sociology of critical capacity’ will be considered. Boltanski and Thevenot do not produce normative prescriptions for decision-making like the theories reviewed in the previous section. Instead, they seek to elaborate the normative frameworks that are employed by and constrain actors in practice. Boltanski and Thevenot view certain domains of social action as situations of justification and criticism (Boltanski and Thevenot 1999; Boltanski and Thevenot 2006). They have in mind situations in which social order or routine cooperation is interrupted and disagreement needs to be resolved to some extent in order for collective action to resume. They refer to these situations a ‘critical moments’ (Boltanski and Thevenot 1999), though in the language of this thesis they can be thought of as situations of public decision-making. Boltanski and Thevenot provide a conceptualisation of justification applicable to these moments that can be described as principled and sincere. These situations, for Boltanski and Thevenot, are characterised by the constraint of justification – that is, the imperative to justify one’s actions, or to justify criticism of the actions of another. In their own words:

“A first characteristic of these situations is that the persons involved are subjected to an imperative of justification. The one who criticizes other persons must produce justifications in order to support their criticisms just as the person who is the target of the criticism must justify his or her actions in order to defend his or her own cause. These justifications have to follow rules of acceptability” (Boltanski and Thevenot 2006, 360).

Consciously departing from the ‘hermeneutics of suspicion’ (Ricoeur 1986) of the likes of Bourdieu and Foucault, Boltanski and Thevenot take seriously the criticisms and justifications of actors as opposed to attempting to reveal otherwise hidden interests, power and forms of oppression (Wagner 1999). In their account, situations of justification are not driven by power and interests but sincere attempts justify actions and beliefs or evaluate those of others in reference to ‘rules of acceptability’. As they put it:

“When one is attentive to the unfolding of disputes, one sees that they are limited neither to a direct expression of interests nor to an archaic and endless confrontation between heterogeneous world views clashing in a dialogue of the deaf. On the contrary, the way disputes develop when violence is avoided, brings to light powerful constraints in the search for well-founded arguments based on solid proofs, a search that thus manifests efforts towards convergence at the very heart of a disagreement” (Boltanski and Thevenot 2006, 13).

Furthermore:

“[P]eople do not ordinarily seek to invent false pretexts after the fact so as to cover some secret motive, the way one comes up with an alibi; rather they seek to carry out their actions in such a way that these can withstand the test of justification” (Boltanski and Thevenot 2006, 37).

Disagreement, then, is not accounted for by interests or irreconcilable clashes of values or identity, but instead by the existence of multiple, mutually incompatible ‘practical philosophies’ (Wagner 1999) or ‘orders of worth’ (Boltanski and Thevenot 1999; Stark 2009; Boltanski and Thevenot 2006). These orders of worth are single-axis scales based on a particular higher common principle on the basis of which situations are evaluated as more or less worthy (Boltanski and Thevenot 2006). They are not usually consciously employed in practice, rather their presence is more subtle and their use tacit. They are though employed, however opaquely, as principles of evaluation underpinning the prosaic disputes of actors in practice (Boltanski and Thevenot 1999). For example, the industrial order of worth evaluates the worth of objects, acts and situations in relation to the higher common principle of efficiency – the more efficient a state of affairs or proposal the more justifiable it is (Boltanski and Thevenot 2006). Disagreement may therefore turn on the validity of a test made in accordance with one particular order of worth (i.e. how justifiable is the act or situation in reference to an agreed order of worth), or more fundamentally may concern the relevant order of worth (i.e. is this the correct basis against which to assess the act or situation) (Boltanski & Thevenot, 2006). These tests vary depending on the order of worth to which they refer and can include testimony, popular vote, the general will, paying the established price, relying on the competence of experts, and so on (Boltanski and Thevenot 2006).

In *On Justification* Boltanski and Thevenot elaborate six of these practical philosophies, each of which is elaborated in reference to a grand old work of political philosophy in which they were crystalized (Boltanski and Thevenot 2006). Boltanski and Thevenot make clear that the list is not exhaustive, and

later propose further orders of worth (Boltanski & Chiapello, 2005; Holden & Scerri, 2015; Lafaye & Thévenot, 2017). The details and characteristics of these practical philosophies are not of interest here. Instead, what is of interest is the approach taken to the concept of justification in which they play a key role, and whether this conceptualisation convinces generally and provides useful insights for the present study.

Boltanski and Thevenot's key theoretical commitments regarding the concept of justification are that, firstly, during public<sup>6</sup> decisions actors are compelled by the imperative to justify. Second, those justifications are based – however indirectly – on one of several incompatible principles of evaluation, each underpinned by a distinct, unitary measure of worth (Stark 2009). Third, in disputes actors are ordinarily sincere in their attempts to reach a justifiable settlement, motivated by an authentic desire to be justified. This leads, fourthly, to the methodological commitment to 'take seriously' the stated justifications and criticisms of actors. It also leads, fifthly, to the insight that disagreement is driven – in these kinds of situations at least<sup>7</sup> – by conflicting evaluations of worth according to a common principle of evaluation or more fundamentally by the use of conflicting principles of evaluation, as opposed to clashes of interests, values or identity.

The first commitment – that actors are constrained by the requirement to justify – is uncontroversial. Whatever their motivations or aims, in order to be successful, actors in public decision-making situations have to at least attempt to be seen to make justifiable decisions on defensible grounds. As Boltanski and Thevenot themselves rather colourfully put it – “[we] cannot say, for instance: ‘I don’t agree with you because I don’t like your face’” (Boltanski and Thevenot 1999). The second commitment, too, is perfectly sensible. They may or may not look precisely like the principles elaborated by Boltanski and Thevenot, but it seems reasonable to suggest that actors in public disputes at least attempt to justify their views, acts or preferences in accordance with what is felt is or should be a shared principle of evaluation, no matter how implicitly or mistakenly. It is the next step – that these justifications and evaluations are ‘ordinarily’ sincere attempts to produce well-founded arguments based on the desire to act justifiably – however, that stretches credulity and unduly circumscribes analysis. The empirical observation that these constraints (to justify in reference to collectively acceptable rules) exist does not preclude the possibility that actors do not occasionally behave strategically by paying hollow deference to them whilst pursuing goals driven by other, obscured imperatives. In other words, the provision of a justification and the apparent appeal to a shared principle of evaluation may be strategic rather than sincere, and the constraints of justification may not be the consummate bulwark against strategy that Boltanski and Thevenot appear to believe.

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<sup>6</sup> ‘Public’ in the sense that they involve at least two parties to a dispute – and so the possibility of the invocation of multiple principles of evaluation exists; but also in the sense that they call for collective agreement on a general conception of the good, or an entities worth evaluated in reference to it (Wagner 1999).

<sup>7</sup> Not all social situations fall under the regime of justification. According to Boltanski and Thevenot, other regimes of social life exist when no dispute arises over the justness of a situation or order (the regime of fitness), or when no appeal to a common principle of evaluation is made (the regime of love when there is no dispute, or violence when there is) (see Wagner, 1999).

This commitment comes about through a combination of empirical observation and theoretical contention. Empirically, Boltanski and Thevenot observe that humans are “equipped with a moral competence and an authentic desire for justice” (Annisette and Richardson 2011, 231). They also observe that actual disputes where violence is avoided reveal the powerful constraints of the imperative to justify (Boltanski and Thevenot 2006). They observe this empirically in the mundane arguments of graduate students and then use classical texts of political philosophy to formalise a repertoire of common principles on which an agreement about a social ordering can be based (Boltanski and Thevenot 1999). As they put it:

“Observing the course of disputes, or, more precisely, disputes in which violence is excluded, one cannot fail to observe the common constraints which shape the behaviour of the people involved. For example, they must base their arguments on strong evidence, expressing in this way their will to converge towards a resolution of their disagreement. Political constructions [the classical texts of political philosophy] can be used as powerful tools to clarify these constraints and make explicit the grounds of reasoning, which are most of the time encapsulated in an implicit form in the arguments exchanged during the course of action” (Boltanski and Thevenot 1999, 366).

Finally, they match up each classical text with a contemporary corporate handbook or ‘how-to’ guide (e.g. matching the industrial order of worth, a productivity how-to guide, and the work of Saint Simon), from which they “extracted the principles of order that are implemented in different daily situations” (Boltanski and Thevenot 1999, 369).

These empirical observations would be more persuasive if the stakes were a little higher – say if the dispute concerned the political future of a nation, or the fate of a highly valuable resource. Are actors expected to be principled and sincere in these scenarios? The deliberations of graduate students in class may also be far from typical. Furthermore, the examples that Boltanski and Thevenot furnish *On Justification* with add to the impression that their notion of justification – and in particular its commitment to the sincerity of actors – only applies to mundane, relatively low stakes, and often face-to-face disputes between at most a handful of interlocutors. One wonders whether the same sincere approach to justification would be observed, for instance, in anonymous strangers discussing a controversial geopolitical situation on an internet forum.

Theoretically, they take issue with suspicious analyses that employ forces such as power and interests as explanatory resources, and which – in their view – mistake justification for deceit (Boltanski and Thevenot 2006). They set out to explicitly provide an alternative to the social worlds theorised by Bourdieu and Foucault, which – again in their view – seem entirely governed by power and so unliveable (Wagner 1999). This theoretical ‘scepticism over scepticism’ takes issue with what they see as these analyses’ tendency to ignore the competencies demonstrated by people when they criticise and justify (Boltanski and Thevenot 1999). This is because, for Boltanski and Thevenot, agreement over the justification of a social ordering in which there was a role for power, interests and strategy necessarily means both that certain actors were deceived and so denied their critical competency, and that certain actors behaved strategically and so denied their competency for justifiable conduct. However, it is far

from clear why recognising the role of power and interests in decision-making necessarily denies actors their critical competencies. Boltanski and Thevenot think that justification must be sincere and not strategic in order to grant actors their critical capacity because actors would either display their critical competence and not stand for an illegitimate justification, and so there would be no agreement; or they would be deceived, and so there would be no critical capacity. However, 'agreement' may be far from an enthusiastic endorsement and actors may very well not be deceived but nonetheless powerless to resist. In short, admitting the possibility of a role for interests, power and strategy in justification does not necessarily render those that lose out dupes. Regarding the strategic actors, an actor displaying strategic behaviour in a dispute is not necessarily incapable of principled and sincere conduct, or of accessing potentially shared frameworks of evaluation, but has decided there is a benefit to be gained from not engaging such competencies in this particular moment. As such, neither critical nor strategic capacity should be stripped from actors *a priori*, the existence of one does not necessarily deny the possibility of the other within the same situation, and principled and sincere justification should be demonstrated in conduct rather than granted as an ordinarily natural state.

Wagner admits that Boltanski and Thevenot - mirroring the flaws they perceived in Bourdieu and Foucault - gave the impression of having produced an equally unliveable world where actors seemed to constantly be involved in justice (Wagner 1999). They clarify that this is only how actors are expected to behave in one regime of social life – the regime of justification. It is not clear whether this means that, by definition, the presence of strategy, interests and power in a situation necessarily means that it must belong to another regime of social life. There is a potential circularity to this defence, however, as any case conflicting with Boltanski and Thevenot's expectations about the conduct of actors engaged in justification can merely be semantically shuffled into another regime of social life, leaving their principled and sincere conceptualisation of justification intact.

According to Wagner, Boltanski and Thevenot are not so much saying that sociology cannot be critical, but that the capacity to criticise also exists beyond academia (i.e. amongst actors in practice) (Wagner 1999). However, there is some ambiguity about Boltanski and Thevenot's methodological prescription regarding the taking seriously of the critical competencies of actors and constraints of justification, and what this means for analysis in practice. For instance, Boltanski and Thevenot clarify that they "do not underestimate the importance in social life of domination, force, interests and even of deceit, delusion and self-deception" but that a representation of the social world completely grounded in deception is not able "to understand the critical operations undertaken by the actors" (Boltanski and Thevenot 1999, 364). In order to do so, however, and in order to "recognise the normative principles which underlie the critical activity of ordinary persons", Boltanski and Thevenot suggest that the critical stance must be given up, if only temporarily (Boltanski and Thevenot 1999, 364).

There is also a potential methodological paradox in situations where actors in practice themselves couch their criticisms in a register of power and (attempted but failed) deceit (i.e. that they criticise elites for misusing power). In this case, Boltanski and Thevenot would paradoxically instruct the analyst to 'take

seriously' the actors criticism, whilst suggesting that taking these practical critical evaluations seriously requires jettisoning power and deceit from the account. As they later go on to clarify (Boltanski and Thevenot 1999), however, the point is that when actors criticise power and deception (as it is by now admitted they do) they are demonstrating a competence for distinguishing legitimate and illegitimate justifications and criticism, and to do so necessarily entails an appeal - however implicit - to a common principle of justification (i.e. that it is unjustifiable for elites to misuse power). But what of the elites in this scenario? Would their justifications as to why this was a legitimate use of power be 'taken seriously' as well? And what in practice prevents 'taking seriously' from amounting to uncritically taking at face-value? Boltanski and Thevenot would explain the difference in view as to what is legitimate behaviour as coming down to the deployment of distinct and incompatible principles of evaluation. But is it not also possible that the elites are appealing to what they consider to be a shared principle of evaluation in order to obscure their misuse of power? In their keenness to grant actors their critical capacity, Boltanski and Thevenot appear to have stripped them of their capacity to act strategically. Readers will also notice that in such a scenario justification is wielded as a strategic tool by one set of actors (i.e. the elites), whilst another set of actors display the capacity to criticise on the basis of a principle of evaluation that distinguishes legitimate from illegitimate conduct. In other words, strategy and critical capacity coexist in the same situation, suggesting that a role for power does not necessarily involve denying actors their critical capacity.

A sincere conceptualisation of justification is one that makes no distinction between the means of evaluation on the one hand, and justification on the other. The means of evaluation – an attempt at a shared principle of evaluation – sincerely was the means of evaluation employed, and is also the means of persuasion precisely because it aspires to be common. However, once we grant actors their strategic capacity – as I argue we must to provide an intellectually plausible and politically useful account of justification – we break the link between the actual basis of choice and the presented justification. This is because sectional interests are largely unpersuasive as reasons to pursue a particular option over alternatives in public decision-making. Therefore, if such influences are actually steering decision selection, then an alternative means of justification must be presented to a broader audience. In short, the way a decision is made and justified become two separate phenomena masquerading as a single entity, with the latter attempting to obscure the former. Therefore, a conceptualisation of justification which recognises the possibility of this distinction – between the material process of selection and a presentational process of justification – is required. The elaboration of such a conceptualisation is the task taken up in the second half of this section.

In sum, Boltanski and Thevenot provide an account of public decisions in which they take seriously the constraints and practical competencies of critique and justification. For them, both empirical observation and theoretical reasoning suggest this task requires accepting that the justifications offered by actors are based on common principles of evaluation which are invoked in a sincere attempt to reach a justified settlement. I have accepted the first two commitments – that actors are compelled by the

constraints of justification, and that they at least attempt to make reference to what they consider to be shared principles of evaluation. However, the third has been rejected. Actors may be compelled to justify and may attempt to make reference to a generally acceptable standard in so doing, but they do not necessarily do so sincerely or innocently. Aware of the reality of such requirements for success in disputes, actors may strategically pay lip service to them in order to advance interests motivated by imperatives beyond the authentic desire for justice. Boltanski and Thevenot's approach to recognising the capacity of actors to criticise appears to strip them of their ability to act strategically. As a result, both their methodological prescription to take seriously the justifications of actors and the insight that disagreement is driven by conflicting principles of evaluation are rendered problematic. Instead, I will now turn to a sceptical conceptualisation of justification in order to furnish this study with the ability to recognise the strategic capacity of actors, the distinction between the basis of choice and the means of justification, and the role of power in decision-making.

### 2.2.2 JUSTIFICATION AS A POLITICAL RESOURCE OR TOOL

Stirling starts from a very different position to Boltanski and Thevenot. Instead of observing that justification in practice is ordinarily sincere and principled, Stirling attempts to understand the enduring appeal of technology assessment techniques in spite of their failure to live up to early promises of a 'science of technology choice'. The initial goal of achieving a truly comprehensive and objective means of technology choice is widely accepted – even implicitly amongst many advocates (see Stirling, 1994, p. 78) – to have eluded such techniques. As such, Stirling suggests that their enduring appeal is not as a means of selection but of 'justification'. They are, in Stirling's rendering, "better regarded as a means to the ex post facto rationalisation of technology choice to a sceptical audience than as a normative decision-making procedure" (Stirling 1994, 80).

Here justification is a quite different notion than in the work of Boltanski and Thevenot above. For Stirling, justification is a resource accrued in favour of a preference, designed to help persuade a broader audience. Stirling's concept of justification has a potentially deceptive or misleading quality to it, as decisions actually taken according to narrower interests may be subsequently justified through an ostensibly rational and so more widely persuasive process. In other words, the actual basis of choice is obscured and presented as the (typically more agreeable) means of legitimisation. As Stirling puts it, technology assessment techniques can operate as "an effective tool for the wider rationalisation of decisions taken according to narrower interests" (Stirling 1994, 80).

Stirling extends this conceptualisation of justification to apply to participatory processes of technology appraisal as well as the analytical processes already considered (Stirling 2008; Stirling 2006). Stirling separates processes of appraisal (i.e. assessing the merits of different policy options) on the one hand, and commitments (i.e. committing to a particular option) on the other. In the conventional view, policy

commitments are the outcome of policy appraisal processes. Stirling suspects, however, that sometimes appraisal processes may anoint already formed commitments with justification. Both analytic and participatory appraisal processes are susceptible to various kinds of conditioning in their design, implementation and interpretation that provide “scope for contingent variability, inadvertent bias, or the exercise of deliberate conditioning influence” (Stirling 2008, 275). For example, choosing policy questions, bounding remits, including disciplines, accrediting expertise, choosing methodologies, defining metrics, prioritizing criteria, and interpreting uncertainties all effect the outputs of analytic appraisal; whereas recruiting participants, phrasing questions, characterising alternatives, providing information, conducting facilitation, and managing dissensus provide scope for channelling outcomes of participatory processes (Stirling 2008, 275). This scope for conditioning is the means through which processes of appraisal might inadvertently align with or be steered toward powerful incumbent commitments and interests. Stirling is quite clear that the influence of power might be inadvertent and tacit, as well as potentially deliberate.

Stirling draws a distinction between two instrumental imperatives toward decision justification potentially operating through appraisal processes. ‘Weak justification’ describes the desire for decisiveness in general, where the specific outcome is unimportant but a decision must be made, possibly reflecting a desire to settle an issue or pool blame. ‘Strong justification’, on the other hand, describes the desire to justify a particular decision option, which may be favoured for narrow reasons not likely to be persuasive to a public audience. As such, the conditioning of appraisal provides a route to secure and justify such favoured outcomes in ways that obscure the reasons actually underlying the commitment to them. Stirling suggests that, “[s]uch is the manifest latitude for conditioning appraisal that there need often be no compromise on (let alone violation of) disciplinary rigor, methodological conventions, or individual integrity” (Stirling 2008, 276). Again, Stirling stresses that “imperatives to strong justification need not necessarily be explicit and deliberate, even on the part of incumbent interests” (Stirling 2008, 276). This is because:

“Such interests are often directly engaged in individual projects through the formal structures of financing, sponsorship, clientship, patronage, or stakeholder oversight as well as in associated general processes of research governance, disciplinary funding, peer review, and professional advancement” (Stirling 2008, 276–277).

It is worth pointing out here that the production of justification is not an easy or riskless endeavour. As Stirling suggests, “recognition of the scope for inadvertent bias or deliberate manipulation seriously undermines the basis for providing either weak or strong justification in decision-making” (Stirling 2006, 99). Here an audience is invoked with the critical capacity to recognise the potential for an appraisal process to be used as a tool for, or inadvertently shape towards, the production of justification. In other words, justification needs to either actively deceive or more passively be overlooked in order to simultaneously secure the preferred outcome (either any decision or a specific outcome in the weak and strong variant respectively) and be persuasive to a broader audience (in order to produce the political resource). If the outcome of an appraisal process was widely perceived to be the result of systemic bias

and deliberate influence, then the process would obviously not have succeeded in producing justification. It is easy to see how an attempt at deliberate strong justification, say, could therefore backfire. Too blatant an attempt to secure the favoured outcome and observers will consider the process to be a 'captured' white-wash and no resource of justification will have been produced (in fact suspicion will have been engendered). Too many concessions to persuasiveness and incumbents may risk losing the ability to channel the process toward their favoured outcome (they may even unwittingly produce justification for another option). In short, the instrumental and expressive tasks of justification are in tension. Boltanski and Thevenot's initial insight – that actors operate under the constraint of justification – continues to exert regulatory pressure on actors who at least have to be seen to operate justifiably, even as they work strategically toward securing support for a favoured outcome. Boltanski and Thevenot's constraint of justification militates against strategy and indeed inadvertent bias, but it does not consummately prevent them.

It is also worth clarifying that appraisal processes are not doomed to be a tool for the production of justification. Such processes "may be undertaken and presented in such ways as alternatively to conceal and reify, or acknowledge and interrogate, these imperatives, sensitivities and susceptibilities" (Stirling 2006, 101). In Stirling's vocabulary the former direction is described as 'closing down' and the latter as 'opening up' (Stirling 2006; Stirling 2008). The purpose of appraisal geared toward closing-down is to authoritatively provide a single option with decision justification (Stirling 2008). Closing-down therefore either cuts through potentially intractable disagreement and incertitude to enable any decision to be made and defended, or it produces support for a particular outcome through inadvertent bias or deliberate action oriented toward the closure of consideration of particular options, issues and perspectives. The purpose of appraisal geared towards opening-up on the other hand is to make clear the extent to which the outcome of appraisal is sensitive to different conditioning effects in its design, conduct and interpretation, leading to 'plural and conditional policy advice' (Stirling 2008). Therefore, the scope of appraisal processes to produce justification is dependent on the extent to which their orientation toward disagreement and diversity in views, values and voices is one geared toward opening or closure.

A sceptical approach to justification therefore recognises that decision-making processes are susceptible to various forms of action and bias with the potential to steer them towards closure generally or to provide support for a particular outcome in ways that are potentially obscured from a wider audience and even decision-makers themselves. Boltanski and Thevenot see the desire and requirement to achieve a state of justification as a positive regulatory force. The sceptical view, on the other hand, sees justification as potentially a tool or resource that can aid typically powerful actors' pursuit of favoured outcomes, whilst at least partially obscuring that pursuit either behind some more agreeable presentation or by simply being overlooked (because these processes are only revealed on close inspection). Justification is therefore not just a constraining force but potentially an enabling one too, and can be produced through the closure-oriented conditioning of decision-making processes.

For Stirling, then, justification is a resource produced through scope for inadvertent bias or deliberate agency to condition appraisal processes towards either general decisiveness ('weak') or a particular favoured outcome ('strong'). Appraisal processes may not actually inform commitments, but, in a reversal of the conventional view, may be shaped and co-opted to produce justification for existing commitments. This conceptualisation recognises the distinction overlooked by Boltanski and Thevenot between the actual basis of decision selection (prior commitments formed in whatever obscured way) and the process of justifying that commitment to a broader audience. It also recognises the possibility of strategic behaviour and the role of power in decision-making. Stirling's repeated insistence, furthermore, that the production of justification is not necessarily intentional is a further important insight. As well as potentially being strategically produced, justification may also be the inadvertent result of systems, habits and other tacit or structural influences.

## 2.3 FRACKING, PLANNING AND CLOSURE

The previous section established a conceptual interest in scope for the production of justification through the closure-oriented conditioning of decision-making processes. The present section will review three relevant literatures. I start by considering the literature on ‘framing fracking’ at a broad discursive level before discussing the literature on ‘closure through planning’ on relatively similar energy infrastructure planning disputes. The former demonstrates differing perspectives between public and institutional actors and flags a possible issue with the accommodation of public views in formal processes of policy- and decision-making. The latter provides an account of similar issues as they have played out across planning processes on relatively comparable types of development. Together these literatures locate planning decision-making on shale gas development as potentially fertile ground for studying processes of closure curtailing the role of expertise and public participation in decision-making and geared towards the production of justification for a particular form of development. Finally, I engage with early work positioned on or around this terrain in the section on ‘participation in the planning of shale development’ and highlight the ways the present study will extend understanding.

### 2.3.1 FRAMING FRACKING

A growing body of literature considers the framing of unconventional gas debates in the UK and beyond. Framing refers to the process of discursively constructing a particular and partial representation of an issue that either strategically or tacitly presents it in a particular light. These frames mix empirical information, interpretive perceptions, and normative or evaluative judgements, and often emphasise or background particular aspects of the issue and highlight or obscure attendant solutions. Frames then are interpretations of an issue that varyingly define the issue, evaluate what is at stake, and prescribe solutions (see Entman 1993; Hänggli and Kriesi 2012; Hilson 2015; Schon and Rein 1994). The present study focuses on a concrete and situated process of regulatory decision-making, as opposed to these studies which focus on the more decentred and intangible ways in which the same issue can be viewed and how those distinct ways variously resonate with diverse political values and identities. However, the two foci are related given both that concrete features of a decision-making process may render it more or less receptive to a particular way of framing the issue under consideration, and that the dominance of a particular issue-framing amongst groups with the resources or authority to sponsor or commission appraisal processes may influence the design and conduct of those processes in particular directions (i.e. conditioning pressures towards strong justification).

Of these studies, many take a largely typological approach, distinguishing and describing the ‘frames’ or ‘storylines’ employed by pro- and anti-fracking coalitions, and charting their relative success. Bomberg,

for instance, finds an opportunity and reassurance storyline amongst advocates, where economic, security and environmental benefits, and robust regulation are stressed. This is contrasted with a threat storyline amongst objectors which emphasises a triumvirate of threats from risk, fossil fuel dependence and bad governance (Bomberg 2015). Bomberg suggests that over time focus has shifted both geographically to more local concerns, and in terms of substance from risk to issues of governance, accountability, power and democracy (Bomberg 2015). In Scotland, Stephan finds a relatively consistent set of storylines. Amongst the pro-development discourse coalition an emphasis on economic benefits and energy security is found. Furthermore, discourses of reassurance (stressing the trustworthiness of operators and playing down the novelty of the process) and responsibility (where natural gas is framed as clean and a bridge, domestic supplies are framed a morally preferable to imports, and a direct energy systems transition to renewables is framed as irresponsible) are also found amongst this group (Stephan 2017). On the other hand, anti-development storylines focus on, amongst other things, uncertainty, bad governance and ‘non-transition’ (Stephan 2017).

Similarly, Cotton et al. report three overarching storylines in the UK national debate - ‘cleanliness and dirt’, ‘energy transitions’, and ‘geographies of environmental justice’. Within each storyline distinct coalitions with distinct values and worldviews compete to frame the issue (Cotton, Rattle, and Van Alstine 2014). Cotton et al. suggest that oppositional frames have struggled to influence the development of UK shale gas policy (Cotton, Rattle, and Van Alstine 2014). Steger and Milicevic survey the diversity of frames employed by the ‘global anti-fracking movement’. They find diagnostic frames that define fracking as a problem of health and safety, climate change, and democracy, as well as attendant prognostic frames. Crucially, when framed as a problem of democracy, the better understanding and management of risk is potentially insufficient as a governance response because it leaves intact the top-down, scientized (see Sarewitz 2004) decision-making processes that are established as part of the problem. As Steger and Milicevic put it:

“Such framing of the “fracking problem” does not lend itself to easy technocratic policy fixes but brings proper politics back into the arena of contention” (Steger and Milicevic 2014, 26).

Participatory methodologies have also been employed by researchers in an attempt to understand how publics perceive and think about the issue of unconventional hydrocarbon development. For instance, an early UK engagement exercise run by Sciencewise and TNS for DECC reported public concerns that included those caused by perceptions of risk, but also concerns provoked by views of shale gas as finite, polluting and a ‘non-transition’; scepticism over the distribution of benefits; a lack of confidence in the impartiality of decision-making bodies in the face of vested interests; a series of uncertainties over impacts, the scale of resource and economic viability; and the view that the Government had taken a prematurely partisan position and would likely be unresponsive to public opposition (TNS 2014). In deliberative workshops across the US and UK, Thomas et al. find a focus on risks and doubts about benefits and their distribution, as well as sceptical perceptions of the trustworthiness of governing

institutions and the motivations of corporations. Furthermore, and particularly in the UK, they find concern over a lack of local control over regulatory decision-making (Thomas et al. 2017).

Partridge et al. also conduct a series of deliberative workshops across the UK and US and report the importance not just of specific risks, but also of the perceived compatibility of shale development with participant visions of and concerns about long-term energy futures (Partridge et al. 2017). They report that shale development was typically seen as short-term, insufficient, and possibly counter-productive as a response to climate change. These ‘too little too late’ or ‘backwards step’ storylines also emphasised concerns about the crowding out of renewables investment and further entrenching an unhealthy reliance on fossil fuels, and echo earlier findings of a sceptical ‘non-transition’ discourse amongst UK publics (Parkhill et al. 2013). In some critical comments in their discussion, Partridge et al. suggest that the UK governments public knowledge deficit diagnosis of the issue (see Williams and Macnaghten, forthcoming) was seen as problematic by participants for underplaying uncertainties and failing to recognise the broader nature of concerns. They reflect on the problematic lack of “space for other perspectives” that this official storyline leaves (Partridge et al. 2017, 9).

Other studies take a more thoroughly critical stance, arguing that dominant forms of industry, government or scientific discourse frame the issue in such a way as to marginalise and potentially exclude from sites of policy and decision-making the perceptions and understandings structuring public concern over the matter. Williams et al. analyse both Government rhetoric and public perceptions through public pronouncements and focus groups respectively, before exploring alignments and divergences between the two (Williams et al. 2017). They detect a ‘risk and safety’ framing and corollary public knowledge deficit diagnosis amongst governance actors. In this institutional storyline, public scepticism over fracking is caused by public misunderstandings over shale gas and hydraulic fracturing, scientific knowledge about impacts is the key basis of decision-making, and public resistance is remedied through the pedagogical communication of this knowledge to publics. This deficit model approach was found to be poorly aligned with public discourse on the issue, and furthermore is not well supported by the available evidence (see Williams and Macnaghten, forthcoming; see also Stedman et al. 2016 for a contrary view). Four themes of public concern were reported over the trustworthiness of institutions, the inclusivity of policy- and decision-making processes, the responsiveness of policy to public values and arguments, and the perceived lack of precaution in the Government approach. As such, public concern was found to relate not only, or even primarily, to the impacts (i.e. risks and benefits) and their distribution which dominated Government thinking, but also the processes through which commitments and decisions were being made and the perceived behaviour and orientations of institutional actors. As such, Williams et al. conclude that the Government response to public controversy is at best partial and at worst risks failing to recognise let alone address key issues motivating public concern, particularly those that relate to the processes and behaviours of regulatory agencies and governance institutions themselves. In other words, the UK fracking controversy:

“[I]s not just about the existence of objective risks, nor just about the public’s ability to understand them, but also about the institutional ability and willingness to recognise, encounter and accommodate diverse and polyvalent public views” (Williams et al. 2017, 100).

Writing from a political economy perspective, Mercer and de Rijke also report a similar misalignment between anti-development campaigners, and the state Government and industry in the case of Coal Seam Gas (CSG) in Queensland, Australia. Their critical discourse analysis finds themes of irreplaceability, damage and interference amongst the discourse of the ‘Lock the Gate’ campaign, contrasted to a shared focus on themes of growth and prosperity amongst the Queensland state government and CSG companies. Mercer and de Rijke conceptualise this distinction as being one between ‘neoliberalising’ and ‘non-neoliberalising’ beliefs and perspectives where the latter are foreclosed and silenced as unthinkable and unreasonable in decision-making (Mercer and Rijke 2014).

In sum, this literature catalogues the diversity of ways shale gas development is ‘framed’ amongst various groups. In terms of oppositional frames, whilst this literature demonstrates that the perceptions and judgements underpinning public scepticism are varied and complex, I would argue that a fairly consistent set of concerns is increasingly emerging. The *process of hydraulic fracturing* is seen as novel and risky and as producing impacts that are likely to be distributed unevenly and that remain the subject of scientific uncertainty and expert disagreement; *the product of shale gas* is perceived as representing a ‘non-transition’ or ‘a backwards step’; *governance and industry actors* are not necessarily trusted to act in the public interest; and, finally, *governance processes* are viewed as exclusionary to publics and unresponsive to their concerns. Many of the studies point to a disconnect between publics and institutional actors and the ways they view and think about this issue. This is a fairly well observed phenomena across issues related to the environment and innovation (Dryzek et al. 2009). Some go further by arguing that this disconnect is marginalising typically more sceptical public framings at a broad discursive level, whilst also speculating about their possible exclusion from concrete exercises of policy- and decision-making. This prompts some of the authors above to make the general recommendation that decision-making processes will need to attempt the difficult task of recognising and accommodating public views in order to be legitimate or effective. Others attempt to locate specific areas of public concern and styles of reasoning that institutional discourses appear unreceptive to, and that decision-making processes may exclude or not take seriously. Beyond the handful of studies discussed in section 2.3.3 below however, little attention has been paid to concrete exercises of regulatory and governance decision-making on the matter of unconventional hydrocarbon development (as opposed to the more abstract broader frames discussed here). To the sites, mechanisms and practices through which public views are either included or not and taken seriously or not. In short, little attention has been paid to the inclusiveness of sites of regulatory and governance decision-making over shale development, and their receptiveness to public ‘frames’ and arguments. The present study locates itself within that gap by assessing whether planning decision-making processes are conditioned in such a way as to render them insensitive to fracking-sceptical public views and expert analysis alike. Similar

work has, however, been conducted on relatively comparable cases to shale development, to which this review now turns.

### 2.3.2 CLOSURE THROUGH PLANNING

Here I focus on studies into the treatment of expertise and public participation in planning processes, the extent to which these groups are able to influence planning decisions, and the forms of closure that frustrate such efforts. I start with a couple of studies on general forms of development, before moving to energy development cases in particular.

Bedford et al. assess the limits of 'new' public participation in planning development control in the UK in the context of contemporaneous and potentially contradictory moves to improve the efficiency of the system during the New Labour years. They argue that in two cases of residential development sites in London, such, at the time, 'new participatory practices' largely amounted to 'consultation and placation' rather than more meaningful 'participation and empowerment' (Bedford, Clark, and Harrison 2002; see also Arnstein 1969). This was primarily because these participation practices did "little to lessen the grip of political or economic power on decision-making" (Bedford, Clark, and Harrison 2002, 322), and because there was a "basic disjuncture between what the public wished to object to and what was on the table for negotiation" (Bedford, Clark, and Harrison 2002, 326). They warn against raising expectations of meaningful impact on decision-making whilst limiting participation to consultation and placation, which they suggest may lead to greater cynicism and distrust of public institutions. As they conclude:

"[P]articipants' experiences of 'new' participatory practices leave them feeling just as disempowered by a process that consults more but still does not permit them to gain effective purchase on the decision-making process" (Bedford, Clark, and Harrison 2002, 328).

Bedford et al. encourage attention to the economic, political and institutional contexts and realities within which public participation in planning is situated, and the extent to which the former limits and circumscribes the latter. This study will focus on the extent to which a civil society organisation's participation in a planning inquiry is circumscribed by the broader political and institutional context, especially the context of planning and energy policy. This study supports the idea that participation in planning decision-making enables little public 'purchase' on decision outcomes where participating publics are objecting to a form of development supported in the broader policy landscape. This study will demonstrate, through the notion of 'vertical deference' in particular, how this broader policy landscape shaped the inquiry's ability to accommodate key arguments and frames of objectors in this case.

Bickerstaff and Walker critically reflect on the upsurge of participatory rhetoric and practice in local government through the examination of two deliberative exercises employed in local transport

planning. In interviews with participants, planning officers and councillors they find a series of issues over both the process and outputs of such exercises. With regards to process, participants' experiences of such processes make clear that unequal power relations may be reinforced rather than equalised through the dominance of particular forceful interests and various kinds of strategic behaviour. In terms of outputs, Bickerstaff and Walker argue that these deliberations were used to "justify or validate higher policy objectives or mobilise civic support" and that "the use of participatory outputs often served a rather symbolic role – to signal good decision-making without necessarily influencing it" (Bickerstaff and Walker 2005, 2134). Furthermore, the possibility of participatory outputs influencing decisions was constrained by statutory requirements and the broader institutional context. Ultimately, the local plan had to conform to government guidance, but government also encouraged public participation. Within the context of prescriptive central government policy, local authority influence on decisions and any role for public participation therein were heavily circumscribed and repeatedly seen as "a matter of tampering at the edges of decisions essentially made" (Bickerstaff and Walker 2005, 2137). They conclude with the warning that such deliberative exercises risk "providing something of a legitimacy veneer over existing relations of power within and between institutions and civil society" (Bickerstaff and Walker 2005, 2140).

Turning to types of energy infrastructure more closely related to fracking, Wolsink considers 'top-down planning' as a major obstacle to development in a discussion on public opposition to wind farm siting in Europe (Wolsink 2007). Wolsink argues that how public concerns are treated and whether public values are allowed to influence decision-making at the local siting decision-making level are crucial in securing local support for wind developments and realising national policy on wind power. Crucial here, according to Wolsink, is the institutional tendency to misunderstand local opposition actually based on landscape values, community identity and environmental justice as being simple nimbyism. As Wolsink puts it:

"For authorities and policy implementing agencies, the recognition of any NIMBY-motivated resistance is the ultimate legitimization for not considering the arguments that are put forward; however, the literature on facility siting and risk assessment shows that it is not a wise policy strategy to disregard the objections, and that ignoring the arguments might eventually become one of the major sources of societal resistance" (Wolsink 2007, 2701).

Wolsink urges paying close attention to the fine detail of local planning decision-making on energy infrastructure siting, and especially to the treatment and categorisation of public concern and the influence of public values on decision-making. He is also concerned with the 'closure' performed through the institutional framing of public opposition (i.e. as nimbyism). The present study follows the former point closely. I chart the treatment and influence of the arguments of a civil society group through the fine detail of a local planning decision. However, I take a slightly different approach on the second point. I focus on the actual procedural mechanisms through which 'disregarding objections' and 'ignoring arguments' – to use Wolsink's terms from the quote above – are achieved, rather than the discursive work through which this achievement is then rationalised.

Turning to nuclear power, a by now classic series of studies into so-called 'big public inquiries' on nuclear planning decisions in the UK throughout the late 70s and 80s addresses the treatment of public participation and expertise within these processes. Kemp considers the planning system as a tool for legitimisation in the case of the 1977 public inquiry into the proposal to build a thermal oxide reprocessing plant at Windscale in Cumbria (Kemp 1980). Adopting a Habermasian approach, Kemp assesses the inquiry against the normative yardstick of the 'ideal speech situation' (see Habermas 1990) and from the theoretical starting point of the 'crisis of legitimisation' (see Habermas 1975). Kemp points to several deficiencies of the process, including inequalities in technical and financial support between objectors and applicants, the inability of objectors to question government policy, and the limited research capabilities available to the inquiry (Kemp 1980). Perhaps unsurprisingly then, Kemp concludes that the eventual decision to grant permission was not reached owing to the 'force of the better argument', and that it may be said to have been reached under conditions of 'domination' (Kemp 1980). He adds that rather than enabling public participation in decision-making the public inquiry served to procure legitimisation for planned state actions (Kemp 1980).

During the public inquiry into the Sizewell B pressurised water reactor, Kemp et al. note the emergence of a series of procedural innovations in response to questions about the legitimacy of decisions over large, complex, uncertain and controversial technological projects (Kemp, O'Riordan, and Purdue 1984). A key development, they argue, was the active investigatory role taken on by the public inquiry by commissioning and undertaking research itself, rather than relying on the information providing by interested parties. They argue that this arose from concerns over the fairness of the inquiry relating to structural inequalities between supporters of and objectors to the scheme. Specifically, the concern was that, given the complex and technical nature of the content of the inquiry, there was a clear disparity in the level of resources enjoyed by supporters and objectors and so their capacity to produce and present highly technical evidence. The recognition of this structural power imbalance led the inquiry itself to take an active role in filling this gap and producing the knowledge required to test the proposal thoroughly. Kemp et al. are therefore interested in emerging procedural responses to avoid the closure of public, NGO and expert criticism and scrutiny that would otherwise not be voiced, or at least not be voiced effectively, due to structural asymmetries in resources.

Wynne highlights the limited scope for meaningful public influence in the nuclear planning inquiries of the 70s (Wynne 1982). Crucial here is the distinction between Government nuclear policy and the local impacts of specific siting decisions, with the former typically established as lying beyond the terms of reference of an inquiry. The Government was frequently in the position of supporter of a technological development and setter of the terms of reference within which planning appraisal of specific proposals for such development will be constrained, leading to ample scope for strategic behaviour to stifle potential arguments and avoid uncomfortable subjects. As Wynne puts it "[o]nly fragments [of the overall issue] are exposed for public participation, and the government can therefore control the comprehensive vision" (Wynne 1982, 59). In this context objectors are left with a dilemma since "an

inquiry promises potential influence, even if it flatters to deceive” and furthermore hands “the initiative in the overall definition and control of an issue to existing institutions” (Wynne 1982, 60). These inquiries, furthermore, typically considered safety issues as beyond dispute, with objectors often having difficulty accessing technical information from Government agencies for scrutiny. Wynne argues that these inquiries’ expression of an image of rationally discovering the best decision was a myth generated through procedural ritual, concealing social choice and producing legitimation for decisions already effectively made. However, having encouraged the public perception that such decisions should be rational (i.e. full and open examination of the issues), the reality of participating in these inquiries exposes “the contradictions in the ritual and is beginning to generate the hostility towards political authority it is supposed to preclude” (Wynne 1982, 73).

Wynne also analyses key aspects of what he terms judicial rationality or thought. This includes ideas about the legitimate content of arguments but also deeper styles of reasoning, which together help to set the ‘shape’ of the issue. In his account of the 1977 inquiry into plans for a nuclear reprocessing plant on the Windscale site in Cumbria, Wynne outlines two forms of what I am here calling ‘closure’ as a result of judicial rationality. First, is the exclusion of certain issues as beyond the scope of the inquiry (e.g. Government policy, need, alternatives, etc.). Second, is the ostensive positivism of juridical rationality. This positivism maintains that issues can be purified into precise empirical questions which are answerable through reference to objective facts alone and is adopted at the expense of broader ethical, historical and sociological forms of argument (Wynne 1982). We will see that this distinction between legitimate and illegitimate styles of reasoning still more or less stands in the case presented here. This is demonstrated in the illegitimacy of arguments concerning the track record of Cuadrilla and the EA; and of the ‘similar facts’ case put forward by FoE regarding public health impacts in the US.

Looking more broadly at conflicts in energy planning in the UK during the same period, Owens considers the increasing demands being placed on public inquiries from different groups. Central here is the extension of the terms of reference of inquiries from ‘traditional’ site-specific matters to consider broader issues such as government policy and national need. These broader debates were typically sought by environment groups who were sceptical about whether public discussion on energy policy was occurring elsewhere and so “[i]n the absence of a credible alternative forum... [these] groups persevere in raising these issues within the framework of the planning process” (Owens 1985, 549). They argued, therefore, that the development of say a nuclear reactor at Sizewell was part of a broader programme that regrettably could not be satisfactorily scrutinised by public groups in the round in any other forum. These groups ideally sought an extension of opportunities for public participation, and for such participation to occur at an early stage before policy commitments are made and become virtually irreversible. In contrast, developers tended to view these attempts to expand the terms of reference for such inquiries as going beyond the brief of planning and as resulting in unacceptable delays and costs. Developers therefore tended to be “in favour of ‘streamlining’ planning procedures, usually implying curtailment of debate on generic issues” (Owens 1985, 549). In conclusion, Owens suggests that

developer interests seemed more likely to win out at the time, suggesting a streamlining of the system and curtailing of debate rather than an expansion of participation and relevant issues. However, she argues that whether or not this would help achieve developer aims “to pursue and legitimize their development programmes with minimum delay”, will depend on “whether the reaction to ‘streamlining’ takes the form of acceptance with resignation, disruption by civil disobedience or explicit politicization of the debate” (Owens 1985, 557).

In more recent work, Johnstone reflects on the continued dominance of the ‘streamlining’ approach to planning reform identified as having the upper hand by Owen around three decades earlier, with a particular focus on the 2008 Planning Act and its consequences for nuclear power consultation in the UK (Johnstone 2014). Crucial here is the creation of the Nationally Significant Infrastructure Projects regime, in part as a response to frustrations with local planning inquiries which had become increasingly seen as a hindrance to sustainability, not least because they had tended to become embroiled in national policy issues. Through these reforms, from the public inquiry format to various sites of ‘consultation’, opportunities for engagement are compartmentalised, different publics are kept separate and the different issues that can be raised at different sites of consultation are closely policed. Activist interviewees fondly recall the ‘scalar fluidity’ of the public inquiries of the 80s where there was scope to raise broader issues around national policy, need and alternatives alongside local issues of amenity and siting. This is contrasted to the new regime of consultation within which two scales (local and national) and their issue-content and publics are distinguished and separated. Johnstone considers the “dissection of policy into contained scales” as a move that helps render a highly politicised form of development more ‘administrative’, and speculates that closing down the limited opportunities for challenging policy that existed in the public inquiry system will result in politics returning through other channels (e.g. the legal system and direct action protests, or ‘uninvited participation’ – see Wynne 2007) (Johnstone 2014, 708–709).

Finally, in a historical case study of a planned Norwegian oil-fired power station that was never built, Asdal offers a corrective to overly pessimistic views on the use of public and expert participation to manage political contestation of planned energy infrastructure (Asdal 2008). Asdal focuses in particular on the role of a public hearing in jolting administrative practice from its default business-as-usual avoidance of ‘the political’ and reframing the prospective plant as an extraordinary and risky object. The hearing is a ‘technology’ for giving space to multiple judgements and in this case broke open the managerial space to enact difference and scepticism (Asdal 2008). As such, the hearing was not a technology of control but a tool for undermining management. As Asdal puts it, “[r]ather than stabilising or increasing the power of the centre, this tool at the heart of administration took part in transforming or undoing administration-as-usual” (Asdal 2008, 21). Asdal gives us little to go on in terms of the specific features of this hearing that enabled such effective unsettling of both the proposed object (from ordinary to extraordinary, risky, and old fashioned) and the administrative process (from business as usual, the avoidance of politics and seemingly routine acceptance to not only a space for different and

doubtful views to be voiced but also those voices successfully influencing the decision). She is keen to stress that it is the relationship or contact between the public, expertise and public administration that opens the possibility of the democratisation of the decision, rather than that capacity being the possession of any one in isolation. The present case tells a different story to Asdal's abandoned power station. It demonstrates how publics (and dissenting experts) can be brought into contact with the administrative process without necessarily realising the possibility of democratisation - which according to Asdal is latent within this contact - and without these groups necessarily being able to gain a 'purchase' on decision-making. It is an account of how the creation of space for different and doubtful views to be voiced (which did occur to an extent) did not lead to those voices unsettling either the mundane framing of the object under consideration or the business-as-usual managerialism of the administrative process.

To summarise, several forms of 'closure' have been identified as curtailing participation in planning processes. First, many of the studies surveyed reflect on the impact of uneven resources and unequal power relations preventing certain voices from participating effectively in planning processes. Second, some of these studies flag the importance of formal inquiries possessing an investigatory capacity in order to redress such imbalances, as well as voicing concerns over insufficient scrutiny of or undue deference toward the technical case of the developer. Third, many demonstrate the prevalence of the closure of public and expert participation through the blunt procedural exclusion of defining certain issues as being beyond the scope of what can be discussed or questioned. Government policy in particular was regularly placed beyond what was permitted to be discussed. Another recurring finding was the compartmentalisation of the oversight of and opportunities to participate on related issues, broader programmes, and connected developments (i.e. oversight and participation was siloed not systematic). Fourth, the difficulty for local processes to enable participating publics to gain decisional influence was highlighted in the context of centralised and authoritative broader institutional contexts and statutory requirements. In short, where local decisions must align with central policy, public views not aligned with the Government view will always struggle to achieve decisional influence. Fifth, Wynne pointed to the juridical-rational style of reasoning that dominates in such processes at the expense of other forms of argument. Sixth and finally, Wolsink drew attention to the closure performed by delegitimising public views by miscategorising them as nimbyism.

The present study represents an opportunity to assess whether these or similar forms of closure are curtailing expert and public participation in contemporary planning processes over fracking. As already suggested, this study has a different focus to that of Wolsink, being more interested in the mechanisms through which arguments are rejected, rather than the miscategorisation of publics and their arguments used to rationalise such closure. It also does not attempt to assess material inequalities between parties participating in the process. Instead, it assesses, in a sense, inequalities in the treatment of arguments within the decision-making process. In addition, Wynne's focus on styles of reasoning is not repeated here, with the focus instead being primarily on more procedural forms of closure. However, the forms of

closure relating to investigatory capacity and scrutiny of technical claims, deference to the policy and views of Government, the ‘compartmentalisation’ of issues and oversight, and the procedural exclusion of matters as beyond the scope of the inquiry will all be returned to in the discussion in the light of the analysis reported in chapter 5.

### 2.3.3 PARTICIPATION IN THE PLANNING OF SHALE DEVELOPMENT

This review started by considering the diverse ways in which different groups frame fracking, and established a concern over the marginalisation of sceptical public frames and views from formal processes of policy-making and regulatory decision-making. We have just seen various ways in which contrary expert and public views have been involved but neutered through the design and conduct of participatory opportunities in the planning system. The ‘framing fracking’ literature establishes a divergence in the framing of fracking between the institutional actors who are promoting and overseeing shale development, and some of the publics they are attempting to persuade. The ‘closure through planning’ literature demonstrated that planning decisions are susceptible to the processes of justification discussed by Stirling, and detailed various forms of closure through such processes might operate. In short, they together locate planning decision-making processes on shale gas development as potentially fertile ground for the study of the production of justification through the closure-oriented conditioning of such processes. A handful of studies have already covered related ground, albeit from slightly different perspectives, and are considered next.

In a particularly relevant paper Chris Hilson conducts an assessment of the capacity of both the EAs environmental permitting regime and the planning system’s development control regime to accommodate the key frames of the anti-fracking movement (Hilson 2015). Hilson identifies two key ‘scalar frames’ amongst anti-fracking campaigners – local frames emphasising local environmental risk and global frames focusing on impacts on global climate change – as well as a ‘novelty’ frame emphasising fracking as a new and exceptional process. Hilson then examines whether these frames can “be heard and considered in the decision-making process” of the English planning and regulatory system (Hilson 2015, 186).

Hilson notes that, whilst Environmental Impact Assessments (EIAs) are required to consider both indirect and direct impacts of a fracking proposal on both the local environment and health and the global climate, there are two elements of policy that may prevent planning processes from accommodating the global anti-fracking frame. First, Hilson suggests that it is unclear for the purposes of an EIA whether the term ‘indirect’ includes the eventual use of produced gas as a fuel or is limited to off-site emissions used in the production and transport of goods used or disposal of waste generated on-site. Second, and less ambiguously, it seems clear that exploratory applications cannot take the global climate frame into account because any impact on the global climate, including potentially the

gas' ultimate use as a fuel, are primarily associated with the production phase of operations which policy makes clear should be applied for and appraised as a subsequent and separate process (see DCLG 2012, 36, para. 147; see also DCLG 2014, no pagination, para. 27–120).

The second point regarding the phase-by-phase organisation of planning oversight of shale gas development will be returned to in the empirical chapters, and is a key part of one of the 'forms of closure' presented in chapter 5. The first has subsequently been clarified by a High Court ruling in the case between FoE and Frack Free Ryedale and North Yorkshire County Council (FoE/FFR vs. NYCC, Justice Lang 2016) over the latter's granting of planning permission to the company Third Energy for their KMA site near Kirby Misperton, North Yorkshire. One of the grounds of appeal was that NYCC failed to take into account the end-use emissions of the gas as a fuel<sup>8</sup>. Briefly put, indirect effects can in principle be considered by planning processes depending on the details of the case, but the emissions as a result of the end use of gas as a fuel is unlikely to be such a 'reasonably required' indirect effect, primarily because they have already been overseen and accounted for by the EA in their permitting of the power station (see Justice Lang 2016).

Turning from EIAs to the Planning Practice Guidance on minerals (PPGM), Hilson notes that many issues related to the oppositional local frame are to be considered by planning decision-makers. However, there are matters relating to well construction and the control of processes or emissions that are the responsibility of specialist regulatory regimes (the Health and Safety Executive – HSE - and the EA respectively) which planning should assume will operate effectively (see DCLG 2012, 29, para. 122; see also DCLG 2014, no pagination, para. 27–112). Moving onto the global climate change frame, Hilson observes that the PPGM prevents planning authorities from taking into account key elements of this frame. At paragraph 124, the guidance states that "planning authorities should take account of Government energy policy, which makes it clear that energy supplies should come from a variety of sources" (DCLG 2014, no pagination, para. 27–124).

As Hilson concludes:

"This clearly rules out (at any stage) consideration by MPAs [Mineral Planning Authority, the county council in most cases] of the 'eventual use' type of indirect climate change impacts of shale gas adverted to above in discussing EIA/ERA. They have to assume that energy supplies from all sources are equally valid and they are not permitted to consider the reduced greenhouse gas potential of alternative supplies such as renewables or ('demand') of energy efficiency measures" (Hilson 2015, 196).

Hilson finds a similar unreceptiveness to the indirect 'end-use' element of the oppositional global frame in the EAs environmental permitting regime, suggesting that this is because this argument "calls into question government energy choices which are regarded as off-limits for the Agency" (Hilson 2015, 202).

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<sup>8</sup> Third Energy were applying for planning permission for production phase operations at KMA in order to supply their own nearby gas-fired power station at Knapton.

In summary, Hilson suggests that both the planning and EA regimes have limits on the extent to which they can consider the global climate frame. He suggests that although the regimes can register argument concerning direct and some indirect climate emissions, the receptiveness of both to “indirect ‘final fuel use’ emissions from the production stage appears to be at best unclear and, at worst, completely excluded insofar as this might be taken to call into question national government policy choices on energy” (Hilson 2015, 202). Hilson’s findings regarding planning are based on an assessment of EIA regulations and planning policy rather than how that policy is interpreted and implemented at the decision-making ‘coalface’. His findings on the environmental permitting side are based on two early decisions, as well as the draft decisions for the two sites focused on in this study. The present study represents a good opportunity to see if these largely anticipatory, in principle expectations about the ability of regulatory decision-making processes to accommodate key fracking-sceptical frames are borne out in practice.

Cotton suggests that the ‘all out for shale’ policy position adopted by all of the last three UK governments has been a significant driver of UK planning reform (Cotton 2017). He locates that reform within the same recent tradition of the Planning Act 2008, the Localism Act 2011, and most recently the Infrastructure Act 2015, towards streamlining and centralising planning decision-making. Cotton in particular makes reference to the power of the SoS for Communities and Local Government to call-in planning applications and recover planning appeals (see DCLG/DECC 2015), the latter of which occurred in the case considered in this study. Taking an explicitly normative position that affected communities and publics should have the opportunity to participate in decision-making processes, which require their informed consent, Cotton considers moves to curtail opportunities for local deliberation and decision-making control as a form of procedural injustice.

Cotton’s interest, then, in planning processes on shale is in the extent of local community access to and control over decisions. The present study focuses on the forms of closure through which public and expert participation is circumscribed, and how these forms of closure render the process insensitive to certain arguments and matters of concern. In other words, how access is granted but control far from ceded. More specifically it highlights how ‘control’ is to a great extent situated in the broader policy context within which a local planning decision exists – particularly in this case the development of planning and other relevant Government policy. If not total control, then certainly potentially critical conditioning influence is situated at the level of national energy and planning policy formulation with few routes for meaningful public participation. Any public access to decision processes downstream from this is then highly constrained by these prior, remote and largely inaccessible national policy commitments.

Whitton et al. assess and compare opportunities for public participation in the US and UK (Whitton et al. 2017). In the UK, Whitton et al. focus on a shale wealth fund consultation document (SWF) which sets out a vision for the sharing of the economic benefits of shale development with local communities (see HM Treasury 2016). The document makes a clear rhetorical commitment to local participation in

decisions over funding allocation and the spending of proceeds, as well as on decision-making more broadly. They therefore focus on opportunities for participation on decision-making over benefit distribution rather than key prior areas of decision-making such as siting and technology and energy choice. The present study seeks to ask how public participation in decision-making one step back upstream is circumscribed by the conditioning of planning processes (i.e. over the siting of shale development rather than the distribution of benefits once potentially produced by those sites). Furthermore, Whitton et al.'s analysis is limited to an analysis of the prospective participatory rhetoric adopted in a consultation document and so they have relatively little to say about the authenticity of the participatory opportunity. The present study analyses the actual treatment of participants and their arguments in a planning decision-making process. Whitton et al. make some more generic normative claims about the importance of authentic public participation in decision-making for securing the social license to operate and producing environmentally just decisions, and suggest that failing to do so "would likely lead to public opposition, political controversy and eventual planning failure" (Whitton et al. 2017, 17). Finally, they claim that:

"[T]here needs to be adequate public engagement in the processes of assessing both the social and ethical viability of shale gas as a fuel and a technological solution to energy security, climate change and economic growth (a participatory technology assessment process), and for siting new shale gas installations downstream at the point of siting actual fracking wells. If this is not observed, then decision-making will solely reflect the choices of central, institutional actors rather than those that are directly affected" (Whitton et al. 2017, 17).

The present study can be seen as an assessment of whether the rhetorical commitment to the importance of public participation that Whitton et al. identify in the SWF consultation document translates in practice to meaningful opportunities for participation in planning decision-making. As already suggested, the discussion will also address the question of the relationship between unresponsiveness to public arguments at the level of downstream planning siting decisions and the prior national policy level energy and technology choice commitments already made by the UK Government on shale development and fracking.

Finally, Stokes assesses the regulatory strategies employed by the UK Government over shale development and fracking. Stokes identifies two regulatory strategies working in tandem to enable and justify shale development in the UK which she terms 'regulatory domain' and 'regulatory dexterity'. Regulatory domain frames hydraulic fracturing as a regulatory object that is mundane and only incrementally different from prior and more familiar forms of development (i.e. conventional onshore oil and gas extraction). As such, the regulatory focus is on the *coverage* of fracking by generic existing regulation, which is then taken to reflect the *adequacy and efficacy* of that existing regulation and so the lack of need for reforms. The image portrayed is one of reassuring regulatory comprehensiveness and control. Stokes demonstrates how the framing of fracking as an unexceptional regulatory object and the attendant satisfaction with existing regulation is largely selectively applied to matters of health, safety and the environment. In other words, areas relevant to the potential negative impacts of fracking. The envisaged benefits, on the other hand, are treated quite differently with fracking viewed as an exciting,

novel, and even revolutionary innovation requiring an approach of ‘regulatory dexterity’ to unlock them. As opposed to the satisfaction with broad, generic coverage in the domain approach, the dexterity approach identifies specific parts of the regulatory landscape that interfere with, or are insufficiently encouraging to the development of a shale industry. Areas where the dexterity approach has been applied include planning, finance and land access where regulation has been added or changed in order to produce an environment conducive to the speedy development of an industry (Stokes 2016).

Stokes stresses that these two distinct approaches work in tandem in several ways. The selective application of dexterity to realise benefits is in part justified by the approach of domain which promises that risks are covered, and the two approaches help to mask the other’s weaknesses. Stokes also suggests that debate over regulation is flattened, “and fracking becomes difficult to contest on grounds that are not in some way answerable to domain or dexterity” (Stokes 2016, 984). Attempts to shift the debate to public participation in decision-making or human rights, Stokes suggests, are stymied as the dexterity and domain approaches ‘form the regulatory whole’ (Stokes 2016, 984). Finally, both work to encourage development in their inversely selective application. Domain is used to prevent burdensome extra regulation of risk, whereas dexterity enables new regulation or the amendment of existing regulation in order to encourage and remove obstacles to the realisation of benefits.

Stokes concludes that:

“Legal interpretation, therefore, can impact significantly on the nature and viability of particular technological choices – law is not a neutral arbiter of technological outcomes, since ‘domain’ and ‘dexterity’ promote a particular technological trajectory as though there are no sound alternatives. Their straightjacketing effect needs to be subject to critical scrutiny” (Stokes 2016, 985).

Stokes repeats the need for further research, suggesting that “the normative pull of ‘domain’ and ‘dexterity’ towards a particular technological end, deserves closer attention than they have recently found” (Stokes 2016, 986).

Stokes demonstrates how particular framings of fracking as an object of regulation shape the regulation of that object towards operating as a tool for rather than bulwark against the emergence of a shale gas industry. Stokes makes clear that the selective application of domain and dexterity to risk normalisation and benefit realisation respectively is an intentional choice of Government and results in a normative pull towards the establishment of a shale industry. The present study will shed light on some of the consequences for planning decision-making that filter down from the utilisation of these regulatory strategies. Stokes briefly touches upon some of these when listing a series of examples of domain non-interventions and dexterity interventions in planning policy and law. For instance, the domain approach to the risks of fracking leads to “deference to existing rules and suppositions of efficacy” being built into the regulatory structure to some degree (Stokes 2016, 973). Stokes points to the example of the assumption of effective regulation enshrined in planning policy (see DCLG 2012, 29, para. 122; see also DCLG 2014, no pagination, para. 27–112). This assumption of regulatory competence and the deference it requires from planning decision makers is explored in section 5.3 below as the key basis of a form of

closure I term 'horizontal deference'. On the dextrous side, Stokes mentions the recovery and call-in powers already discussed (DCLG/DECC 2015). In short, the present study is an opportunity to explore the consequences of the strategies highlighted by Stokes at the 'coalface' of planning development control.

In sum, work on the planning and regulation of shale development exhibits a concern over the extent to which certain sceptical frames and local publics are accommodated within and are able to influence decisions. Whitton et al. note a rhetorical commitment to public participation on decisions over benefit distribution and more broadly that they argue will have to be maintained and put into practice in order to avoid a deepening of controversy and local resistance to sites. Cotton argues that local community access to and control over decision-making are necessary for environmentally just shale development, but notes that planning reform by recent Governments has tended to travel in the opposite direction toward centralisation. Hilson's assessment anticipates that planning decision processes will be unreceptive to key elements of the global climate frame of fracking opponents. Finally, Stokes identifies a 'normative pull' toward shale development as a result of two distinct strategies of regulation working selectively and in concert, as well as noting some implications of this that filter through to planning decision-making. So far, therefore, there has been some normative argument on the importance of public participation in decision-making, as well as some assessment of opportunities for such participation. This work has so far tended to overlook the fine-detail of how participating publics and their arguments are treated in practice within participatory settings, as well as the full-scale and specific mechanisms of the constraining influence of prior commitments at the broader level of Government policy. Furthermore, the focus has tended to be on public participation, with conditioning influences curtailing the role of expertise and scientific knowledge in decision-making largely overlooked. Stokes' approach is slightly different, instead focusing on two distinct strategies of regulation and how in the case of fracking their selective use gears the regulatory task toward risk normalisation and benefit realisation resulting in a 'normative pull' toward shale development. The present study fleshes out how these regulatory strategies filter through to and shape planning decision-making processes, which in turn further entrench the normative pull toward shale development – or as this study terms it the production of justification for shale development - by closing-down opportunities for and receptiveness to sceptical publics and analysis.

## 2.4 THEORY, CONCEPTS AND LITERATURE SUMMARY AND IMPLICATIONS

This chapter started by considering three normative theories of decision-making and their critiques. Two consistent concerns were identified. First, the potentially illegitimate and distorting role of power in decision-making was identified as a key concern because the regulation of power was a central purpose of these models' normative prescriptions. Second, possible frontstage/backstage dynamics between the actual basis of selection and the subsequent process of decision justification were also identified as a key concern. A recurring concern amongst critics was that as well as failing to provide effective bulwarks against power, these models could operate as tools for power by offering powerful interests misleading 'presentational' means of justification for preferred outcomes actually selected for typically less acceptable reasons. The exception here was the partisan model, though only through attempting to legitimise dubious means of decision selection, whilst offering no viable means of public justification.

Section 2.2 then turned to the concept of justification. Two varying approaches to that concept were explored. First, the approach to justification as a 'constraining force' was considered through the work of Boltanski and Thevenot. Next, the work of Stirling was the focus in an elaboration of the view of justification as a political resource or tool. It was argued that the key theoretical concerns established in section 2.1 necessitated adopting this latter, more sceptical conceptualisation. Most importantly, the apparent unwillingness to grant actors the capacity to act strategically in situations of public decision-making rendered Boltanski and Thevenot's account both unduly restrictive to analysis and politically naive. Stirling's alternative, on the other hand, holds open the possibility of a role for both strategic action and inadvertent biases in decision-making; offers an account of how justification as a tool or political resource is produced through the conditioning of analytic and participatory appraisal processes; and, finally, clarifies that such processes can be undertaken and presented in ways that acknowledge and interrogate ('opening up') rather than conceal and reify ('closing down') such susceptibilities.

Finally, section 2.3 surveyed the relevant literatures. The literature on 'framing fracking' demonstrates the diversity of ways that fracking is framed by distinct groups, and many authors point to divergence between the views of policy and industry actors on the one hand and publics on the other. This divergence gives rise to concerns over the extent to which decision-making processes marginalise or accommodate and address public views. The 'closure through planning' literature highlights several forms of closure that have prevented both public and expert arguments from being voiced or taken seriously within planning appraisal processes, which in many cases were as a result argued to be geared towards the legitimisation of particular forms of development. The literature considered in section 2.3.3 bridges these two sets of insights by considering the necessity and capacity of planning and regulatory appraisal processes on fracking in the UK to accommodate sceptical public views. As already noted, though, this work has tended to overlook the fine-detail of how participating publics and their

arguments are treated in practice within such processes, the extent and mechanisms of the crucial influence of prior commitments at the broader level of Government policy, and the treatment of experts and their arguments in such processes.

The subsequent empirical chapters of this thesis therefore follow on from the theoretical concerns, conceptual commitments, and existing insights and remaining gaps in the relevant literature established throughout this chapter. As such, of particular interest is the conditioning of planning decision-making processes on fracking in the UK and the extent to which they are geared towards opening up specific proposals and broader policy to scrutiny and influence from publics and experts. Or, on the other hand, whether the participation of these groups is curtailed in such a way as to position these processes as sites that enable and justify specific developments and produce justification for Government policy more broadly. As will be detailed in the following chapter, these questions will be explored through the case of the company Cuadrilla's applications to drill and frack a total of eight wells at two sites in the Fylde region of Lancashire. Of particular empirical focus will be the planning inquiry held to consider Cuadrilla's appeals against LCC's initial rejection of these applications, and the participation and treatment of the arguments of the environmental NGO FoE throughout that process.

### 3. METHODOLOGY

The previous chapter established planning decision-making over shale development in the UK as fertile ground for generating insights into the production of justification through the closure-oriented design and conduct of decision-making. Section 3.1 of this chapter starts by setting out how this case came to be studied and the rationale behind the field-site selection (i.e. the inquiry). Also included is a brief guide to the inquiry. In the following section, the concept of retroduction is introduced and then my particular approach to retroductive explanation and theory extension is presented. Leaving the *theory* of method, 3.3 covers the *practice* of method. Included here are sub-sections on both the methods of data collection and the approach to analysis. Finally, the process through which the study's research questions were both developed and answered is summarised, and the research questions formally stated.

### 3.1 THE FIELD-SITE

The research process began with an 'intrinsic interest' in the fracking controversy (Stake 2008). An initial research design dependant on the emergence of a physical field-site of protest within the fieldwork time window (early 2016) had to be revised due to delays in fracking companies receiving planning permission for projects throughout 2015. In particular, LCC somewhat unexpectedly refused Cuadrilla permission for the PNR site in June 2015 against the recommendation of their planning officer. There were also delays in the planning process for sites belonging to the companies Third Energy and IGas around this time. These sites of protest would of course eventually materialise in 2017. However, for the duration of my fieldwork period the fracking controversy had become stuck in the planning system. What emerged instead of field-sites of protest during this period therefore were field-sites of planning and regulatory decision-making and public and expert participation therein. The most extensive of these decision-making processes during this period was the public inquiry over Cuadrilla's appeal against LCC's decisions to refuse their sites at PNR and RW planning permission, which took place in February and March 2016. Although some general themes of interest carried over from the previous iteration of the research design (such as an interest in public participation in socio-technical controversies), fieldwork was approached with an open mind and a largely blank slate (i.e. with little thematic or theoretico-explanatory pre-specification) and conceptual and analytic development took place subsequently.

The major rule 6 parties at the inquiry were Cuadrilla (the Appellant), the North and Western Lancashire Chamber of Commerce (CoC, both in favour of the appeals), LCC (defending their initial decision to refuse), and the local community groups Preston New Road Action Group (PNRAG) and Roseacre Awareness Group (RAG, all against the appeals). Rule 6 parties are interested parties with a substantive case and rule 6 status is granted on request by the Planning Inspectorate (The Planning Inspectorate 2016). Each of these groups puts together a case across various issues based around the evidence of expert witnesses. The main issues covered at the inquiry were noise, traffic and highway safety, landscape and visual Impact, climate change, waste management, public health, economic impacts, and the correct planning approach to decision-taking. Prior to the inquiry each witness submitted their case in writing in a document referred to as a Proof of Evidence (PoE). PoEs set out a view as to the acceptability of the proposal and expressed the grounds on which this view was based. Witnesses also had the opportunity to rebut the Proofs of rival witnesses.

The inquiry was held in a conference room within the stadium of Blackpool Football Club. The rule 6 parties were arranged in a horse-shoe shape with the Inspector sat at the top, the parties in favour of the appeals to one side, and those against to the other. Immediately either side of the Inspector were two tables where witnesses would sit when they took the stand, when they would sit on the far side from whoever was questioning them at the time. Opposite the Inspector were rows of seating from which an audience of interested members of the public, the media and the odd PhD student could

observe proceedings. Each rule 6 party employed a barrister and legal teams of varying sizes (with the exception of the CoC who made do with a lay advocate). It was these barristers in combination with the expert witnesses who produced the vast majority of the content of the inquiry. The inquiry began with each barrister reading out their party's Opening Statement – their case as it stood on day one of the inquiry. Then came the main body of the inquiry which involved each party, one-by-one, calling their witnesses to put their case. Each witness went through several stages. First, Evidence in Chief (EiC) saw a witness' own barrister ask them to state the key points of their case. Second, Cross-examination saw hostile questioning from barristers of parties who had a different view from the witness on a particular point. For instance, Cuadrilla's planning witness, Mark Smith, faced cross-examination from the barristers of LCC, PNRAG, RAG and FoE. However, not all of these barristers were interested in the same issues. PNRAG focused on the PNR site and RAG the Roseacre site, whereas FoE focused on distinct issues. In a third stage of proceedings that was in truth rarely taken up, interested persons in the public audience who had registered an interest to speak were invited to ask a relevant question of the witness if their point had not already been put by one of the barristers in the course of cross-examination. The fourth stage of Re-examination saw the witness' own barrister re-question them with a view to clarifying answers that might not have been clear in the heat of cross-examination. In the final stage of the main body of the inquiry, Inspector's Questions, the Inspector directly asked the witness questions. This entire process was then repeated for each witness. At the end of the inquiry each party's barrister presented their Closing Statement – their case as it stood at the culmination of proceedings. Four public sessions were also held where interested members of the public could make a representation before the Inspector. These slots were limited to five minutes, and these sessions have not been focused on here. Subsequent to the inquiry, the Inspector considered her recommendation and compiled her report, which was submitted to the SoS by a deadline of July 4 2016. The SoS then made his decision, which was published along with the Inspectors report on October 6 2016 (see DCLG 2016; McKay 2016).

*Table 2: The inquiry protagonists relevant to the issues focused on here*

<b>Planning Inspector</b>	Wendy Mackay
<b>LCC's planning officer for initial decision</b>	Stuart Perigo
<i>Cuadrilla</i>	
<b>Barrister</b>	Natalie Lieven QC
<b>Planning expert witness</b>	Mark Smith
<i>FoE</i>	
<b>Barrister</b>	Estelle Dehon
<b>Planning expert witness</b>	Richard Bate
<b>Climate Change expert witness</b>	Professor Kevin Anderson

<b>Waste Management expert witness</b>	Alan Watson
<b>Public Health expert witness</b>	Dr David McCoy
<i>LCC</i>	
<b>Barrister</b>	Alun Evans
<b>Planning expert witness</b>	Katie Atkinson
<i>CoC</i>	
<b>Advocate</b>	Peter Whitehead
<b>Economic impact expert witness</b>	Babs Murphy

The decision was to be taken in accordance with the development plan unless material considerations indicated otherwise, as enshrined in section 38(6) of the Planning and Compulsory Purchase Act 2004 (HM Government 2004). In this case the ‘development plan’ was comprised of a suite of local policy, namely the Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD (The Joint Advisory Committee for Strategic Planning: Lancashire County Council; Blackpool Council; Blackburn with Darwen Council 2009), the Joint Lancashire Minerals and Waste Local Plan Site Allocation and Development Management Policies (The Joint Advisory Committee for Strategic Planning: Lancashire County Council; Blackpool Council; Blackburn with Darwen Council 2013a; The Joint Advisory Committee for Strategic Planning: Lancashire County Council; Blackpool Council; Blackburn with Darwen Council 2013b) and the Fylde Borough Local Plan (Fylde Borough Council 2005). In the event, Cuadrilla did argue, unsuccessfully, that material considerations indicated that the decision should not be made in accordance with the development plan but directly with the National Planning Policy Framework (NPPF) instead. However, this procedural argument had no bearing on the issues considered here and so the reader will be spared the detail. Decision-taking is a matter of assessing whether the proposed development is in accordance with the prescriptions of the development plan and whether material considerations support or militate against the granting of permission. Material considerations are ‘weighed’ through a heuristic method known as the ‘planning balance’ whereby considerations are found to be weighing in favour of or against the development and given a notional weight. For instance, in the case of PNR, the SoS found that the national need for shale gas exploration was a factor of ‘great weight’ in favour of the proposals whilst the modest local economic benefits were attributed ‘little positive weight’ (DCLG 2016).

## 3.2 THEORY OF METHOD

### 3.2.1 RETRODUCTION

In spite of the relatively linear way it has been presented here, the research process was in fact highly iterative with the theoretical concerns, and conceptual and analytic approaches developed largely after, and in part stemming out of the fieldwork. In other words, the sequence of research did not fall neatly into a deductive form – the identification of literature gaps and theoretical interests, the development of research questions, then entering the field followed by analysis and writing. Instead, the sequencing and rhythms of this research more closely resembled an approach to research known as either ‘abductive’ or ‘retroductive’. The purpose of structuring and presenting the thesis in a more conventional sequence is not to mislead, but simply for clarity of argument. This sequencing of the research process was, in truth, dictated by events as much as being the product of design. However, the ‘retroductive’ approach detailed in this section is in any event my preferred approach to research.

In setting out their ‘retroductive’ approach to developing and testing critical explanations of the social and political, Glynos and Howarth begin from a critique of positivism in the social sciences (Glynos and Howarth 2007). Their issue here is with any straightforward transposition of deductive reasoning, the hypothetico-deductive method of scientific investigation, and the covering-law model of explanation from the natural to the social sciences. The starting point for their scepticism is the failure of social scientists to predict major social, economic and political events. Glynos and Howarth problematise, therefore, the central and elevated position of prediction in deductive reasoning and the law-like approach to explanation when it comes to studying social and political phenomena. In an idealised model of science, prediction plays a crucial role in justifying theories and explaining facts. Put simply, theories are corroborated or falsified by deducing predictions from them and testing these expectations against empirical observation, and these observations are explained wherever they conform to law-like expectations derived from theory. Explanation and prediction differ only in terms of whether we stand before or after the fact (i.e. a prediction is a proto-explanation awaiting corroboration, an explanation is a prediction that held). The task of explanation in the natural sciences is thus preoccupied with the *context of justification*. That is, the rigorous testing of a theory-derived hypothesis against empirical observation, where corroboration of law-like statements amounts to explanation. The important question is therefore not ‘how did you find your theory?’, which on this view of science is irrelevant, but ‘how did you test your theory?’ (Popper 1961).

What is neglected therefore is the question of where theories come from, or the *context of discovery*. In fact, the deductive account tends to view discovery as a matter of psychology (Popper 1980, 31), or serendipity. How the theory arises (*discovery*) is subordinated to its rigorous testing through the scientific method (*justification*). In the natural sciences, theory construction has been associated with

retroductive reasoning by some. For the American pragmatist philosophers of science, Norwood Hanson and Charles Sanders Pierce, casting theory construction as a-rational as Popper does is not satisfactory. They instead suggest that theory-construction in the natural sciences occurs through ‘retroduction’ (or ‘abduction’), which Pierce describes as a matter of “studying facts and devising a theory to explain them” (Pierce 1934, 145). Theory building, Hanson suggests, starts from data and sets about the struggle for intelligibility from there (Hanson 1961). Retroductive reasoning, in other words, starts with empirical observation and then works backwards in the search for plausible hypotheses. Retroduction is therefore problem-driven in the sense that it begins with surprising (i.e. not predicted) empirical observations that call for explanation and theorising. Put another way, the task of explanation necessarily entails new theorising because the surprising fact is not covered by existing theory-derived predictions (hence the need for a new explanation). Once retroduced in this way, a theory’s explanatory power is then tested through deduction. As already seen, theories explain phenomena to the extent that expectations deduced from them predict those phenomena (the covering-law model of explanation). In this way, testing theories and explaining remain tied to prediction, and retroduction is limited to constructing theory. As Glynos and Howarth put it, “a positivist conception of testing and explanation is committed to the ideal that a hypothesis is detachable from the context of its discovery, enabling efforts to be directed primarily at the context of its justification” (Glynos and Howarth 2007, 35).

Glynos and Howarth extend this notion of retroduction along two dimensions. First, they seek to extend retroduction’s utility from the task of building theory and the context of discovery to the task of explanation and the context of justification (i.e. testing and accepting hypotheses). Second, they seek to extend its relevance to social and political inquiry. They suggest that “the form of reasoning involved in positing a hypothesis and the form of reasoning involved in accepting a hypothesis cannot be differentiated so starkly in the a social science context” (Glynos and Howarth 2007, 27). This, according to Glynos and Howarth, is because of “the centrality of self-interpretations in the social world; the relevance of context in attributing sense and significance to data against which hypotheses are tested; as well as the contestability of the ontological presuppositions necessarily brought to bear when self-interpretations and data are subjected to interpretation” (Glynos and Howarth 2007, 36). In other words, any attempt to explain an actor’s behaviour in a given situation necessarily makes a series of assumptions about how the actor themselves interprets that situation, and there may well be a diversity of equally reasonable ways of interpreting the same situation based on various positions and worldviews. Given the variable, evolving and complex nature of social contexts, no theory can be expected to cover the full range of these interpretive possibilities. Theory is likely to be especially neglectful of this full range of interpretive possibilities where theory construction has largely been a matter personal intuition on the part of the researcher (as in the case of the deductive view in the natural sciences).

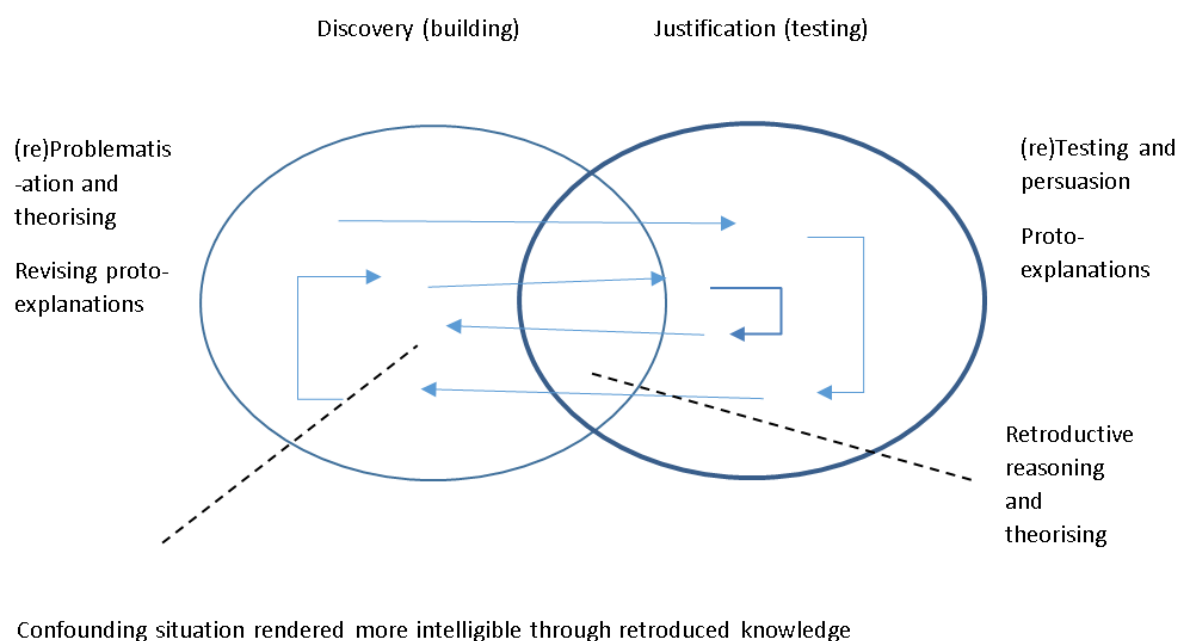
Instead of the stark separation of the contexts of justification and discovery, Glynos and Howarth argue for three moments of social science practice linked together in a recursive cycle, where the boundary

between discovery and justification is scrambled. They are: 'problematisation'; 'retroductive explanation and theory construction'; and 'persuasion and intervention' (Glynos and Howarth 2007). For Glynos and Howarth retroduction begins with a confounding or problematic situation - an observed anomaly which begs inquiry and explanation. It is therefore problem-driven and backwards working (when compared to 'positivist' deduction which goes the other way, from theory to observation). The initial observation of an anomalous or unintelligible phenomena kick-starts a recursive 'circle'. As Glynos and Howarth put it:

"Work is then started on furnishing an explanation that can render the recalcitrant phenomenon more intelligible. This process is understood in terms of the logic of retroductive explanation and theory construction, which involves a to-and-fro movement between the phenomena investigated and the various explanations that are proffered. In this way, an initially chaotic set of concepts, logics, empirical data, self-interpretations, and so on, at varying levels of abstraction, are welded together, so as to produce an account which, if it removes our initial confusion, can constitute a legitimate candidate for truth or falsity" (Glynos and Howarth 2007, 34)

The task of explanation is to render a confounding situation more intelligible in comparison to existing explanations. An explanation is valid if it produces insights and greater illumination according to criteria (e.g. concerning evidence, consistency, exhaustiveness, etc.) where these criteria are themselves contestable. Testing the validity of explanations also encompasses practices of persuasion aimed at both the scholarly community and the actors being studied. Unlike the deductive approach then, where testing is a matter of falsifying or corroborating theory-derived predictions, testing becomes a matter of whether the explanation renders the situation more intelligible, not only in accordance with the researcher's internal criteria but to external audiences too. Finally, the subject matter of this persuasion extends beyond the explanation itself to also include how the problem was characterised, and so implicating practices of discovery (problematisation, theorising) in processes of testing and persuasion.

Figure 1: Post-positivist retroduction (adapted from Glynos and Howarth, 2007)



For Glynos and Howarth this means that justification is no longer merely a methodological issue (*how did you test your theory?*) but now potentially covers ontological, political and ethical issues as well. These attempts at persuasion are both instrumental and constitutive. In other words, the purpose is to persuade audiences that the explanation is correct, but any failed attempt at persuasion can result in a recasting of the problem, a theoretical revision, or a new awareness of an actor's interpretative viewpoint not previously considered, which can then be fed back into another circumnavigation around the retroductive circle. In this way, the tasks of building theory and deriving and testing explanations are no longer neatly separated and sequenced, but are now scrambled and shot through a recursive process (see figure 1).

In sum then, the process of research starts with an empirical problem that the researcher casts in a particular way and sets about trying to explain. This task of explanation involves a cycle of to-and-fro movements between theory and the empirical case. Candidate or proto-explanations can be extracted from theoretical insights and academic literature or come from the case itself. Testing these proto-explanations involves assessing the extent to which they render the situation more intelligible against internal and external checks. The problematisation and theorisation that led to the explanations also require justification. Finally, any testing and persuasion failures furnish the research process with insights to feed back into the cycle. The previously separate contexts are now scrambled as the question '*how did you find your theory?*' requires an answer and the empirical case becomes a potential source of theoretical discovery rather than merely a yardstick against which to test predictions. Retroduction, in Glynos and Howarth's hands, becomes a method for recursively developing and testing explanations of the social and political. The expectation is that the first few attempts at explanation will fail, which will give rise to new problematisation and theorising. In this way, a recalcitrant situation goes in, and an explanation that renders it more intelligible comes out. For this reason, Glynos and Howarth's term 'retroductive circle' is potentially misleading given that the aim is not to end up in the same position one started in (with an unintelligible problem). The desired movement is arguably more accurately described as a spiral.

Having set out the process of retroductive explanation, Glynos and Howarth are relatively permissive about the possible content of explanations. They suggest that these explanations may involve contextualised self-interpretations (e.g. hermeneutics), causal mechanisms (e.g. critical realism) or logics (their own poststructuralist unit of explanation). In fact, the only rule is that explanations cannot accommodate entities that entail universal subsumption. In their words, explanations that aspire "to maximise the context-free status of causal laws (by discovering or approximating 'natural laws of society') or empirical generalizations (by transforming them into 'probabilistic generalizations of society', whether causal or correlational)" (Glynos and Howarth 2007, 41).

### 3.2.2 MY APPROACH

The key attraction of retroduction is its recursive nature. The assumption is that proto-explanations will be confounded the first few times around by failing to account for the situation against internal criteria or failing to persuade external audiences thus giving rise to new theory building more attuned to the context. Glynos and Howarth are not explicit about retroduction tending toward more context-attuned theorising and explanation. However, this seems a likely consequence of their approach especially where actor self-interpretations yield explanations or failed attempts to persuade a studied community give rise to a new round of problematisation and theorising. This suggests that the process spirals in towards producing better, more context-attuned explanations in a centrifugal movement. What I take from Glynos and Howarth's retroduction is the recursive to-and-fro between heterogeneous elements - existing theory, case details and actor interpretations, failed proto-explanations, and new problem framing and theorising - honing in toward an explanation that renders the situation more intelligible and more context-attuned, refined theory.

It should be noted that the approach taken here represents a marginal variation of Glynos and Howarth's approach in a couple of ways. First, the hermeneutic insight and the self-interpretations of actors are less central here. The central task of the thesis became accounting for the near total failure of FoE's case at the inquiry. Of course, the perceptions of the actors involved over why FoE's arguments failed would have yielded interesting material, but this was not relevant to the focus here. As well as the clearly identifiable instrumental outcome of the decision, the focus here was on the expressive side of public decision-making. That is, the publicly viewable demonstration of good decision-making in action. As such, what mattered here was explaining the failure of FoE's arguments as it was publicly on display, rather than garnering actor self-interpretations on why or how this had happened. This remoteness of self-interpretations to the focus of the study was reinforced by the type of forum being studied, and in particular the style of speech therein. The formal, disciplined and precise form of discourse at the inquiry left relatively little bandwidth for interpretative plurality, and where such scope did exist any difference in interpretation between parties (say, over the meaning of a passage of policy) was rendered explicit for all to see. Part of the point of cross-examination is to clarify the disagreement between parties. The hermeneutic minimum requirement (that the self-interpretations of actors should be taken into account) has therefore not been violated but for the reasons given here actor self-interpretations take a back-seat. The relevant self-interpretations here are the case that FoE considered persuasive or worth voicing, the difference in views with rival parties highlighted through cross-examination, and the judgements of the Inspector and SoS over who won the argument. In other words, what matters here is the relevant parties' cases and the decision reasoning as stated, and not the actor reflections on the process that might have been gleaned through interviewing.

Second, the approach taken here is more tilted to generating an explanation than building theory. The study has occurred at a relatively shallow level of abstraction. Therefore, although the study has been

inspired by and made use of theory as a key input to the retroduction of an explanation, the notion that this study has ‘built theory’ is somewhat grandiose. The key theoretical insight influencing the research comes from Stirling’s conceptualisation of justification. The approach has been more to extend or build on this insight, rather than construct theory in any more expansive fashion. By theory extension I mean taking a conceptual insight abstracted from a particular case or at least with a particular empirical context in mind and testing whether it is productively illuminating in a different case. The ‘foreign’ insight is translated to other contexts to see if it guides and informs the generation of an explanation if only as a starting point on the way to a more context-attuned explanation. The expectation is that as well as the insight helping to render the situation more intelligible, the translation of the insight to a new context will entail an at least partial transformation of the insight. In other words, putting the insight to work in a new context will likely ‘extend’ it in various ways. The point then is to put relevant ‘foreign’ insights ‘at risk’ in an encounter with a new context to see both whether it helps to render the situation more intelligible and whether exposing it to a new empirical context necessitates the modification or qualification of the insight itself. Therefore, the process produces both an explanation inspired by both theory and empirical details and ‘extended’ or ‘translated’ (and thus partially transformed), more context-attended theoretical insights. These extended theoretical insights might possibly be subsequently translated or extended to other contexts or cases as the process starts afresh. The ways in which the concept of justification can be said to have been ‘extended’ as a result of being put to work in this particular case are discussed in section 6.2 of the discussion.

Third, and related to the above, there is a slight difference in emphasis when it comes to the approach to theory and theorising taken here. The role of the normative decision-making theories reviewed in section 2.1 has been to highlight consistent academic concerns over decision-making, which in turn led to a sceptical conceptualisation of justification (section 2.2.2). The role of what has here been called theory (the normative models of decision-making) was neither theoretico-explanatory nor foundational-evaluative. In other words, the reviewed models did not directly contribute towards the generation of an explanation and nor were they used as a normative foundation against which to assess decision-making. The purpose of these models was to guide the framing of the research problem and so help to justify the task of problematisation. The role of theory here has therefore been more akin to that of a ‘guidebook’. That is, it helped to direct and bound the focus of inquiry towards what was interesting and important in the case and the questions that ought to be asked of it. In this case, theory pointed towards the regulation of power, interests and strategy, and scope for frontstage-backstage dynamics in decision-making. This contribution to problematisation also informed the particular conceptualisation of justification adopted here. It is Stirling’s rendering of justification, which has been referred to as a concept here, that has acted as theory does in Glynos and Howarth’s postpositivist take on the theoretico-explanatory role of theory. In other words, it has gone beyond the identification of broader interests and ‘problems’ to furnish the analysis presented here with the explanatory resources to render FoE’s failure more intelligible.

The structure of the thesis potentially gives the impression that this problematisation and theorising occurred in a bloc and prior to fieldwork, but, as has already been said, this was not the case. The identification of consistent anxieties over the regulation of power, interests and strategy and frontstage/backstage dynamics in the theoretical debates and the commitment to a sceptical conceptualisation of justification all occurred after fieldwork. This theoretical and conceptual development occurred in a dialectic with my initial and emerging interpretations of the empirical material through which proto-problematisations and –explanations were cycled through. Initial problematisations were driven by the vague question ‘what is interesting or problematic here?’ and eventually honed-in on the question of the near total failure of FoE’s case having gone through several revisions. In other words, the theoretical interests and conceptual commitments were shaped by early engagement with the empirical material, and subsequent analysis of that material was then shaped by those interests and commitments.

Fourth, the concept of a ‘case’, only briefly touched upon in Glynos and Howarth’s account, plays an important role here. Their discussion of testing explanations occurs at a largely abstract level and possibly overlooks the extent to which a particular empirical context or case can influence and inform the retroductive cycle in ways not quite captured in their discussion of actor self-interpretations. This role of concrete contextual detail is better captured in the methodological theorising of Bent Flyvbjerg (Flyvbjerg 2001; Flyvbjerg 2006). Flyvbjerg’s positive advocacy for ‘phronetic’ social science – much like Glynos and Howarth – starts with a critique of ‘epistemic’ social science (understood strictly as rule-based, context-independent, ‘explanatory’ and predictive). Flyvbjerg’s phronetic approach is geared more towards understanding and learning than ‘explanation’ (in the positivist version of the term Flyvbjerg problematises). Flyvbjerg’s approach privileges particular contexts over the abstract or general and aims at stimulating broader reflection on questions of power, values and direction rather than making predictions.

The notion of the ‘case’ is central to his approach. Case studies, according to Flyvbjerg, can enable a researcher to “‘close-in” on real-life situations and test views directly in relation to phenomena as they unfold in practice” forcing researchers to revise “preconceived views, assumptions, concepts and hypotheses” (Flyvbjerg 2001, 82). What emerges from the process for Flyvbjerg would not be ‘theory’ or ‘explanation’ but learning, reflection and understanding, though I sense Flyvbjerg would not object to Glynos and Howarth’s post-positivist notion of explanation as rendering a situation more intelligible. Flyvbjerg’s call for a ‘closeness’ to the empirical details of the case fits in nicely with the retroductive approach in ways not fully emphasised by Glynos and Howarth. Although they talk of a to-and-fro movement between theorising and testing, Glynos and Howarth are not clear about the to-and-fro movement between abstract insights and case details this entails. The case is not only a problematic situation requiring explanation but a key resource for the generation of that explanation. Case details are the yardstick against which the explanation will be tested (are they rendered intelligible?), and a reservoir of insights to feed into problematisation and theorising. Furthermore, it is the interaction

between theoretical insight and case detail that produces the explanation. That is, the testing of whether the insight productively illuminates the situation, and the extension or adjustment of the insight where it doesn't quite fit with the fine-grain detail of the new context. In other words, not only is the case crucial to both discovery and justification, it is also crucial to the process of deriving a context-attuned explanation from a 'foreign' insight.

Fifth and finally, testing was largely introspective and so did not involve practices of external persuasion. This is not necessarily an unacceptable violation given that Glynos and Howarth give the impression that these practices of persuasion – whether to an academic audience or the actors being studied – do not have to occur within each research project but could occur over a longer time-frame. For example, one of the primary mechanisms for presenting explanations to the scholarly community for testing and persuasion is through the publication of work. This, of course, typically occurs at the end of the process but could still yield insights that might be fed back into problematisation and retroductive theory building and explanation in future projects. Hence retroduction, including practices of persuasion, might span several research projects rather than necessarily being neatly contained within projects. This means, in other words, that practices of external persuasion do not necessarily need to have occurred at the point of presenting this thesis. The testing of the explanation presented here against internal criteria will be discussed in section 6.4 below, as will the problematisation and theoretical commitments underpinning it.

The process of arriving at the analysis presenting in this thesis through the modification of Glynos and Howarth's retroductive approach just presented will be discussed in section 3.3.2 below. This will involve an account of the various revisions to the way the research problem was constructed, the various sources of insight that fed into theory extension and explanation generation, and the iterative process of refining research questions in response to the testing of early proto-explanations.

In sum, Glynos and Howarth transform retroduction as they transpose it from natural to social science. Most notably they extend retroduction from being limited to the generation of theory and hypotheses ('the context of discovery'), as it conventionally is in the natural sciences, to also being implicated in testing the explanatory power of that theory in specific situations ('the context of justification'), scrambling these two contexts in the process. Theorising and building on the one hand, and explaining and testing on the other, now go together, with theorising tested as it is built and every failed test giving rise to a new round of building. The approach taken here differs in emphasis if not kind in a couple of ways to Glynos and Howarth. First, the self-interpretations of actors are important but only in the relatively specific ways discussed as a consequence of both the framing of the problem and the details of the case. Second, the approach is primarily geared toward the generation of an explanation, and has a secondary interest in 'theory extension'. Third, there is a distinction between what has here been referred to as theory – which guided and justifies problematisation – and what has been referred to as a conceptual insight – which was the theoretical input to the retroduction of an explanation. Fourth, the

notion of the case, and the role of case details in justification, discovery and deriving a context-attuned explanation from a 'foreign' insight was emphasised. Fifth and finally, the exclusively internal approach to testing was defended.

### 3.3 PRACTICE OF METHOD

#### 3.3.1 METHODS

The practical methods of data collection employed were simply those that allowed the arguments, treatment and fate of FoE's case to be followed. This involved participant observation, video analysis and document analysis. The inquiry was held in Blackpool between Tuesday 9 February and Wednesday 16 March 2016 and was attended in full. During the inquiry, time-stamped notes were taken on the key points of the parties' cases as proceedings unfolded. Audio recordings of the proceedings were captured by myself. Cuadrilla arranged for a video feed of the inquiry to be livestreamed over the internet and these recordings were downloaded and kept for analysis. After the inquiry, notes were consolidated into an outline of the case of each party and the key arguments over each issue. After the analytic approach to explaining the failure of FoE was settled on (see the following section for an account of how this was arrived at) the time-stamped notes were used to identify all relevant periods of the proceedings where the issues of climate change, public health, waste and economic impacts were debated. All of these sections were then watched back. Using Nvivo the videos were selectively transcribed, with key passages being transcribed verbatim and in full and less significant sections summarised in note form.

Documents were then put together that charted the entire debate over each of the issues focused on, where each issue was split into sub-issues covering three identified levels of debate – procedural, epistemic, and substantive (although not all issues entailed debate at all three levels). These began with the planning inspector's report to the LCC committee that initially rejected the applications at the end of June 2015. Following this, the arguments of the relevant parties on the particular issue from their pre-inquiry documentation were summarised. This included the PoEs of each of the relevant party's witnesses, as well as these witnesses' rebuttals of each other's proofs. Then, the particular issue-relevant arguments from each party's opening statement at the inquiry were covered. Following this were the selectively transcribed passages and notes from the video recordings (the back-up audio recordings had to be relied upon in a couple of cases where the sound quality of the video recording was too poor, in one case where there had been an error in downloading the video, and in one case where there was a gap in coverage of the inquiry between the end of one video and the beginning of the next). Finally, after the closing statements of each party, the Inspector's recommendation and reasoning and the SoS's decision were summarised.

Wherever oral or written evidence made reference to an external document, the relevant section of that document was also analysed. In other words, the bounding of relevance of documents was largely carried out by the inquiry participants themselves. In some cases document analysis went beyond this inquiry-set boundary – particularly in the case of the epistemic contests over the estimates of both methane emissions and flowback fluid volumes. This was because it became clear that the inquiry had

not scrutinised these issues closely therefore necessitating an assessment of the detail that had been overlooked by this cursoriness. This also reflected the fact that whilst substantive contests hinged on the Inspector's judgement of the balance of the evidence before the inquiry, and procedural contests referred to intentionally highly codified and authoritative documents (e.g. planning policy), these epistemic contests referred to the altogether messier and more contradictory worlds of academic climatic and geological science literatures.

The purpose of these summaries was to establish precisely what each party argued, how they stated their case, and how they responded to their rivals' arguments; and to chart how the debate over the issue unfolded throughout the inquiry. Each of these summaries was then written up into a descriptive account of how each issue was debated and resolved by the inquiry. These descriptive accounts ultimately became chapter 4 of this thesis.

This combination of naturalistic methods was deemed to be sufficient for the purposes of this research without the need for triangulation with other methods, for instance interviews with those involved in the process studied. This is connected to the point in the previous section about actor self-interpretations. The focus here is on how FoE's case was dismissed by the Inspector and the largely procedural mechanisms through which this closure was achieved. Therefore, participant ideas about why FoE's case failed of the sort that could be generated through interviewing were not necessary. The case that FoE thought worth attending the inquiry to voice and the explicit reasoning of the Inspector in rejecting this case were sufficient for this study's focus.

### 3.3.2 ANALYSIS

Defining the near total failure of FoE's case as the research problem requiring explanation was the culmination of a process of retroductive reasoning as described earlier in this chapter. As such, the analytic approach went through several revisions. Arriving at FoE's failure, of course, was only possible subsequent to the publication of the SoS's decision and Inspector's report on October 6<sup>th</sup> 2016, because prior to that it was not known that FoE had indeed failed.

The entire backstory of the cycles of research problem framing and explanation generation and testing will not be fully restaged here as a full account would run to several pages and involve the repetitive description of a series of marginal revisions. The key shifts, though, will be briefly documented. The interest in the concept of justification was initially explored shortly after the conclusion of the inquiry and was spurred on by the initial impression that depending on the Inspector's judgement, there was scope to defend both allowing and dismissing the appeal. Stirling's approach to the concept of justification allowed processes of appraisal to be seen as potentially the means to produce justification for particular outcomes, and described the mechanisms through which this can occur (the design,

implementation and interpretation of such processes). Already at this point initial impressions of the empirical material made it obvious that if the Inspector was going to side with Cuadrilla on the issues that FoE pursued at the inquiry then this would likely entail procedural closure. These initial impressions highlighted, for example, the possibility of deferring to the Government view on the climate sustainability of shale gas, assuming consummate future regulation of public health, and defining waste as a matter for the EA.

Initially then, at this pre-decision stage, the key questions were about the possible grounds on which resolutions might hinge (e.g. procedural materiality or epistemic credibility) and how the broader design and structure of planning oversight in general might shape the issues and debates that could be accommodated. In other words, I was interested in the grounds on which an argument might be accepted or rejected and how this might be shaped by the rules and norms of the process. To reiterate, the view was that depending on the particular interpretation of policy or evidence there was scope for the Inspector to resolve many arguments either way. A conceptual repertoire of terms began to emerge in order to describe the treatment of arguments – ‘claims’ or ‘arguments’ were put forward by parties as part of a ‘contest’ with rival parties which called upon an ‘adjudicator’ to ‘resolve’ which arguments would succeed or fail. Linking this back to the interest in Stirling’s work was the suspicion – shared by many participants at the inquiry at the time – that the prospects of success or failure at the inquiry (of claims and arguments but also cases and parties more broadly) might be conditioned in various ways. At this point, prior to the Inspector’s reasoning and the decision being known there was also an interest in the inquiry’s capacity for ‘opening up’. Also at this point, the work of Boltanski and Thevenot was engaged with but rejected as the conceptualisation of justification to be used here for the reasons detailed in section 2.2.

An early iteration of the research questions drew an analytic distinction between the closure of arguments as determined by policy (e.g. particularly clear policy prescriptions such as the phase-by-phase approach to oversight) and the closure of arguments through agency, discretion and, in some sense, choice (e.g. the judgement over the reliability of emissions estimates or the interpretation of a more ambiguous passage of policy). The key analytic-interpretative question became ‘why do arguments succeed or fail?’ An early working idea of the candidate answers to this question involved a distinction between arguments being successful because they were the better argument or because broader contextual factors led them to be seen as preferable (see, for instance, Pellizzoni 2001). A since dropped proto-concept ‘arbitrariness’ was used to try and capture the discretionary power to choose felt to be at play in the second above form of closure and its susceptibility to processes of justification in Stirling’s sense. At this point the review of the normative theories of decision-making which ultimately resulted in section 2.2 of this thesis was conducted. Initially, the purpose here was to harvest a series of candidate answers to the question of why particular arguments should or do succeed in influencing decisions.

The decision was published in October 2016 at which point much of this early, and by definition, speculative analytical development was thrown into sharper focus. The candidate answers harvested from the theoretical review were found to be largely unsatisfactory in accounting for the success or failure of arguments and a series of more *in vivo* candidate answers were developed. The normative theories of decision-making were then positioned as locating an interest in the role of power, strategy and frontstage/backstage dynamics in decision-making. Some of these *in vivo* candidate answers were derived directly from the overt reasoning of the Inspector. For example, the Inspector explicitly stating that an argument fails because it contradicts policy led to the candidate explanation that arguments would succeed or fail because of their consistency with policy. Some of these candidate answers were based on more inchoate and covert dynamics interpreted as being at play. In retrospect the overt/covert distinction was unhelpful. What, however, had started to be identified was that the failure of arguments was overwhelmingly the result of procedural immateriality and achieved through various means of procedural closure. In fact, it was rare that the Inspector would make a judgement over empirical claims. In other words, the story of the inquiry was largely about the procedural avoidance of considering certain arguments and matters of concern.

Much like in the quote from Glynos and Howarth above, this “chaotic set of concepts, logics, empirical data, self-interpretations, and so on” (Glynos and Howarth 2007, 34) were consolidated into an account of why arguments succeeded and failed at the inquiry. These various lenses, proto-insights, concepts, and empirical details were tested against a selection of intuitively interesting details of the inquiry in an attempt to align, nest or discount the various strands of analysis into a more coherent account. Five arguments and their resolutions were chosen in order to test the emerging explanations (a mix of particular issues and broader, cross-cutting procedural arguments). At this stage it was noticed that key forms of procedural closure were ‘vertical deference’ and ‘horizontal deference’, as well as that when empirical claims were considered by the Inspector there were early signs of an apparent reticence to problematise Cuadrilla’s estimates (which would become ‘selective scepticism and credulity’).

At this point I began the process of writing up a descriptive account of the chosen key arguments. A clearer sense of the bounding of the most relevant empirical material emerged through this process. The four issues of climate change, public health, waste, and economic impacts were settled on, and the thesis became about the failure of FoE at the inquiry. The rationale here was threefold. First, this gave the bounding of the relevant issues a nice symmetry as it restricted my focus to the issues contested by FoE. Second, these issues all involved procedural arguments over whether they were relevant and so revealed much more about what has come to be a primary focus of the thesis – the way the planning appraisal of fracking is restricted through procedural closure. In other words, nobody doubts that the local issues raised by other parties at the inquiry (noise, traffic, landscape) are planning issues and so there is no layer of argumentation concerning the scope of inquiry’s remit in their deliberation. Third, by this point it was already clear that presenting the arguments at the inquiry with sufficient attention to

detail was highly space consuming and that covering any further ground would result in a thesis of excessive length.

As will be discussed in the following section, a refined set of research questions was now comprised of two descriptive questions, an analytic question and a conceptual question. The two descriptive questions, answered in chapter 4 below, simply invite a description of the arguments made by parties on the chosen issues and an account of which succeeded and failed. The analytic question, answered in chapter 5 below, asks why FoE's arguments fail. In answer to this question I present four forms of closure - namely double compartmentalisation, horizontal and vertical deference, and selective scepticism and credulity. Finally, the conceptual question, engaged with in section 6.2, then orientates focus back to the conceptual interest in justification and invites reflection on the 'extension' of Stirling's work.

### 3.4 SUMMARY AND RESEARCH QUESTIONS

In sum then, the literature reviewed in the previous chapter highlighted planning decision-making on shale gas in the UK as potentially fertile ground for studying forms of closure curtailing the role of expert and public participation in decision-making in ways geared towards the production of justification for a particular form of development. The present chapter went on to detail how the conceptual and theoretical interests in justification and the role of power in decision-making were identified and developed in response to empirical engagement with the inquiry. This occurred through the modification of Glynos and Howarth's notion of 'retroduction' presented in this chapter. Furthermore, a summary of the process of retroductive reasoning was given. This included the process through which the research problem of FoE's failure at the inquiry was arrived at, the feeding in of various insights from the case and academic literature, the proto-explanations that were proposed and revised, and the various iterations of the research questions that were cycled through. It is through this process of retroductive reasoning that, ultimately, the explanation aimed at rendering a confounding situation more intelligible presented here was developed. The rationale behind the field-site selection and the methods of data collection have also been discussed.

Having established the process through which they and their answers were developed, the study's research questions can now be formally stated:

Research problem – How do we account for the failure of FoE's case at the inquiry?

RQ1 – What key arguments are made by parties on the relevant issues?

RQ2 – Which succeed and fail in influencing the decision?

RQ3 – Why do arguments succeed or fail?

RQ4 – What does FoE's failure at the inquiry reveal about the production of justification through the closure-oriented conditioning of planning appraisal?

As already discussed, the former two research questions are descriptive and will be answered in the rich account of inquiry proceedings in the following chapter. Question 3 is analytical and is answered through the elaboration of four 'forms of closure' in chapter 4. These forms of closure are argued to have played a key role in shaping the possibility of arguments succeeding or failing to influence the decision. Finally, question 4 turns attention back to the conceptual interest in justification and is answered through the discussion in section 6.2. The argument put forward is that these forms of closure helped to establish the inquiry as a site for the production of justification for both the specific applications in question and shale development more broadly, and a number of insights into and 'extensions' of the concept of justification are elaborated.

## 4. FINDINGS I: DESCRIPTION – THE NEAR TOTAL FAILURE OF FRIENDS OF THE EARTH AT THE INQUIRY

This chapter provides an account of FoE's participation at the inquiry structured around the four main issues on which their case was based - climate change, public health, waste disposal and economic impacts. Each issue is in turn split into a number of 'contests' – the key procedural, substantive and epistemic disagreements on which the issues turned. For each, the key arguments of the relevant rule 6 parties across the initial LCC decision, pre-inquiry written evidence and the inquiry itself will be presented, before considering how the contest is resolved in the Inspector's recommendation and SoS's decision.

## 4.1 CLIMATE CHANGE

The issue of climate change turned on three key arguments at the inquiry. The first, procedural argument concerned the interpretation of the planning policy approach to the Government view on the relationship between shale gas and climate change. This view was expressed through a written ministerial statement (WMS) given to the House of Commons on September 16 2015 by the then SoS for Energy and Climate Change Amber Rudd (DCLG/DECC 2015). The second, substantive argument was over the judgement of the acceptability of the impact of the projects' greenhouse gas (GHG) emissions. And, finally, the third, epistemic argument concerned whether the emissions estimates on the basis of which that impact was assessed were credible. I consider each in turn below, following the contest across the various phases of the decision-making process before highlighting the approach taken by the Inspector and SoS.

### 4.1.1 CAN THE GOVERNMENT VIEW ON SHALE GAS AND CLIMATE CHANGE BE QUESTIONED?

The WMS sets out "the Government's view that there is a national need to explore and develop our shale gas and oil resources in a safe, and sustainable and timely way" (DCLG/DECC 2015, no pagination, see A1.1.1). It states directly that it should be taken into account in planning decisions. This national need arises because "[e]xploring and developing our shale gas and oil resources could potentially bring substantial benefits and help meet our objectives for secure energy supplies, economic growth and lower carbon emissions" (DCLG/DECC 2015, no pagination). These emissions reductions benefits arise because gas provides flexibility and helps "to reduce the use of high-carbon coal" (DCLG/DECC 2015, no pagination) and because shale gas "can create a bridge while we develop renewable energy, improve energy efficiency and build new nuclear generating capacity" (DCLG/DECC 2015, no pagination).

#### *Pre-inquiry written evidence*

In his PoE, Professor Kevin Anderson, FoE's climate change expert witness, sets out three headline conclusions, the first and third of which relate to the issue of how the inquiry should approach the Government view on the relationship between shale gas and climate change. The first states that under the existing UK carbon budget gas can only have a marginal and rapidly declining role in generating electricity post-2030. The third holds that post-Paris<sup>9</sup>, there is no viable emissions space within UK

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<sup>9</sup> The applications were made and initially determined by LCC pre-Paris, however the appeals inquiry was conducted in the February and March of 2016, shortly following the COP21 in December 2015 at which Paris was adopted.

carbon budgets for shale gas to fulfil even a transitional role (Anderson 2016a, 8–10). Elsewhere in his PoE, Anderson suggests that the projects are self-evidently an instrumental step towards a production-phase, full-scale UK shale gas industry; that Cuadrilla justifies the projects in relation to benefits purportedly associated with a production-phase, full-scale industry; and that therefore any reasoned analysis of the appropriateness of the projects' GHG emissions must be set in the context of the potential for a role for a UK shale gas industry in meeting the UK's commitments under Paris (Anderson 2016a, 9–10). He carries out just such an analysis in his written evidence, leading to his third headline conclusion.

In his written evidence, Cuadrilla's planning expert Mark Smith sets out Cuadrilla's case on the issues raised by FoE generally. These issues have, he argues: either been assessed to not give rise to unacceptable impacts; and/or reliance can be placed on other regulatory regimes to effectively address the matter; and/or the issue is not with these applications but with Government policy on shale gas (Smith 2016a, 52). Smith then goes on to highlight the support for gas as a part of achieving Government commitments on climate change in national policy, referencing in particular the 2011 Carbon Plan and the 2015 WMS (Smith 2016a, 54–55).

In a rebuttal to Anderson's PoE, Smith suggests that with the exception of his criticism of the projects' emissions estimates (see section 4.1.3 below), the issues raised by Anderson are a matter for national policy and not these applications. Quoting the WMS, Smith suggests that the Government position is that there is a need for shale gas as part of its policy response to climate change. He makes clear that, rather than contest the matter of the relationship between shale gas and UK climate change commitments with FoE, Cuadrilla's approach is to "rely on the Ministerial policy" (Smith 2016b, 3). Furthermore, he argues:

"In the context of the government support for shale gas as part of its response to climate change, as set out in the Ministerial Statement, an assessment of climate change implications of shale gas development has already been dealt with at the policy level. To debate this issue through this inquiry would merely extend the time and scope of the inquiry for no material purpose in the decision-making process" (Smith 2016b, 3).

Adding:

"Professor Anderson's analysis and opinions on climate change therefore may provide useful information in the future to help shape any changes to policy at a national level. At present though national policy is clear and unequivocal, as set out above and in my Proof of Evidence that the government recognises that gas (and specifically shale gas) has an important role to play in achieving greenhouse gas reductions" (Smith 2016b, 4).

In his counter-rebuttal to Smith, Anderson reasserts his position on the scope for a UK shale gas industry within the constraints of present, and especially expected future carbon budgets:

"In short, Cuadrilla's proposal is a non-starter. UK shale gas exploration either will use up an unacceptable amount of carbon only to discover that production at scale is not viable; or it will discover there can be production at scale, but there is no room in the carbon budget for industrial scale fracking. It is the ultimate lose-lose investment, unless the UK chooses to renege on its commitments under the Paris Agreement" (Anderson 2016b, 3).

Anderson then challenges Smith on two claims made in his written evidence. First, in relation to the Carbon Plan (HM Government 2011), Smith makes the claim that these applications are in line with the Government strategy to reduce emissions from electricity generation “through increasing the use of gas instead of coal” (Smith 2016a, 54; HM Government 2011, 9). Anderson argues that because coal phase-out is planned to be completed by 2025, by which time a shale gas industry will not be ready at scale, and gas has a temporary and diminishing role to play in displacing coal in the UK, “[s]hale gas will not be a substitute for coal” (Anderson 2016b, 3). Second, Smith makes the claim that the Government has acknowledged that natural gas (including shale gas) has an important role to play in addressing climate change “whilst also seeking to ensure the availability of secure, clean and affordable energy” (Smith 2016a, 55). Anderson suggests that Smith provides no evidence to show that shale gas is secure, clean, or affordable, before problematizing all three claims (Anderson 2016a, 15–18; Anderson 2016b, 3–6).

A final relevant expert witness was Richard Bate, who appeared as FoE’s planning expert. In his written evidence to the inquiry he set out the general support in both local and national planning policy, as well as in law, for securing a radical reduction in GHG emissions (Bate 2016, 5–9). He concludes that the:

“[D]etailed effects of the proposed developments on climate change, as established by Professor Anderson, would challenge the major national and local planning policy objective of securing a radical reduction in greenhouse gas emissions. The exploration drilling appeals before the inquiry would do the opposite” (Bate 2016, 11).

At the point of the inquiry, then, Anderson’s evidence – though he was careful not to couch it in such terms – appeared to at the very least clarify the meaning, if not challenge the conclusions of the WMS. First, the vague reference to a need for gas ‘for years to come’ was, in the context of the current carbon budget, given a specific and relatively tight timeframe. Second, Anderson argued that the WMS’s view that there is a role for shale gas in transitioning to a low carbon economy has been subsequently rendered unsustainable by Paris. Cuadrilla’s response, through Smith’s written evidence, was that Anderson’s evidence concerning the viability of a transitional role for a UK shale gas industry was entirely immaterial. They argued that it is the clear government view that shale can play such a role, and it is not for this inquiry to question that. In other words, irrespective of its intellectual merits, Anderson’s line of argument was procedurally prohibited because it – in spite of Anderson claiming otherwise – questioned the view set out in the WMS.

### *Inquiry proceedings*

In their opening statement at the inquiry, Cuadrilla reiterated their position that - with the exception of Anderson’s argument regarding the methane emissions estimate (see section 4.1.3 below)<sup>10</sup> - the issues raised by Anderson are a matter of national policy, and national policy is presently settled emphatically in favour of envisaging a key role for shale gas in the policy response to climate change. “[I]t is the

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<sup>10</sup> Cuadrilla contest the methane emissions estimate issue at the inquiry because “this was not expressly covered in the Ministerial Statement” (Cuadrilla 2016a, 3).

Appellant’s absolutely clear view that”, set out their QC Natalie Lieven, “these are not material issues for the inquiry; that evidence upon them will not assist you or the Secretary of State; and therefore we do not intend to call evidence or make submissions that go beyond the national policy” (Cuadrilla 2016a, 2–3).

FoE, in their opening statement, contended that the projects are in breach of the Development Plan policy DM2 (see A1.2.1). DM2 provides that development be supported where a decision maker is satisfied by the provision of appropriate information that the development makes a positive contribution to, among other matters, the reduction of carbon emissions (The Joint Advisory Committee for Strategic Planning: Lancashire County Council; Blackpool Council; Blackburn with Darwen Council 2013b, 10). Estelle Dehon, barrister for FoE, argued that Anderson’s evidence shows that the projects will do the opposite of what is required from DM2. The projects also, argued Dehon, fail to comply with para. 93 of the NPPF and its requirement for radical reductions in GHG emissions (FoE 2016b; DCLG 2012, 21–22, see also A1.2.2). Turning to the WMS, Dehon argues that it does not bear the weight placed on it by Cuadrilla – it does not create a presumption in favour of these developments, nor displace relevant planning policy, nor reduce statutory duties under the Climate Change Act 2008 (FoE 2016a, 9).

In Smith’s EiC, Lieven stresses the more recent nature of the (2015) WMS, as opposed to the (2012) NPPF, para. 93 of which Dehon ‘placed considerable reliance’ in opening (INQ 9 Feb p3 23.30 - 24.30). “In that Ministerial Statement”, she asks Smith, “does the Secretary of State deal with the relationship between the extraction and exploration of shale gas and the Government’s climate change commitments?” “It does”, replies Smith, pointing to paras. 3 and 8 in his answer (see A1.1.1) (INQ 9 Feb p3 24.55 – 25.20).

In cross-examining Smith, Dehon starts by challenging Cuadrilla’s position that the issues raised at the inquiry by FoE are immaterial. A long exchange follows concerning the relationship between para. 93 of the NPPF and paras. 3 and 8 of the WMS (see A1.1.1 and A1.2.2) (INQ 10 Feb p1 55.10 – 01.05.00). Dehon argues that para. 93 places the GHG emissions of the proposed sites squarely within the inquiry’s remit as a material consideration. Smith regularly seeks to return to the WMS to reiterate the (recent) Government support for shale gas. His point is that the Government envisages a role for shale gas in helping to respond to climate change, and therefore shale gas exploration applications are seen as - in general and necessarily - helping to fulfil the objectives of NPPF 93. He at one point questions the need for the Environmental Statements’ (ES) GHG emissions estimates in the light of the subsequent WMS (i.e. there is no longer a need to consider the amount of CO<sub>2</sub>e estimated to be emitted by particular shale gas sites because, in the Government view, shale gas development is in general an aid to the reduction of emissions and the response to climate change – INQ 9 Feb p1 26.00 - 28.40).

Dehon puts it to Smith that the WMS’s view about what a shale gas industry ‘could potentially’ bring about (i.e. helping to tackle climate change, improving energy security) does not prevent a planning

decision maker from hearing evidence on the extent to which, under what conditions and within what timeframe that could come about. Smith replies that if there was such valid evidence, then that would be material and part of a decision maker's consideration among the other evidence (INQ 10 Feb p2 02.00 - 11.30). Focusing in on the phrase 'the longer term' in the WMS, Dehon puts it to Smith that on Anderson's evidence the longer term would be up until 2025. Smith concedes that "I haven't got the expertise or the knowledge to second guess that" (INQ 10 Feb p2 18.30 – 20.00). Finally, on Paris, Dehon asks Smith whether it is a material consideration to which he agrees (INQ 10 Feb p2 24.30 – 25.10).

Helping Smith clarify his responses in re-examination, Lieven returns to the relationship between NPPF 93 and the WMS. "To what degree, in your view, does the Ministerial Statement deal with that aspect [the role of planning in securing radical reductions in GHG emissions] of the NPPF?", she asks. Smith answers that it confirms the important role shale gas will play in helping secure reductions in GHG emissions (INQ 10 Feb p4 2.02.30 – 2.03.15).

In his EiC, referring to a recent letter from the Committee on Climate Change (CCC) to the SoS for Energy and Climate Change setting out an early assessment of the implications of Paris for the proposed fifth carbon budget and government policy more broadly<sup>11</sup>, Anderson picks out their continued advice to achieve 'total [electricity] sector emissions intensity of below 100gCO<sub>2</sub>/kWh by 2030' (CCC 2016, no pagination). Anderson suggests that this gives us a quantitative definition of low carbon for power generation by 2030, whilst pointing out that definition will have to fall again post-2030, with the need for an eventually zero carbon energy (not just power) system arising by 2050, if not significantly before that. He says natural gas burnt in efficient power stations generates power at 400-450gCO<sub>2</sub>/kWh (INQ 26 Feb p1 32.00-35.20). "In terms of what low carbon means from the Committee on Climate Change", asks Dehon, "does it or does it not include shale gas?". "No, without a doubt, it does not include shale gas", answers Anderson (INQ 26 Feb p1 35.20-36.05).

Referring to two documents that he co-authored (Broderick et al. 2011; Broderick and Anderson 2012), Anderson suggests that shale gas, subject to best practice extraction and combustion, will deliver power at lower emissions per unit than is possible with coal. However, he adds two caveats. First, he points to uncertainty in the UK over levels of methane emissions. "Talking to my colleagues, who are experts in this area", he says, "they certainly have some reservations about saying that shale gas will necessarily deliver lower emissions than coal". Second, he refers to the 'announcement from Government to phase out coal fired power generation by 2025', alongside statements from Cuadrilla and others that do not anticipate a significant UK 'shale industry until post-2025', suggesting that there is therefore little scope for substituting coal for shale gas (INQ 26 Feb p1 36.20-44.15).

This brings Anderson onto the role of shale gas as a 'bridge'. Here he refers to a recent report from the UK Energy Research Centre (UKERC) – in fact it was published during the inquiry – entitled 'The future role of natural gas in the UK' (McGlade et al. 2016). "I would concur with UKERC", he says, "that we are

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<sup>11</sup> 'Implications of the Paris Agreement for the fifth carbon budget', 28 Jan 2016 (CCC 2016).

significantly down that bridge... and that post-2030 we would need to be getting off the other side of that bridge". He adds that the UKERC report is premised on the 4<sup>th</sup> carbon budget, not Paris or the proposed 5<sup>th</sup> carbon budget, both of which will "make the situation considerably more stringent and effectively you'll have to get off the bridge sooner" (INQ 26 Feb p1 44.30-49.50).

Lieven begins her cross-examination of Anderson with the WMS. This is the "current ministerial position in relation to planning decisions... for exploring for shale gas?", she asks. Anderson answers that he's not a planning expert and so wouldn't know if Paris would supersede the WMS. Pointing to the statement that access to natural gas is a key requirement if the UK is to successfully transition in the longer term to a low carbon economy, she asks, "that was the Government's position?". "Yes", replies Anderson, who then focuses in on the 'for years to come', suggesting that – interpreting the Governments own statements and policies, and their expert advice – this must mean out to about 2030. "So I think", he continues:

"I'm in full agreement here with the Minister, in that, in years to come, gas will play a role in that, but once we get to 2030, that is really very much a pivotal point as we start to rapidly ramp-off, ramp away from the use of gas for providing energy, because it is no longer in line with our commitments on climate change and therefore that transition to that low carbon economy the Minister talks about in that very paragraph" (INQ 1.22.25-1.27.20).

"Can I just check, Mr Anderson, that you're really in full agreement with the Minister", asks Lieven, drawing Anderson's attention to the WMS's statement that 'shale gas can create a bridge'. Eventually Anderson says that he isn't in full agreement. There would be five years of opportunity where shale gas could play a role, he explains, and "I think we'd all agree", he ventures slightly optimistically, "if it was only for five years, it would be foolhardy to go down a shale gas route". "Does this statement say that the bridge should come to an end by 2030?", asks Lieven. "No it actually makes no reference to time", responds Anderson. He goes on to suggest that using the CCC's clear quantitative interpretation of 'low carbon', along with other official positions and expert advice, you can interpret the length of the bridge as to around 2030 (INQ 26 Feb p1 1.27.30-1.32.00).

Lieven then suggests that the implications of Paris are a matter to be considered by Government. "It would be strange to me", responds Anderson:

"To think that it is appropriate to focus on a document from the past, given the international repercussions of the Paris agreement. I'm a little baffled as to why we would focus on that statement [the WMS], given what has happened since".

Lieven asks if the Prime Minister's speech at Paris says anything about shale gas. "No, it does not refer specifically to shale gas", answers Anderson. Furthermore, she asks, "[i]s there any Government policy statement, whether from DECC, DCLG, or the PM [Prime Minister], post-Paris, about how to consider planning applications for shale gas, or indeed about gas and oil policy generally?". Anderson is not aware of any (INQ 26 Feb p1 1.33.05-1.36.10).

In re-examination, Dehon turns back once again to the WMS. She draws attention to the three conditions of Government support - namely, that exploration and development be conducted in a "safe,

and sustainable and timely way” (see A1.1.1, para. 1). She asks Anderson what he understands by these conditions. Anderson focuses on ‘sustainable’ and ‘timely’, suggesting that shale development would have to be in line with Government commitments on sustainability, including climate change commitments, and that it would have to fit into the timeframe we have to address issues of sustainability (INQ 26 Feb p1 1.39.05 - 1.46.20).

In his EIC, Bate sets out the requirement in both local and national policy for the planning system to reduce GHG emissions (DM2, NPPF, PPG), as well as the objective, in law, to reduce emissions in the Climate Change Act. The combined effect of these policies, he argues, is that local authorities must take opportunities for GHG emissions reduction seriously; that decision makers in planning cannot leave GHGs for someone else to tackle ‘somewhere else, on another occasion’ (INQ 2 Mar 16.00 – 24.55; Bate, 2016a: 9-10).

He then deals with the, at that time, recent decision from the Government to withdraw £1b in funding to support Carbon Capture and Storage (CCS) projects (DECC 2015). He sets out the importance of CCS in establishing compatibility between policy support for gas and climate change obligations. He quotes the House of Commons Energy and Climate Change Committee (ECCC) who, in their response to the withdrawal, conclude that “[w]ith gas and without CCS, we will not remain on the least cost path to our statutory decarbonisation target” (ECCC 2016, 19). The up-shot of this, argues Bate, is that little weight can be attached to previous statements made prior to the withdrawal (i.e. the WMS), and indeed to the prospect of a significant role for gas in the energy system going forward (INQ 2 Mar p2 24.55 – 36.00).

Dehon turns to the approach to take to the WMS. Bate states that the WMS does not alter the necessity for applications to go through the planning process so as to ensure that they are indeed safe, sustainable and timely (mimicking the conditions set out in the WMS) (INQ 2 Mar p2 19.55 – 22.00). Dehon then asks what should be taken into account when determining the weight to be afforded to the support for shale development set out in the WMS. Bates replies that whilst the WMS is clearly an important consideration, two highly significant things have happened subsequently (i.e. Paris, CCS withdrawal) that reduce the weight that should be afforded to the Government view set out in it ‘quite substantially’ (INQ 2 Mar p2 22.00 – 26.15).

In cross-examination, Lieven reiterates that the most recent and direct expression of the Government’s position on shale gas remains the WMS, and that position is that exploring for shale gas could potentially help to lower emissions. Furthermore, she stresses that the Government has not informed planning decision makers that their position has changed post-CCS and -Paris. In other words, these subsequent events do not undermine the WMS or the support for shale gas it articulates (INQ 2 Mar p2 26.40 – 42.00).

In closing, Lieven reiterates that the Government’s position on the relationship between shale gas and climate change is made clear in the WMS, which remains a consideration of very great weight in these appeals. The Government view is that shale gas has an important role to play in the transition to a low

carbon economy (Cuadrilla 2016b). Furthermore, the Government response to Paris and CCS are matters for national energy policy and not these appeals. Lieven concludes that “the need for SG [shale gas] exploration is set out in very strong terms in national policy, and the potential benefits that SG can bring in terms of national economic, energy and climate change and should be given very great weight” (Cuadrilla 2016b, 6).

Dehon, closing for FoE, sets out climate change’s status as a material consideration in these appeals. Dehon then sets out what, in her case, as a matter of law is the correct approach to the WMS. The WMS sets out, she suggests, the government view of what potentially could be the case and it falls to the decision maker to assess, in light of the expert evidence before the inquiry, the weight to be given to that view. The question of need is “not predetermined by the government’s view in the WMS” (FoE 2016b, 6). As such, Anderson’s expert evidence on the scope for shale gas to act as a bridge is relevant to understanding the WMS. The WMS prescribes neither decision outcomes in specific cases, nor the weight a decision maker should attach to it, which are instead matters of planning judgement taking into account relevant material considerations. Paris and the CCS funding withdrawal are two such considerations that substantially reduce the weight to go to the WMS. The WMS does not diminish the weight to be given to potential adverse impacts arising from the applications, including on climate change; nor does it require permission be granted for shale gas exploration that is not safe, sustainable or timely (FoE 2016b).

At the close of the inquiry, then, the parties disagreed over the approach the decision maker should take to the Government view about the relationship between shale gas and climate change. It was Cuadrilla’s case that the view set out in the WMS about the role for shale gas in transitioning to a low carbon economy was a consideration of great weight. Furthermore, this weight was undiminished by subsequent developments concerning Paris and CCS, and any response to those developments, if required at all, would be formulated at national policy level and was not a matter for this inquiry. This rendered Anderson’s evidence concerning the scope for a UK shale gas industry within the constraints of present and future carbon budgets immaterial. These matters would already have been considered in formulating the WMS and were not to be re-tread in the decision over these appeals. The Government’s view was that shale development would aid the honouring of climate change commitments and this inquiry was not the forum to register challenges to that view. FoE argued, on the other hand, that rather than being automatically compelled to accept the Government view without considering its merits or ongoing relevance, the role of the decision maker was in fact to assess the precise meaning of and weight to be given to the WMS on the basis of the expert evidence before them. This would include FoE’s arguments on the extent to which there was scope for a shale gas industry within the constraints of UK carbon budgets, and the impact of subsequent developments concerning Paris and CCS.

#### *Recommendation and Decision*

In her report to the SoS, the Inspector, Wendy McKay, concludes that the WMS remains the Government's position on shale gas and that the subsequent issues of CCS and Paris are matters for national policy development. The Inspector concludes that for "the purposes of these appeals, the analysis should be limited to a consideration of the project emissions during construction, operation and decommissioning, together with cumulative impacts as assessed by the ESs within the framework set by national and local policies" (McKay 2016, 407). The SoS fully agrees with the Inspector's reasoning. The viability of shale policy in the light of Paris and the CCS withdrawal is a matter for future national policy development and not these appeals. The support for shale development set out in the WMS reflects the view that it could help achieve lower carbon emissions and help meet the Government's climate change targets. This view is not to be questioned through this forum, and the weight to be attributed to this support is not diminished by the issues FoE raises (DCLG 2016). In short, the Government view concerning the relationship between shale gas and climate change was placed beyond criticism at the inquiry. As such, any evidence that suggested that a shale gas industry and the UK's climate change commitments were not as easily reconcilable as the WMS suggests – the bulk of Anderson's case - was effectively rendered immaterial for contravening the Government position.

#### 4.1.2 ARE THE PROJECTS' GHG EMISSIONS ACCEPTABLE?

Beyond the debate above about the reconcilability of a shale gas industry and the UK's climate change commitments, FoE also argued that the emissions from these two exploration applications in and of themselves represented an unjustifiable proportion of the UK's tight carbon budgets, especially when adjusted in anticipation of Paris.

##### *Pre-inquiry written evidence*

In his written evidence to the inquiry, FoE's climate change expert Anderson draws three headline conclusions. The second of which, relevant here, states that the cumulative emissions of both projects together for stand-alone, non-productive activities cannot be justified within the tight UK carbon budget constraints consistent with the Paris agreement (Anderson 2016a, 8–10). Whilst arguing that Cuadrilla's emissions estimates are likely to be an underestimation (see section 4.1.3 below), Anderson suggests that even this, in his view, low estimate represents too high a proportion of the Fylde's Paris-adjusted emissions budget to be acceptable. FoE's planning expert Bate adds that the effect of national and local policy support for radical reductions in GHG emissions is that "[t]he argument cannot be entertained that a development's greenhouse gas emissions amount only to a 'drop in the ocean' and therefore be given little weight in a decision" (Bate 2016, 10). Cuadrilla's planning expert Smith, on the other hand, states that the cumulative carbon footprint of both exploration sites as assessed in the ESs is "relatively

insignificant and accounts for less than 0.002% of the UK Carbon Budget” (Smith 2016a, 53; Arup 2014a, 123). Smith goes on to judge this to be a “negligible and insignificant impact of the greenhouse gas emissions attributable to the sites” (Smith 2016a, 53).

### *Inquiry proceedings*

In opening, FoE’s barrister Dehon takes issue with Cuadrilla’s argument that the emissions are justified because they are a small fraction of the UK carbon budget. FoE label this a ‘drop in the ocean’ argument, which they claim is neither cogent, nor in line with planning policy (FoE 2016a).

In his EiC, Anderson suggests that, by his calculations, the cumulative emissions from both of the projects would account for between 5% and 9% of the Fylde’s prorated proportion of the UK’s carbon budget over the six years of the projects when adjusted for Paris, or between 0.007-0.01% of the UK’s Paris-adjusted budget for the same period. Anderson considers these figures to be very high, and a hugely disproportionate allocation of constrained carbon budget to non-productive activities (i.e. exploratory). He argues that the 124,000tCo<sub>2e</sub> high range estimate of emissions for each site in the ESs (Arup 2014a, 107) is unjustifiable to undertake exploration for its own sake. This would only be justifiable if the proposals were a stepping stone to a shale gas industry - as Anderson suggests is obviously the case given that Cuadrilla allude to benefits only associated with production at scale in support of the appeals - and then only if that industry would be compatible with present and future carbon budgets. Anderson argues that his evidence makes clear that a UK shale gas industry is irreconcilable with UK commitments on climate change. In other words, Anderson’s point is that the acceptability or otherwise of the emissions can only be fully understood in the context of the acceptability of what they are an instrumental step towards (i.e. shale gas production at scale). The acceptability of the emissions cannot be judged in isolation without an assessment of the acceptability of their purpose (INQ 26 Feb p1 49.50-57.20).

Closing for FoE, Dehon argues that the emissions as estimated in the ESs are in themselves an irresponsible use of the UK’s highly constrained carbon budgets. This situation is only exacerbated when budgets are adjusted, as they will have to be, for Paris. The ‘drop in the ocean’ argument is an entirely wrongheaded approach that would result in the inability to secure emissions reductions through planning. The applications therefore do not comply with DM2, nor para. 93 of the NPPF (FoE 2016b).

At the close of the inquiry, then, FoE had argued that the projects’ GHG emissions impact was unacceptable, especially when anticipating tighter carbon budgets to come post-Paris. Furthermore, they argued that the ‘drop in the ocean argument’ could not be entertained by planning decision makers. FoE also argued that the acceptability of the emissions impact of these applications could not be separated from the question of the acceptability of the emissions of the shale gas industry they are

an instrumental step towards. Cuadrilla, for their part, argued that the GHG emissions impact was negligible and insignificant.

#### *Recommendation and decision*

In her report to the SoS, the Inspector rejects Anderson's second headline conclusion, in which he judges the emissions of the two sites taken cumulatively to be unjustifiable in the context of Paris. The projects would, suggests the Inspector, represent a very small percentage of total emissions whether compared at the regional or national level, even in the context of Paris. She concludes that, in "the light of the support provided by the national policy for shale gas exploration, I believe that those emissions would be entirely reasonable and fully justified" (McKay 2016, 408). As such, she implicitly adopts the 'drop in the ocean' approach FoE criticised. Furthermore, in finding the support in national policy relevant to assessing the substantive impact of the GHG emissions of the projects she effectively accepts Anderson's point about only being able to assess the acceptability of emissions in the context of their purpose, whilst – as we saw above – refusing to register his problematisation of that purpose.

#### 4.1.3 ARE THE GHG EMISSIONS ESTIMATES RELIABLE?

FoE not only argued that the emissions estimates in the ESs were unjustifiable on their own terms, but also that they were likely to underestimate the true scale of emissions from the sites, rendering the GHG emissions impact even less acceptable.

#### *Pre-inquiry written evidence*

In his written evidence to the inquiry, FoE's climate change expert Anderson expresses concern that Cuadrilla's GHG emissions estimate is likely to underestimate the projects' emissions, particularly the methane emissions (Anderson 2016a, 30–31). Anderson points to uncertainty in the scientific literature (Karion et al. 2013; McGlade et al. 2015) about expected levels of leakage and fugitive emissions from natural gas production, especially from shale gas. Anderson also criticises Cuadrilla's use of a Global Warming Potential (GWP)<sup>12</sup> figure of 25, as opposed to 34 – which he describes as "the latest scientific assessment (IPCC AR5) of methane's global warming potential" (Anderson 2016a, 31).

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<sup>12</sup>GWP conversion rates are used to convert the global warming effect of a given unit of various GHGs into an equivalent unit of measurement (CO<sub>2</sub>e) based on CO<sub>2</sub> as a benchmark. In other words, how much more effective as a GHG is, in this case, a given unit of methane compared to the same unit of carbon dioxide. GWPs are dynamic over time and so change depending on the timescale over which they're calculated (typically 20 or 100 years).

In response, Cuadrilla's planning expert Smith defers to an appended technical note from a colleague at Cuadrilla's environmental consultants Arup, Gordon Richardson. Unlike Anderson, Richardson did not appear at the inquiry and his views were not subjected to cross-examination. The technical note asserts that the ES analysis of GHG emissions was "based on reliable figures of GHG emission sources" (Richardson 2016, 2). It tells us that for each emission source more than one conversion factor was used, 'where possible', to account for uncertainty associated with the input data. It tells us, furthermore, that the source data for their methane estimates comes from a US study (Allen et al. 2013). This study was chosen, we're told, because it focuses on the stage of operations most relevant to these exploratory applications – well completion rather than the whole lifecycle of production wells. 27 such completions were surveyed across four US shale formations. Finally, the note concludes, that:

"We (Arup) consider the method and assumptions used and the sources of data to be reliable and we therefore disagree with Professor Anderson that we have underestimated methane emissions" (Richardson 2016, 4).

#### *Inquiry proceedings*

Opening for Cuadrilla, their QC Lieven suggests that this matter has already been dealt with by the EA's permitting regime, which includes the oversight of emissions to air including the flaring of gas.

"[N]ational policy is entirely clear", Lieven argues, "[w]here there is another regulatory regime that deals with a matter then the planning decision maker should rely on that regime and assume that it will operate appropriately" (Cuadrilla 2016a, 3). Lieven references para. 122 of the NPPF (see A1.2.2), 'similar guidance' in PPGM<sup>13</sup>, and the ruling of the High Court in the case *Frack Free Balcombe v West Sussex County Council* (FFB vs. WSCC, see Justice Gilbert 2015, see also A1.3.1), before concluding:

"There is no basis for you or the Secretary of State to go behind those regimes, and do anything other than assume that they will operate effectively" (Cuadrilla 2016a, 3).

In his EiC, Smith summarises the responsibilities of the EA, including "emissions to air". From his PoE, he states that the permits already secured from the EA cover "[t]he incineration by flaring of natural gas during the temporary (up to 90 days) testing of gas flow rate from each exploration well" (Smith 2016a, 44). Finally, he quotes the EA permit decision document, which states:

"We consider that, in reaching that decision, we have taken into account all relevant considerations and legal requirements, and are satisfied that the permit will ensure that a high level of protection is provided for the environment and human health" (EA 2015, 8).

In other words, as well as contesting the content of Anderson's claim about the underestimation of methane emissions in written evidence through Richardson's note, Cuadrilla also argue – through Smith's evidence – that it is procedurally immaterial to the inquiry. Flaring and emissions to air are

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<sup>13</sup> For example, paras. 12 and 112 (see A1.2.3)

regulated by the EA who should be assumed to operate effectively by planning decision makers, and who have already found the proposals – including presumably the emissions estimates - acceptable.

In his EiC, FoE's barrister Dehon asks Anderson for his response to Richardson's technical note. There are, he answers at length:

"Lots of issues around the production of methane from any fossil fuel sector, but particularly here from shale gas, and particularly for somewhere like the UK, because we have no experience of producing shale gas and it is very different from being in the US. So there will be lots of uncertainties.... there are an array of potential sources of methane that could themselves be very significant. The problem at the moment is to quantify those accurately is not possible. We are still trying to understand the mechanisms. We understand one of the mechanisms, that we are fairly confident will lead to some additional leaking of methane into the atmosphere. But we have not been able to quantify that accurately as yet. So I think it is very fair to say, that because there are an array of different mechanisms by which... methane can enter the atmosphere the estimate in the ES is inevitably conservative. In addition, what we call the global warming potential... the estimate of the relative importance of methane in the latest IPCC report... in their latest set of reports they've increased the impact of the global warming potential - i.e. the impact of methane - to 34 compared with 25 that was used in the Environmental Statement. So, our best scientific understanding now is that the impact per molecule of methane is higher than we thought before, by a considerable margin, over 40% higher. And we're also aware scientifically that there will be... other mechanisms by which methane will be released into the atmosphere. So inevitably the Environmental Statement will be conservative and will be an underestimate of the methane sources" (INQ 26 Feb p1 1.14.05-1.18.20).

In closing, Dehon reiterates Anderson's argument that the ES emissions estimates are likely to underestimate methane emissions from the schemes. His views on this matter, she suggests, are to be preferred to the less expert and untested views of Richardson (FoE 2016b, 15).

By the close of the inquiry, then, FoE argued that the assessment of the GHG impact of the projects was likely to underestimate its true scale. They pointed to both scientific uncertainty over expected methane emissions from shale gas developments, particularly in the UK, and to the use of a low GWP figure in the ESs. Cuadrilla, on the other hand, argued both that these estimates had already been considered and found acceptable by the EA and should not be re-assessed through this process; and that, in any event, the estimates were indeed reliable.

#### *Recommendation and decision*

In her report to the SoS the Inspector concludes that she is "satisfied that the method and assumptions used, and the sources of data referred to, can safely be relied upon and there has been no material error in the ES estimate of methane emissions" (McKay 2016, 408). The SoS concurs that there has been no material error in the ES's estimates of methane emissions (DCLG 2016), which are therefore found to be epistemically credible.

## 4.2 PUBLIC HEALTH

Dr David McCoy, FoE's expert witness on public health, helpfully distinguished between the various facets of public health at play at the inquiry in his written evidence. 'Direct impacts' to human health include both impacts from possible pollution to air and water, as well as 'nuisances' (i.e. noise, traffic, so on). On the other hand, 'indirect' impacts are impacts on human health and wellbeing mediated through the stress and anxiety caused by public concern and 'perceptions of risk'. Finally, McCoy also included impacts to human health as mediated through both climate change and socio-economic impacts (McCoy 2016). In what follows I consider potential direct impacts from air- and water-borne pollution and 'intermediate' impacts together under the banner of 'public health' (i.e. waste and climate change will be dealt with separately, as they were at the inquiry, and nuisances and socio-economic impacts are beyond the scope of the present work).

The issue of public health can be split into four contests: whether the Inspector should simply defer to the EA on health matters potentially arising from processes over which they have regulatory responsibility (i.e. emissions to air and water); whether the public health risks of a potential production-phase industry at scale were material; how uncertainty over the public health impacts of fracking should be dealt with; and whether, finally, the indirect health risks were acceptable. For each of these questions I will provide an account of the parties' arguments, and the approach adopted by the Inspector and SoS.

### 4.2.1 SHOULD PLANNING SIMPLY DEFER TO THE EA'S OVERSIGHT ON 'DIRECT' RISKS?

The first key matter on public health concerned the extent to which the regulatory capacities of the EA could be relied upon by the planning decision maker to oversee any direct risks to public health. In other words, was there a role for planning generally and the inquiry specifically in regulating the issue? Cuadrilla's approach was that it was clear that the EA had regulatory responsibility for the potential health impacts from pollution to air and water, and that a planning decision maker should assume that the EA has regulated and would regulate such matters effectively. It was FoE's case that the decision maker was not forced to 'irrebutably presume' the effective operation of other regulatory regimes, and thus was still required to satisfy themselves that no unacceptable impacts would arise. In short, then, FoE argued for a more interventionist interpretation of planning's role on matters of regulatory overlap, whereas Cuadrilla argued for a more passive or deferential approach.

### *Initial LCC decision*

In their response to the applications initially, FoE raised concerns about the regulatory system. Noting the contingency of Public Health England's (PHE) general expectation of low risk to public health from fracking on operations being properly run and regulated (PHE 2014), they point to what they describe as Cuadrilla's 'very poor track record' as an operator and self-regulator. They also point to a regulatory framework they describe as "inadequate, flawed or ineffectively applied and enforced" (FoE 2014b, no pagination, para. 134).

### *Pre-inquiry written evidence*

McCoy reiterates the point in his written evidence, adding "Public Health England did not assess the adequacy of the regulatory system for shale gas exploitation, nor the capacity of regulatory bodies to implement regulation effectively and adequately" (McCoy 2016, 12). In other words, PHE do not assess whether their condition is likely to be satisfied. FoE's case going into the inquiry, therefore, was that there are reasons to doubt the efficacy of regulation in the UK, and therefore whether PHE's 'low risk' assessment holds in practice.

In contrast, Smith, in his written evidence states that "[w]ith respect to potential public health effects for those matters that are the responsibility of other regulatory bodies, reliance should be placed on other regulatory regimes to control and manage the operations effectively to ensure that they do not cause harm to people or the environment" (Smith 2016a, 58). Smith adds in his rebuttal that:

"The adequacy of the operations of other (non planning) regulatory regimes are not material to the determination of planning applications or any subsequent appeals. The NPPF is unequivocal in this respect..." (Smith 2016b, 5).

He then quotes para. 122 of the NPPF (see A1.2.2).

Going into the inquiry, then, FoE had sought to question the efficacy of the regulatory system, and also therefore to problematise assessments of low risk to public health which assume effective regulation. Cuadrilla had in response argued that these concerns were not material considerations because the decision maker is explicitly instructed in the NPPF to assume other regulatory regimes will operate effectively.

### *Inquiry proceedings*

In her opening statement Dehon seeks to establish public health as a matter that planning policy dictates must be considered by a decision maker. "[A] whole chapter of the NPPF is dedicated to the promotion of healthy communities", she argues, "and paragraph 1 of the PPG on Health and Wellbeing mandates local planning authorities to 'ensure that health and wellbeing... are considered... in planning

decision-making” (FoE 2016a, 8). Furthermore, “[p]ara 144 of the NPPF requires that decision-makers in determining applications for mineral development should ensure that there are no unacceptable adverse impacts on, amongst other things, human health” (FoE 2016a, 8). Lieven, on the other hand, points again to 122 of the NPPF and suggests this approach to other regulatory regimes was upheld by the High Court in the case FFB vs. WSCC (see A1.3.1). “These matters”, including impact on health, she concludes:

“[H]ave been dealt with in great detail through the environmental permitting regime, and will be subject to intensive monitoring and regulation as part of that regime, if and when the proposals are implemented. There is no basis for you or the Secretary of State to go behind those regimes, and do anything other than assume that they will operate effectively” (Cuadrilla 2016a, 3).

In cross-examination Lieven takes McCoy to his own written evidence where at para 4.18 he states that:

“The levels of risk to human health that is posed by various potentially hazardous pollutants associated with shale gas exploration have been generally assessed to be low or negligible. I would tend to agree with this assessment, but only on the assumption of adherence to best practice guidance and stringent safety measures (properly enforced)” (McCoy 2016, 15–16).

Lieven then suggests that in planning terms, the assumption prescribed in NPPF 122 fully resolves McCoy’s point here. The Cuadrilla argument here is that concerns about the efficacy of regulation as required to ensure low or negligible risk to public health are not an issue with any weight in planning terms because NPPF 122 dictates that a decision maker can safely assume the effective operation of other regulators.

In Bate’s EIC, whilst discussing waste but relevant to health too, Dehon draws a distinction between the requirement in local policy DM2 to ‘be satisfied’ on the basis of the provision of appropriate information and the requirement in NPPF 122 to ‘assume’ the effective operation of other regulatory regimes.

“What, in planning terms”, asks Dehon “is required to be satisfied by the provision of appropriate information?”. “The key phrase”, Bate answers, referring to DM2, “is to the satisfaction of the mineral and waste planning authority – that is the criterion, they have to be satisfied that these matters will be resolved to the extent that the policy prescribes”. “It [waste, and other impacts with overlap between planning and the EA – i.e. risk of pollution to air or water] is very much a planning related issue”, he continues, “which has to be addressed in this case ultimately now by the Secretary of State, so that he can assure himself... to his satisfaction that these matters specified here have been taken into account” (INQ Mar 2 p1 02.37.00 – 02.41.25).

Dehon then takes Bate to 122 of the NPPF – “What do you have to say in relation to that?”. “I think... to understand the NPPF just go back a couple of paragraphs, and start with paragraph 120”, responds Bate. Bate then reads 120 (see A1.2.2). “So it’s very clear, in the NPPF, what the starting point is”, continues Bate, “that these are matters for the planning authority to address” (INQ Mar 02 p1 02.41.25 - 02.44.45).

Dehon then suggests that the interpretation of the word 'assume' in Smith's evidence comes rather close to an 'irrebuttable presumption'. That, in other words, one assumes it no matter the evidence before the inquiry, and indeed the inquiry must 'close its eyes' to evidence that questions the merits of assuming in this particular case. "How do you understand the term 'assume'?", she asks Bate. "I would view it as a working assumption", says Bate - "the difference I have with Mark Smith is that I think there's much more that is actually the province of the planning authority than he does" (INQ Mar 2 p1 02.44.45 – 02.47.20).

On health specifically, Bate, reading from his written evidence reiterates the requirements in planning policy for decision makers to consider health. This includes local policies CS5 and CS9 with their commitment to ensure that "amenity, health, economic well-being and safety of the population are protected" (The Joint Advisory Committee for Strategic Planning: Lancashire County Council; Blackpool Council; Blackburn with Darwen Council 2009, 30, 51); and para. 144 of the NPPF with its requirement to ensure "that there are no unacceptable adverse impacts on... human health" (DCLG 2012, 31) (INQ Mar p2 00.10.30 – 00.15.10).

In cross-examining Bate, Lieven goes back to NPPF 122. The way you ensure there are no unacceptable impacts on health from emissions regulated by another regulator (and so satisfy para. 144), suggests Lieven, is to consult with that regulator and to take their consultation response into account. Bate suggests that Lieven's argument is rather 'black-and-white'. "As we saw with wastewater", he continues, "there is scope for particular issues to be in the province of both the specific regulator and the planning authority". "And also", he adds, "there are general requirements in policy, particularly on health, as with waste too, on the planning authority to satisfy themselves that certain requirements are met". Lieven ends the exchange by suggesting that a planning decision maker can ensure there will be no unacceptable impacts on health from a matter dealt with by another regime by assuming that regime is operating effectively, rather than having to consider each issue itself, to which Bate does not explicitly object (INQ Mar 2 p2 – 00.42.50 – 00.46.50).

In closing, Dehon reasserts health as a matter of planning policy and as a material consideration in these decisions (FoE 2016b, 2). On NPPF 122 she reiterates that the 'assumption' is not an 'irrebuttable presumption'. Justice Gilbert's reasoning on FFB vs WSCC (that there is ample authority for the planning authority to in its discretion consider that matters could be left to the regulator), she suggests, has the obvious corollary that there is a discretion to consider relevant matters which cannot be left to the regulator. Lieven, on the other hand, reiterates that direct health effects from pollution of groundwater or emissions to air are strictly controlled by the EA, who will ensure there is no impact on human health, and the decision maker must assume they will operate effectively (Cuadrilla 2016b, 29).

Cuadrilla, then, based on NPPF 122, argued that on health impacts arising from processes controlled by the EA, the Inspector must defer to their assessment in their permitting decision and more broadly assume any risks will be mitigated through effective regulation. In other words, satisfaction on these

matters is achieved through deference to the present and future work of the regulator. FoE argued for a more active approach to ‘being satisfied’, one in which the assumption of effective operation does not close down the discretionary possibility of considering such matters where there is evidence before the inquiry of planning issues not addressed by the regulator. In truth, by the close of the inquiry, on health (unlike on waste, see section 4.3 below), FoE do not emphatically argue that there are specific reasons why planning should not be satisfied that ‘direct’ health impacts from air and water pollution are acceptable in this case by merely deferring to the EA (both existing permit decisions and the assumption of effective operation going forward) (FoE 2016b, 18–20). Instead, they put forward general claims about the need for planning to consider public health and focus on ‘indirect’ impacts (section 4.2.4) and ‘nuisances’ (not considered here).

#### *Recommendation and decision*

In her report to the SoS, on the question of air and water pollution and the relationship between planning and other regulatory regimes, the Inspector resolves that:

“In the light of para 122 of the NPPF, and the Frack Free Balcombe case, I am content that it could be assumed that the regulatory system would operate effectively to control such emissions. There would be no health impacts resulting from these matters” (McKay 2016, 403).

The SoS fully agrees with this approach and so the issue of direct health impacts from emissions to air and water is procedurally closed at the inquiry (DCLG 2016).

### 4.2.2 DOES SCIENTIFIC UNCERTAINTY OVER DIRECT HEALTH IMPACTS NECESSITATE A PRECAUTIONARY REFUSAL?

#### *Initial LCC decision*

In their response to the applications during LCC’s initial decision, FoE sought to establish the precautionary principle as an approach to decision-making in the context of risk and uncertainty encouraged by UK planning policy (FoE 2014b). FoE argue for a precautionary approach to be adopted in this particular case because there is general uncertainty over the public health impacts of high volume hydraulic fracturing (HVHF) in the UK, there are reports of ground and surface water contamination from the US, and because of issues of insufficient information on certain matters in Cuadrilla’s applications (FoE 2014b). They suggest that adopting a precautionary approach to the matter of the potential risk of water-born pollution in this case would entail refusing permission “unless it can be proven that there will be no groundwater contamination”, and would mean that known impacts from the US and Australia cannot be ignored in decision-making (FoE 2014b, no pagination, para. 1).

### *Pre-inquiry written evidence*

In his written evidence to the inquiry, McCoy highlights the ongoing uncertainty concerning the health impacts of HVHF in the UK. He suggests that there are “few robust and long-standing ‘exposure and health impact studies’ of HVHF” and rigorous evidence would require costly and complex epidemiological studies and require many years to complete (McCoy 2016, 7). Notwithstanding this lack of understanding, McCoy points out that the scientific literature is growing rapidly, which he suggests now makes the PHE review that Cuadrilla rely on out of date. In response, Cuadrilla’s planning expert Smith refers to the ESs, which find impacts on air quality to be insignificant and the risk of water contamination as negligible (Arup 2014a).

### *Inquiry proceedings*

In her opening remarks, barrister for FoE Estelle Dehon again reiterates the uncertainty surrounding the public health impacts from shale gas extraction. She suggests that “[t]his uncertainty is in itself a material planning consideration” (FoE 2016a, 7), all the more so because of the requirement of local policy DM2 for the decision-maker to be satisfied by the provision of appropriate information that all harmful impacts of the development can be eliminated or reduced to acceptable levels. FoE’s claim here is that the general scientific uncertainty over the health impacts of HVHF means that the Inspector cannot be satisfied that public health impacts will be eliminated or reduced, as DM2 demands. On the other hand, Cuadrilla point to specific assessments and consultation responses from the likes of the EA and PHE (EA 2015; PHE 2014), which find known risks to public health to be low to negligible if operations are properly run and regulated, and on the basis of which the Inspector should be satisfied.

In cross-examination, QC for Cuadrilla Natalie Lieven challenges McCoy on extrapolating from reports and studies from the US. She takes McCoy to the PHE report, from which she quotes that “[c]aution is required when extrapolating experiences in other countries to the UK since the mode of operation, underlying geology and regulatory environment are likely to be different” (PHE 2014, iii). “I would assume that you would agree with that?”, she asks. McCoy responds that he does agree, but picks out ‘caution’ as the key word. “You need to be cautious about applying evidence from elsewhere to the UK setting – it doesn’t say that you shouldn’t apply it at all”. He then suggests that some factors, such as population density, suggest the risks could be greater in the UK. Lieven then takes him to the Medact report (McCoy and Saunders 2015), of which he is a co-author – specifically to the section where the various differences between the US and UK are acknowledged (McCoy and Saunders 2015, 26–27). “So there’s a whole series of reasons”, she concludes, “why the US and the UK are not the same, in terms of risk”. “Exactly”, replies McCoy (INQ Mar 2 p1 01.16.30 – 01.20.30). Returning to the matter in re-examination, Dehon makes the point that whilst urging caution the PHE report itself relies on the US experience to reach its conclusions. In response, McCoy makes a couple of general points about the state of scientific evidence linking shale development and health:

“The first point... is this is still a relatively new activity for which scientific evidence is being generated. The second is that there is a large amount of uncertainty in all of this. Uncertainty about the potential impacts on health of a variety of hazards, and uncertainty about the extent to which shale gas production actually creates human exposure to these potential hazards. We’re also seeing, within the evidence, quite varied findings... you have some research that shows that there’s very little exposure to potential hazards, [and] other studies that indicate that there is potentially significant exposure to hazards... However... independent public health people are saying two things. One is that there are clearly signals from the scientific literature that suggest that these hazards and the potential impacts of these hazards on human health are real and potentially significant. And secondly, we need to proceed with caution. That there’s certainly a requirement for more monitoring and evaluation. But, within that body of general opinion there’s also a view, in public health, that the signals are enough to suggest that we shouldn’t go ahead with shale gas production at all” (INQ Mar 02 p1 01.27.00 – 01.32.00).

Richard Bate, FoE’s planning expert, is asked in EiC about the relevance in planning policy terms of McCoy’s evidence on uncertainty. “To what extent, if any”, asks Dehon, “is that lack of understanding relevant in planning policy terms?” “It is relevant” answers Bate. He then suggests that the approach in such a context is to put thorough monitoring arrangements in place to improve levels of knowledge; and to make a judgement in relation to risk, where, as dictated by DM2, the decision maker must be satisfied by the provision of appropriate information that the development will not produce adverse impacts (INQ Mar 02 p2 00.15.30 – 00.17.45).

It is FoE’s case that these ‘signals’, as McCoy puts it, prevent the decision maker from achieving this satisfaction and are sufficient to justify a precautionary rejection of these applications on public health grounds. They claim the scientific literature primarily on the US is relevant to this decision, and, taken as a whole, demonstrates uncertainty over health impacts. It remains Cuadrilla’s case that the relevant regulators and consultees have assessed these specific applications and found no significant or unacceptable risk to public health, assuming operations are ‘properly run and regulated’. It is these assessments, and not ‘signals’ from the US experience, that are relevant to achieving satisfaction because of the difficulty in extrapolating from the US. The dispute is therefore over the steps the decision maker takes, and places they look, in order to be satisfied that the development will not produce unacceptable impacts on human health. FoE suggest the Inspector should take the US experience into account, and find the uncertainty over impacts therein a barrier to being satisfied. Cuadrilla suggest these signals are irrelevant in the face of the responses to the proposals of the EA and PHE, which ought to ensure the Inspector’s satisfaction.

### *Recommendation and decision*

In her recommendation to the SoS, which on public health the SoS accepts in full, the Inspector notes that neither Perigo, nor PHE consider the risk to public health from the applications to be significant or unacceptable. On the question of US evidence the Inspector states that “[w]hatever the US experience, the regulatory regime in the UK is different” (McKay 2016, 403). Whilst providing no reasoning directly on scientific uncertainty over health impacts generally, she therefore concludes that any scientific

uncertainty over health impacts in the US is irrelevant. Finally, she concludes: “I am satisfied that the Appellants have demonstrated, by the provision of appropriate information, that all potential impacts on health and wellbeing associated with the projects would be reduced to an acceptable level” (McKay 2016, 404).

#### 4.2.3 ARE THE PUBLIC HEALTH RISKS OF PRODUCTION-PHASE, INDUSTRY-SCALE FRACKING MATERIAL?

##### *Pre-inquiry written evidence*

In his written evidence McCoy sets out the importance of considering the potential impacts of production at scale at the stage of these two exploration applications:

“These potential impacts of commercial shale gas production at scale are pertinent because they contribute to the current and considerable levels of anxiety and stress amongst certain communities in Lancashire” (McCoy 2016, 15).

In other words, the Inquiry ought to consider the likely impacts of a production-phase industry – of the sort the Government seeks to encourage – because members of the community are reacting in significant part to that very prospect when expressing anxiety and stress over these applications, which in turn can cause ‘indirect’ health impacts. McCoy then suggests that the risk to public health is likely to be greater for the production phase than for exploration; with the negligible to low risk from water and airborne pollutants for these specific applications due to, in part, the temporary and limited nature of exploration. McCoy suggests that it is the greater intensity and cumulative nature of health risks from production at scale that make it a higher risk activity (McCoy 2016). He suggests Cuadrilla’s failure to assess the health impacts of production at scale is inadequate before, finally, he concludes:

“[O]ne cannot reasonably avoid or neglect the relationship between shale gas exploration on two sites in Lancashire with the possibility or the likelihood of commercial shale gas production taking place at scale” (McCoy 2016, 19).

##### *Inquiry proceedings*

In his EiC, Dehon asks McCoy why it is relevant to consider commercial production at scale at the exploration application stage. “I think that the stress, anxiety and worry that is being experienced and expressed by members of the community”, answers McCoy, “relates only in part to the direct and immediate potential impacts of fracking on two exploratory sites, but relates to the future possibility of fracking having a much bigger impact both on the health of the population, but also on the wider social and ecological environment” (INQ 02 Mar p1 00.32.00 - 00.33.10).

In cross-examination Lieven takes McCoy to para. 147 of the NPPF, which includes the requirement for mineral planning authorities to “distinguish between the three phases of development (exploration, appraisal and production)...” (DCLG 2012, 36; see A1.2.2).

“So the national policy position”, continues Lieven, “is at this stage to only look at the exploration phase, isn’t it?” “I think what’s really evident”, McCoy responds, is:

“That even in this phase of exploration, concerning only two sites, what’s very clear is that the concerns, the stress, the anxiety, the mental health impacts of this exploratory phase is clearly related to fears about the risk of commercial scale production. And for that reason I think it’s completely reasonable for, even at this stage, for some form of risk assessment of commercial scale hydraulic fracturing being undertaken...” (INQ Mar 02 p1 01.0.50 – 01.08.30).

Cuadrilla’s position, then, is that the planning policy is entirely clear – the only impacts to human health that should be considered at the exploration stage are those arising from exploration itself, and not from any potential future production application or hypothetical industry. FoE do not directly challenge this as a matter of policy, but suggest that impacts of production at scale are relevant in so far as their prospect is causing ‘indirect’ health impacts now.

#### *Recommendation and decision*

Ultimately the Inspector and SoS sided with Cuadrilla on this matter, with the Inspector concluding:

“The health impacts associated with these exploratory works appeals should be distinguished from those which might be associated with production at scale. The available evidence does not support the view that there would be profound socio-economic impacts or the climate change impacts on health envisaged by Dr McCoy associated with these exploratory works” (McKay 2016, 404).

#### 4.2.4 ARE THE INDIRECT HEALTH IMPACTS ACCEPTABLE?

FoE do not argue that the direct health impacts of emissions to air and water from the exploratory activities proposed at these two sites are unacceptable (though, as just seen, they do argue that uncertainty over the health impacts of fracking generally prevents reaching the ‘satisfaction’ on the basis of ‘the provision of appropriate information’ required by DM2). Instead it is McCoy’s case that direct health impacts from the proposals will “be most likely caused by the effects of noise and other nuisances” (McCoy 2016, 20). As such, there is no explicit disagreement between the parties on the acceptability of the direct health impacts from emissions to air and water, though as McCoy makes clear in his written evidence, this is only so on the assumption of effective regulation and only applies to the exploration phase:

“In relation to other hazards (notably water and air borne pollutants), as noted earlier, a negligible to low risk is due to the specific combination of the temporary and limited nature of

shale gas exploration; and assumes that measures will be effectively applied to mitigate risk and harm” (McCoy 2016, 20).

There was however disagreement on the matter of the acceptability of ‘indirect’ health impacts being felt already by communities and mediated through public concern and perceptions of risk.

#### *Pre-inquiry written evidence*

In his written evidence McCoy refers to a Health Impact Assessment (HIA), commissioned by LCC’s Director of Public Health and focusing on the two application sites, which reported that:

“The over-riding responses about the two proposed exploration sites voiced by members of the local communities who attended the workshops were those of fear, anxiety and stress, which are affecting their mental wellbeing, with some people experiencing sleep disturbance and depression” (Cave et al. 2014, 2).

McCoy suggests that this fear, stress and anxiety is likely to be caused by perceptions of risk, particularly in relation to production at scale; a lack of trust in the oil and gas industry in general and Cuadrilla in particular; and, finally, “feelings of anger and helplessness caused by the view that shale gas production will be forced onto local communities by national government policy and insistence” (McCoy 2016, 11). McCoy considers Cuadrilla’s proposed mitigations to alleviate such concern and perceptions to be insufficient so long as “there is a belief that the government is set to impose commercial shale gas production at scale”, the risks of production at scale have not been properly assessed, and reasons exist to doubt the efficacy of regulation (McCoy 2016, 11). McCoy goes on to claim that public concern regarding production at scale being conducted safely continues for a number of reasons, including:

“[A]) the lack of certainty about the laws, policies and systems that would regulate commercial shale gas production at scale, including the specifications for impact assessments and monitoring; b) a reliance on self-monitoring and reporting by the industry; c) key regulatory bodies, including the EA, the HSE and local authorities, having experienced large budget and staffing cuts in recent years; and d) recent requirements for local authorities to speed up the process for assessing planning applications to conduct shale gas exploration” (McCoy 2016, 11–12).

In Smith’s written evidence, he acknowledges that health effects may be exacerbated or triggered by “the perceptions that people have about the projects and how they believe they may be affected by it rather than the likelihood of their exposure to it” (Smith 2016a, 57). He then sets out the steps Cuadrilla are taking to mitigate these ‘perception effects’. These include environmental monitoring and the publication of results, the implementation of comprehensive environmental operating standards, and continuing engagement with the local community.

#### *Inquiry proceedings*

In her opening remarks Dehon reiterates that the HIA demonstrates that negative health impacts arising from the public perception of risk are already being caused by these applications, and argues that

Cuadrilla's proposed mitigation is unlikely to be sufficient for the reasons set out by McCoy above (FoE 2016a). In Cuadrilla's opening submissions, Lieven states that:

"A number of third parties have raised issues around health impacts arising from the stress and fear induced by the proposal. Doubtless these concerns are very genuinely felt, and it is understandable that when a technology comes forward that they are not used to, and which has been subject to much adverse publicity people will feel anxious. There is much evidence that exactly the same was true of the development of railways in the early nineteenth century. The Appellant has done its utmost to deal with these concerns, and will continue to try to assuage concerns through monitoring and information" (Cuadrilla 2016a, 7).

Followed by:

"Public concerns can be material considerations. However, where those concerns are shown to be objectively not justified and to be fully dealt with by another regulatory regime, in this instance by the role of the EA and the environmental permitting process, they should be given very little weight" (Cuadrilla 2016a, 7).

In his EiC, Dehon asks McCoy "to what extent are the perceptions of risk.... expressed by the communities objectively justified?"

"The perception of risk is, by definition, something which is subjective... but... for the reasons that I've laid out in my proof of evidence... there are reasonable causes for members of the community – both within the immediate vicinity of the proposed sites but also across Lancashire generally – to have concerns about the impact of fracking on the local environment and the health of people living in Lancashire" (INQ Mar 02 p2 00.30.20 – 00.31.40).

"To some degree", Lieven asks during cross-examination, "public concern can only be displaced and will only be displaced when the activity actually commences and people see a) that it's safe and b) [Notable disquiet in the audience at this point, Inspector has to interject] that the regulatory system is working properly". "There isn't really", Lieven continues undeterred, "any other way to displace the kind of concerns the Inspector's heard at the inquiry is there?" "I think there is", McCoy responds:

"A lot of the stress, concern, and anxiety arises from people's concerns about the prospect of commercial scale fracking. And one way in which you could attempt to dispel that would be to conduct, at this stage, a comprehensive assessment of commercial scale fracking and what that might look like..."

"Until you have fracturing in the UK", Lieven persists:

"It's impossible to convince people that there won't be pathways to human health. The way to prove that there is no pathway to human health, through a combination of good practice and good regulation - and geology - is for the process to start, and then those concerns will, we assume, and Public Health England assume, and the Environment Agency assume, will be dissipated, because [it] will be shown to be safe. You can study 'til you're blue in the face, but until you do it you're not going to dissipate people's fears".

"You're assuming", McCoy responds:

"That it will be shown to be safe. And there's no basis for making that assumption. But we do have experience from other parts of the world, and secondly, we do have experience from the oil and gas industry and the effects of oil and gas production in general, which has been noted as being a risky industrial activity" (INQ Mar 02 p1 01.10.30 – 1.16.19).

In Smith's cross-examination, Dehon asks him whether perception effects are relevant to the health impacts of the development? "They can be relevant", he answers. Dehon then turns to the steps taken to address these perceptions. Focusing on 'engagement with the community', she suggests that thus far Cuadrilla's engagement with the community has not weakened the strength of their concern. "Very, very difficult to judge", answers Smith:

"You're quite right, we've been involved in a lot of consultation, we've put the facts in front of a lot of people. I can't really come to a view on whether the concern is greater or less than before that consultation was undertaken" (INQ 10 Feb p3 00.00.00 – 00.04.30).

In closing Dehon reiterates McCoy's view that public concern and perceptions in this case are justified. "There is", she argues, "a significant degree of uncertainty in the scientific literature about the potential health effects of fracking, and so fears cannot be assuaged by turning to an established view on the matter" (FoE 2016b, 19). She submits, furthermore, that contrary to Smith's answer, it is clear that Cuadrilla's attempts so far to mitigate these concerns and perceptions have not been successful. She makes clear that McCoy rejected both the view that concerns can only be displaced after the activity is allowed to commence, and the assumption that its commencement would indeed necessarily demonstrate it to be safe. Finally, she reiterates McCoy's view that a proper health assessment of production phase fracking at scale is an alternative means to potentially dispel (or indeed confirm) concerns (FoE 2016b).

For Cuadrilla, Lieven repeats the claim that the "public anxiety here, and any stress related health effects here, can only ultimately be dispersed by allowing the development and then showing it can be undertaken completely safely" (Cuadrilla 2016b, 30). She then suggests that many of these fears are based on the US experience, where the regulatory regime is totally different, and from which there's no basis to extrapolate. Finally, she accepts that public concern can be a material consideration, however, "when it relates to processes which are fully regulated and where it can be shown that all pathways that impact on human health are fully controlled, very little weight can or should be given to such concerns" (Cuadrilla 2016b, 30).

Somewhat unusually the parties are in agreement about the procedural question over the materiality of 'indirect' public health impacts. There is agreement that in principle public concern and perceptions are potentially material considerations. Nor do they disagree particularly over the scale or existence of the impact (unlike climate change, waste, economic and direct health impacts, the indirect health impacts are contemporaneous with the decision-making process as opposed to prospective scenarios and estimates). Where they disagree is whether the details of this case dictate that the impact is unacceptable, with the key test being whether the concern and perceptions through which the impacts are mediated are justified. FoE argue that public concern and the health impacts it is causing should be given significant weight – sufficient, along with the health impacts from 'nuisances' and waste disposal, to justify rejection on public health grounds. They argue that these concerns are justified by scientific uncertainty over the health impacts of fracking, particularly production at scale; as well as by the

prospect of Government imposition and reasons to doubt the efficacy of regulation. They also argue that Cuadrilla's attempts to mitigate these impacts have been demonstrably unsuccessful. Cuadrilla, on the other hand, argue that these concerns should be given very little weight because they are based on perceptions, adverse publicity, and extrapolation, not fact; they relate to possible hazards which will be fully controlled by the regulator; and, finally, because the only way to address them is through granting permission, which will inevitably show them to be misplaced.

#### *Recommendation and decision*

On the matter of indirect health effects caused by public concern the Inspector sides with Cuadrilla in granting public concern little weight. She concludes that:

“[T]he processes would be regulated and all pathways that could potentially impact upon human health would be monitored and appropriately controlled. Given these factors, I agree with the Appellants that little weight should be given to these concerns. I do not consider the expressed fear and anxiety can be regarded as being reasonably engendered or a justifiable emotional response to the projects in the light of the level of monitoring and controls that would be imposed upon the proposed activities” (McKay 2016, 404).

Once again, the SoS does not demur (DCLG 2016).

## 4.3 WASTE DISPOSAL

Once again, the dispute over waste was between Cuadrilla and FoE. The issue turned on three key contests. The first concerned – not for the first time – the procedural question on the relationship between planning and the EA. Here, Cuadrilla argued again that the EA had considered the matter of waste during its permitting process (in which Cuadrilla was awarded the necessary environmental and waste permits by the EA) and were satisfied that the matter was acceptable. The approach to take was to defer to the EA’s satisfaction, and that was the end of the matter. On the other hand, FoE’s argument was based on drawing a distinction between *in-theory capacity* to treat and dispose of flowback waste from the projects and the *in-practice availability of that capacity*. The EA had considered the former but not the latter, they argued, and so it fell to the planning decision maker to consider the latter and avoid a gap in regulatory oversight. The second contest concerned the acceptability of the projects’ demands on offsite treatment capacity for flowback waste. Cuadrilla acknowledged that, at peak demand, the two sites would require 68% of the identified treatment capacity for liquid radioactive waste which is classified as a ‘very substantial and significant’ impact (each site on its own at peak required 65% of said capacity, with the 68% figure achieved through staggering operations between sites). FoE argued that this was self-evidently a significant and adverse effect with the potential to overwhelm capacity in conjunction with the potential demands of other users, whereas Cuadrilla claimed that it could be acceptably managed and controlled. The third and final contest concerned the reliability of the estimates of flowback volume and reuse on which treatment capacity demand was based. Cuadrilla argued that their estimates were reliable, and in any event, unexpectedly large volumes could be managed acceptably. FoE argued there was an unacceptable possibility of higher than expected flowback treatment needs overwhelming capacity with potentially serious knock-on effects. For each of these contests I will provide an account of the rival parties’ arguments, as well as the Inspector’s recommendation and the SoS’s decision on the waste issue.

### 4.3.1 SHOULD PLANNING SIMPLY DEFER TO THE EA’S OVERSIGHT ON THE IMPACT ON WASTE DISPOSAL CAPACITY?

FoE’s primary concern over waste was that there may be insufficient national capacity to treat flowback fluid<sup>14</sup> produced by the sites. Cuadrilla’s starting point on waste was that reliance should be placed on

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<sup>14</sup>‘Flowback’ is comprised of fracking fluids which re-emerge from the well after fracking. Flowback is often distinguished from ‘produced water’ – typically lower volumes of much more contaminated wastewater produced in the longer term. The inquiry used the term ‘flowback’ to refer to both the immediate post-fracking flowback and the longer term produced water. It is anticipated that high volumes of flowback will be produced immediately after fracking, with lower volumes of more highly contaminated waste being produced throughout the life of the

the EA permitting regime, which had already addressed the issue and found the projects acceptable. The only knock-on planning issue arising from waste concerned HGV generation (to haul the waste to offsite treatment facilities). However, as peak waste generation is expected to occur during a relative lull in required HGV movements, this was deemed insignificant. In other words, there was no issue for a planning inquiry to debate.

*Pre-inquiry written evidence*

In his written evidence, Mark Smith, Cuadrilla's planning expert, drew support from the conclusions of LCC's planning officer. Waste would be "controlled by other regulatory regimes and... the County Council could assume and be satisfied that such controls would be enforced by the respective bodies" (Perigo 2015, no pagination); and:

"This issue has been reviewed by the EA in their determination of the Mining Waste Permit and the EA is satisfied that the applicant has used appropriate information to design the proposals and that there are sufficient controls in place to ensure that flowback is controlled, treated and disposed of appropriately" (Perigo 2015, no pagination).

In short, Cuadrilla argued that capacity to deal with the waste had already been assessed and found acceptable by the EA and so there was no action required from the planning decision maker other than deferring to the work and conclusions of the EA.

Alan Watson and Richard Bate, FoE's waste and planning experts respectively, sought to argue for the necessity of a role for the planning decision maker in regulating the treatment and disposal of flowback from the sites. Watson draws a distinction between the existence of capacity in theory and the availability of capacity in practice, the latter of which, including the current and projected demands of other users, has not been assessed by either Cuadrilla or the EA (Watson 2016a, 7). He draws attention to a DECC strategic environmental assessment for further onshore oil and gas licensing which acknowledges a possibly 'substantial burden on existing wastewater treatment infrastructure capacity' from further onshore licensing and development (DECC 2013, xvi). Ensuring this does not produce unacceptable effects will require, amongst other things, 'scrutiny through the planning system' (DECC 2013, xvi). In short, Watson argues for precisely this scrutiny from the decision maker in this case over the availability of capacity, as it has not been provided by the EA. Bate adds that waste processing capacity is capable of being a material consideration in planning as established in a range of local and national policies (Bate 2016). Perhaps most pertinent is the requirement in para. 49 of the PPG for Waste (PPGW) that:

"Before granting planning permission, the local planning authority will need to be satisfied that the impacts of non-waste development on existing waste management facilities are acceptable..." (DCLG 2014, no pagination, para. 28-049).

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projects. Flowback is considered a low level radioactive substance by the EA, due to naturally occurring radioactive material (NORM) picked up in contact with the substrata. It therefore requires specialist treatment and disposal.

At the point of the inquiry then, Cuadrilla argued that the treatment and disposal of flowback waste had already been assessed and found acceptable by the EA. The planning decision maker was not required to reconsider the matter, but merely defer to the EA's prior consideration. FoE, on the other hand, suggested that the EA had considered the matter within the bounds of their remit – whether there were facilities at which the waste could be treated. What the EA had not considered, argued FoE, was whether this capacity was likely to be available in practice to Cuadrilla, and any knock-on planning impacts if it was not. As such, the decision maker was required to consider the matter to prevent a gap in the regulation and oversee any impacts arising from the potential unavailability of treatment capacity.

### *Inquiry proceedings*

In her opening statement on behalf of Cuadrilla, QC Natalie Lieven argued that the near entirety of FoE's case across climate change, public health, and waste (with the exception of methane emissions estimates) was immaterial to the inquiry. Drawing on case law (FFB vs. WSCC) and national policy (in particular para. 122 of the NPPF), she suggested that:

“These matters have been dealt with in great detail through the environmental permitting regime, and will be subject to intense monitoring and regulation as part of that regime... There is no basis for you or the Secretary of State to go behind those regimes, and do anything other than assume that they will operate effectively” (Cuadrilla 2016a, 3).

On the other hand, Estelle Dehon, barrister for FoE, argued that neither the national policy nor the case law give rise to an ‘irrebuttable presumption’ (FoE 2016a, 6). That is, the EA's satisfaction is not the beginning and end of the matter, and does not guarantee that the proposals are acceptable in planning terms. The Inspector, she suggests, has the discretion to consider whether these issues have been adequately addressed by the EA.

In cross-examining Cuadrilla's planning expert Smith, Dehon takes him to the local policy DM2 (see A1.2.1). Smith, in turn, prefers to focus on paras. 122 of the NPPF and 112 of the PPGM (see A1.2.2 and A1.2.3).

Dehon puts it to Smith that the assumption prescribed in both paragraphs does not create an ‘irrebuttable presumption’ that the regimes will operate effectively. “If there is evidence to show that the regime is not operating effectively”, she asks, “then the planning decision maker is not required to close their eyes to that?” “It clearly says that the planning authority should assume that those regimes will operate effectively”, Smith responds, “[i]t doesn't say anything about... considering evidence that they don't operate effectively – it says assume that they operate effectively”. Dehon persists, suggesting that the assumption prescribed in policy is not ‘the beginning and end of the matter’. Smith disagrees. “If someone was to bring evidence that the regime was not operating effectively... is your evidence really that the planning decision maker should... not consider it?”. “I don't think it is a matter for this inquiry”, Smith replies, later suggesting that “that evidence should have been brought to the attention

of the Environment Agency before issuing their permit... it's not a planning consideration". "On your evidence", Dehon summarises, "she's [the Inspector] to close her eyes as to the wider effect on the availability of waste treatment capacity?" "In terms of capacity", responds Smith, "that matter has been addressed through the issuing of the permit, and the assumption is that the regimes will operate effectively, as required by paragraph 122" (INQ Feb 10 p2 40.30 – 59.30).

Dehon turns to PPGW para. 49 (see above). Dehon points out that Smith did not make reference to this particular policy in his evidence. Smith accepts that the acceptability of the impact on waste management facilities is relevant, but that this impact has been considered by the EA, who should be assumed to have operated effectively (INQ Feb 10 p2 01.07.00 – 01.10.00). Lieven returns to this with Smith in re-examination, pointing out that the following paragraph (PPGW para. 50) more or less repeats the formulation in PPGM 112 concerning other regimes and the assumption of effective operation (see DCLG 2014, no pagination, paras. 28–050). Reading 49 and 50 together, she asks, what is the guidance on the relevance of the capacity of off-site treatment? "The PPGs position is that that's an issue for other non-planning related regimes", answers Smith (INQ Feb 10 p4 02.08.40 – 02.11.25).

In his cross-examination, FoE waste expert Watson is asked about the assumption of effective operation of other regulatory regimes in planning policy. Lieven suggests that planning policy makes it clear where the responsibility for offsite capacity lies. Watson, in response, draws a distinction between the existence of facilities where the waste can be treated and disposed of in principle, and the in practice availability of that capacity. Lieven then turns to the EA permit decision document which states that:

"We have assessed the application and we are satisfied that the waste can be safely dealt with. Capacity is primarily an issue for the applicant and if an appropriately permitted outlet for the waste cannot be found, the operations will have to stop" (EA 2015, 93).

Watson replies that he asked the EA about this, and they replied that there is sufficient capacity but they haven't assessed the availability of it (see Watson 2016c, 4–5). Lieven responds that if there isn't available capacity they'll just have to cease operations. "Yep", replies Watson:

"Of course, that doesn't stop the land use implications that flow from that. If you swamp the capacity with one application then we all bear the costs of that, which is quite clearly a planning issue".

He goes on to suggest that halting operations has implications for the risk of seismicity. "Offsite disposal is a matter for the EA", Lieven tries one last time. "We've discussed that", replies Watson:

"And our understandings differ on that. Of course the EA regulate those facilities and make sure the discharges from them are acceptable. But what the EA doesn't do and hasn't done is look at the availability of capacity, of other users for example, and look at the impacts of that on those other users" (AUD Feb 26 PM 19.50 – 23.00).

In his EiC, FoE's planning expert Bate is asked about what the wording of policy DM2 means for the inquiry (see A1.2.1). As already seen in the discussion on public health above, Bate replies that the SoS must assure himself that these matters have been taken into account, and that waste impacts are "very much within the frame of reference for this inquiry" (INQ Mar 2 p2 48.00 – 49.20). On PPGM 112 Bate

draws attention to the first sentence which states that some “issues may be covered by other regulatory regimes but may be relevant to mineral planning authorities in specific circumstances” (DCLG 2014, no pagination, para. 27–112). “In other words”, argues Bate, “it’s making it quite clear that there is a possibility that some issues are relevant to both regulatory bodies” (INQ Mar 2 p2 55.20-01.01.00). Turning to the EA permit decision document Bate notes the approach taken by the EA to the availability of treatment capacity. There the EA explain that:

“The Environment Agency regulates how waste will be dealt with. Issues relating to the provision and capacity of facilities are matters for the waste planning authority and market forces. In the event that sufficient storage and treatment capacity is not available for a particular waste stream operations generating that waste will need to cease” (EA 2015, 104).

Bate argues that this makes clear that the EA is satisfied that the method of dealing with the waste is appropriate, but has “quite specifically left open the option that, for one reason or another, capacity might not actually be available in the real world”. Bate suggests that the EA has “washed its hands of the matter” of availability of capacity, and so the planning authority “needs to be satisfied that the waste can be dealt with” (INQ Mar 2 p2 01.01.00 – 01.08.20). Finally, summing up his case on the need for an active role for the planning decision maker in considering the impacts of waste on available capacity, Bate concludes that:

“[B]ecause of the way the environment agencies role is constructed and expressed, we’ve got to the point where it is quite clear that the planning authority should be taking into account the practical availability of wastewater treatment capacity, because that isn’t something which the Environment Agency set out to do” (INQ Mar 2 p2 01.10.55 – 01.11.30).

In cross-examining Bate, Lieven returns to the EA permit decision document. She suggests that the EA have assessed the application and are satisfied with it, and that availability of capacity is primarily a matter for Cuadrilla. Bate repeats that this shows how the EA has ‘washed its hands’ of the question of availability, and so the planning authority needs to consider it “in order for the decision maker... to be satisfied that planning policies will be met” (INQ Mar 2 p3 58.00 - 01.01.00).

In her closing remarks for FoE, Dehon argues that Cuadrilla’s case on waste “requires the turning of a very blind eye to the repeated use of the word ‘satisfied’ in planning policy” (FoE 2016b, 11). She reiterates FoE’s position on the use of ‘assume’ in the NPPF and PPG (122 and 112 respectively). It is not an ‘irrebuttable presumption’, and does not “necessarily result in the decision-maker being satisfied in planning terms that the impacts on existing waste management facilities will be acceptable” (FoE 2016b, 11). This is entirely in-line with the case law (FFB vs. WSCC), she argues, which establishes “a discretion to consider relevant matters which cannot be left to the regulatory authority, particularly where there is evidence that matters of concern will not be addressed by the regulator” (FoE 2016b, 12). She reiterates the argument of both Watson and Bate that the planning authority’s regulatory responsibility includes the accessibility of sufficient wastewater disposal capacity, and that the EA has made clear in their consultation responses that their responsibility does not extend to this issue. This is a matter for the planning decision maker, she concludes, because otherwise there would be no oversight of capacity availability (FoE 2016b, 12–13). On the other hand, Lieven reiterates that offsite capacity is not a matter

for this inquiry, and that ultimately in the event of insufficient capacity operations would just have to stop. There is, in other words, no risk that the waste will not be treated properly (Cuadrilla 2016b, 32).

To summarise, then, Cuadrilla argued that the decision maker's satisfaction on offsite treatment capacity ought to be a formality. The approach to being satisfied was to take the advice of the regulator, who it is assumed operate effectively. The EA, in issuing the permits, had made clear the waste impacts of the projects were acceptable, and as such an assessment did not need to be re-performed at this inquiry. FoE, on the other hand, argued that the EA's satisfaction was limited to the existence of suitable treatment capacity, as opposed to the actual availability of that capacity in practice. This amounted to a gap in regulatory oversight, necessitating a more active role for the planning decision maker in assessing the projects' impact on the national capacity for the disposal of wastewater.

#### *Recommendation and decision*

The Inspector initially agrees with FoE over the interpretation of FFB vs. WSCC, the assumption in planning policy not amounting to an 'irrebuttable presumption', and that a discretion exists for a planning decision maker to consider such matters. In principle, then, there "are clearly matters such as this which could potentially be taken into account by the planning decision-maker in the exercise of its discretion, particularly if there would otherwise be a gap in the environmental controls" (McKay 2016, 392). "However", she continues, "it is necessary to consider whether the particular matter raised by FoE falls within that category and whether the available information indicates that the matter could not and should not be dealt with by the regulatory bodies" (McKay 2016, 392). The Inspector concludes that this is not such a case. The Inspector does not consider the position adopted by the EA as having "left a gap in the environmental controls that would require further consideration of the matter by the decision-maker" (McKay 2016, 399). If there is a growing need for more treatment capacity, she states, "this is a matter which would be dealt with via the normal and appropriate mechanisms of the market and the planning system" (McKay 2016, 399). The SoS concurs that the position adopted by the EA has left no gap in the environmental controls (DCLG 2016, 8). The Inspector confirms then that she had the discretion to consider the matter in principle had she felt the substantive details of the case merited it, which ultimately she did not. FoE's argument was therefore procedurally possible but judged by the Inspector in her discretion as unnecessary in this case.

#### **4.3.2 ARE THE PROJECTS' DEMANDS ON OFFSITE TREATMENT CAPACITY ACCEPTABLE?**

As well as arguing that the matter of the availability of offsite capacity shouldn't be considered, Cuadrilla also argued that in any event the impact was not unacceptable because they were capable of controlling

and stopping the production of waste by way of a mechanism called a ‘choke manifold’. In other words, should capacity be tied up by other users during peak waste production to the extent that there was nowhere for Cuadrilla’s waste to go, they would simply be able to slow or stop the production of such waste.

*Pre-inquiry written evidence*

FoE’s waste expert, Alan Watson, argued in his written evidence to the inquiry that the demand at peak times of both projects – estimated to be 68% of national treatment capacity - was acknowledged by Cuadrilla themselves to represent a ‘very substantial and significant’ impact (Arup 2014a, 525; Watson 2016a, 7). Watson suggests that the significance of this impact is only likely to increase in the coming years, as more companies seek planning permission for shale gas development. This expectation is shared by DECC (DECC 2013, xvi). Watson also makes reference to the UK NORM Strategy from July 2014, in which the expectation is set out that “the quantities and activities of NORM waste is likely to increase in the next five years” (DECC 2014, 56). The full scale of this impact is not able to be assessed because the applications do not contain estimates of projected future demands of other users. Bate adds in his PoE, in reference to the NORM strategy report, that the development and permitting of new treatment facilities is not expected to be easy or quick (DECC 2014, 32; Bate 2016, 17). Watson concludes that:

“The Secretary of State would need to be sure, for example, that there were no other fracking sites or other major users which also anticipated using that limited treatment capacity. The information needed to assess this was not included in the application nor, so far as I am aware, is it available in evidence to the inquiry” (Watson 2016a, 23).

As such, this ‘excessive’ demand on capacity, coupled with the lack of crucial information in the applications, fails to satisfy policy DM2 (see A1.2.1).

Cuadrilla respond to Watson’s criticisms by way of a technical note (recall that Cuadrilla did not call corresponding expert witnesses to FoE as they disputed the procedural materiality of the issues). In the note, authored by Andrew Quarles, it is argued that:

“The rate and volume of the fluid produced is controlled at the surface. In the event of limitations to traffic or storage, the flow can be reduced or even stopped” (Quarles 2016a, 9).

In his response, Watson suggests that such an approach has a knock-on effect on the matter of the risk of seismicity. “Allowing the flowback of fluids, particularly immediately post-fracking”, he argues, “is necessary in order to address seismicity” (Watson 2016b, 3–4). This is acknowledged in the ESs, Watson points out, which recognise ‘rapid flowback’ as part of mitigating against seismic events (Arup 2014a, L120).

Come the inquiry, then, the matter of the acceptability of the demand on offsite treatment capacity depended on the extent to which Cuadrilla could satisfactorily control the rate of or entirely stop

flowback via the choke manifold. Watson argued that such an approach had consequences for the risk of seismicity. Furthermore, FoE argued that Cuadrilla had failed to supply sufficient information to assess the impact of their demand on capacity by failing to estimate the projected demands of other users. This is despite the recognised possibility of increased demand for such treatment facilities from other shale gas developments, potentially within the relevant timescale. As such they had failed to satisfy the ‘provision of appropriate information’ requirement in DM2 (see A1.2.1).

### *Inquiry proceedings*

In his EiC, Cuadrilla’s planning expert Mark Smith reiterates that any issues with capacity could be mitigated by controlling rates of flowback via the choke manifold. This was, he suggested, a tried and tested approach within the industry that did not present the ‘high environmental risk’ suggested by FoE. Furthermore, he reiterates that the EA had assessed the matter and were satisfied that the waste could safely be dealt with (INQ Feb 9 p3 29.00 – 30.15).

In his EiC, Dehon asks Watson about the planning ramifications of an exceedance of capacity. He answers that the waste would start to build up on the site, and if the reason for exceedance was that more flowback was generated than expected this would require extra HGV movements. Furthermore, ultimately operations may have to be stopped in which case the close coordination between the sites required to ‘sneak under’ the capacity levels would be prejudiced and the length of the project would be extended. Dehon then asks Watson about the choke manifold. “There’s no doubt”, Watson responds, “that the choke manifold can be used to regulate the flowback of fluids”. However, using it would be inappropriate in a ‘red seismic event’ as retaining fluid in the well increases the likelihood of seismicity. Retaining fluids in the well for longer also increases their levels of contamination, making the waste more difficult to treat. Watson describes this as ‘a rock and a hard place’ scenario. Watson concludes that the choke manifold is not a solution, but a stop-gap measure that ‘might allow it to stutter on a little bit longer’ (INQ Feb 26 p2 01.15.10 – 01.19.50).

In closing, both parties reiterate their arguments about the choke manifold – Cuadrilla maintain that the quantity of waste can be fully controlled, whereas FoE suggest that the role of allowing fluids to flowback in mitigating seismicity means that it is not so simple (Cuadrilla 2016b; FoE 2016b).

### *Recommendation and decision*

On the issue of seismicity and what this means for the choke manifold’s ability to control the generation of waste, the Inspector is satisfied by the explanation given in a note submitted to the Inquiry by Cuadrilla. The note (Cuadrilla 2016c) explains that Cuadrilla’s mitigation measures would mean ‘Red Traffic Light Events’ would be rare, and in any event, the volume of flowback during a ‘Red’ event would not exceed either the onsite storage capacity or offsite treatment capacity. “Despite the concerns on

this matter expressed by Mr Watson”, she concludes, “I am satisfied that the choke manifold would provide an effective means of controlling the quantum of flowback fluid on-site” (McKay 2016, 397). As such, because Cuadrilla would have the “means to slow down or stop the generation of flowback fluid until treatment capacity became available”, there would be no material adverse impact associated with the unavailability in practice of capacity to treat the flowback fluid. In conclusion, she states that:

“I am satisfied that the Appellants have demonstrated, by the provision of appropriate information, that all impacts associated with the production of flowback fluid by the projects would be reduced to an acceptable level. The proposed development would be in accordance with JLMWLP Policy DM2 and relevant national policy” (McKay 2016, 399–400).

Her reasoning and judgement is fully adopted by the SoS (DCLG 2016, 8).

#### 4.3.3 ARE THE FLOWBACK VOLUME ESTIMATES RELIABLE?

In the final contest on the issue of waste disposal, FoE argue that through a combination of uncertainty, underestimation, insufficient disclosure, lack of clarity, and mistake, the ES’s flowback volume estimates could potentially be underplaying the scale of the impact and fall well short of the ‘appropriate information’ required by DM2.

##### *Pre-inquiry written evidence*

FoE’s waste expert Alan Watson points to uncertainties concerning flowback volumes in his written evidence. This is especially true for the UK because of the experimental nature of HVHF here (Watson 2016a, 6). Watson argues that the assessment of demand (68% of capacity at peak) is based on conservative volume estimates and that “actual demands for treatment capacity could be much larger than indicated in the ES” (Watson 2016a, 9). He suggests that it is difficult to understand how Cuadrilla have arrived at a 40% worst case scenario return rate (the proportion of total fluid injected that returns as flowback, on which the capacity demand is based), the precise timescale to which this refers, and how it is reconciled with the figure for total water injected as well as the traffic generation assessment. Watson references the DECC Strategic Environmental Assessment, which assumes 30-75% of total fluid injected returns, whilst acknowledging that some wells exceed 100% (i.e. more fluid flows back than was initially injected) (DECC 2013). Watson also points out that the applications are ‘strangely quiet’ about the local data available – Preese Hall, a well fracked by Cuadrilla in the same part of Lancashire in 2011. The rate at Preese Hall was 70% (Watson 2016a, 25). Watson suggests that the Preese Hall data “is the only real and local data and is therefore the most appropriate flowback rate to use (at least as an ‘upper bound’)” (Watson 2016b, 2). Finally, Watson claims that the limited onsite treatment proposed will limit

the scope for reuse<sup>15</sup>, and it is unclear what levels of reuse Cuadrilla are basing their estimates on. These various uncertainties and the general lack of clarity, he suggests, violate DM2, and could mean an already significant impact is being underplayed.

Cuadrilla respond through a technical note written by Andrew Quarles. Quarles defends the 40% figure, clarifying that it is based on published literature on North America, and Bowland geology and data from the UK. “We believe”, he suggests, “that this is an appropriately conservative estimate; most likely the flowback percentage will be less than 40%” (Quarles 2016a, 6–7). Quarles makes reference to a US Environmental Protection Agency (EPA) draft report (EPA 2015), which he says demonstrates that most US geological formations experience flowback volumes lower than 40%, with the Barnett shale being an outlier skewing the overall picture. Quarles suggests that this is because of specific geologic conditions (an underlying prolific aquifer) which are not analogous to the Bowland in the UK (Quarles 2016a, 7). The EPA study also suggests that vertical wells (like Preese Hall) tend to have higher flowback than horizontal ones (like these applications). Furthermore, the operations at Preese Hall were different than those proposed here, and included injection of water, further explaining the higher rates and rendering it an inappropriate comparator. Finally, Quarles points out that the EA were satisfied with Cuadrilla’s estimates when granting the permit (Quarles 2016a, 7–10).

At the point of the inquiry, then, the parties disagreed over the estimates on which waste treatment capacity demand was based. The focus, in particular, was on whether Cuadrilla’s 40% worst-case scenario return rate was a reasonable assumption. FoE suggested that there is evidence to support the possibility of a much higher return rate, most notably the data from Cuadrilla’s previous operations at nearby Preese Hall. Cuadrilla, on the other hand, argued that differences in operations and well-type made Preese Hall an inappropriate benchmark, and that the most geologically comparable formations from the US supported the view that their 40% estimate was appropriately conservative.

### *Inquiry proceedings*

In his EiC, Watson and Lieven discuss the flowback volume estimates. The ESs estimate the total volume of flowback during the 60-90 day initial flow testing (IFT) phase as 21,250m<sup>3</sup> per site (Arup 2014a, 511, table 17.52). Watson is unclear how this is reconciled with the 40% return rate figure, given that the total fluid injected is 112,000m<sup>3</sup> (seemingly a return rate of ~19%). Watson, furthermore, is frustrated by the lack of a week-by-week breakdown of expected flowback volume during the IFT. Instead, the ESs present a total (21,250m<sup>3</sup>) and a maximum weekly figure (1,750m<sup>3</sup>). The total weekly capacity is

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<sup>15</sup>Reuse of flowback refers to using flowback again in the fracking fluids for subsequent fracturing operations. Before this can occur sand and natural gas must be removed, and the flowback is treated with UV disinfectant to control bacterial growth and may be diluted with water. Whether these treatments enable reuse will not be fully known until the composition of the flowback is known. Reusing a proportion of flowback would both reduce the total volume of waste and lessen peak demands.

assessed as 2,700m<sup>3</sup>, hence the 65% peak demand figure (Arup 2014a, 511). The 40% return rate figure and the maximum weekly IFT flowback of 1,750m<sup>3</sup> are both referenced to a Cuadrilla study (Cuadrilla 2014a). This assessment is not in the public domain and not before the inquiry for what are described as commercial confidentiality reasons. Watson accuses Cuadrilla of giving the ‘appearance of being scientific’ by basing key assumptions on referenced documents which can’t be checked by third parties (INQ Feb 26 p2 29.30 – 37.00). He suggests, furthermore, that:

“It’s difficult for us to know how reliable this assessment is, because although we know what Cuadrilla say is the total amount, the 21,250, they don’t provide the breakdown of the timescale and the spread of that 21,250 cubic metres, which will almost certainly be included in that Cuadrilla report [Cuadrilla, 2014a]... ” (INQ Feb 26 p2 37.00 – 38.20).

Remaining on the issue of non-disclosure, Watson turns to an email correspondence between the EA and Cuadrilla accessed by FoE via an FOI request (Watson 2016c, 19–20). In it, Cuadrilla report that the Preese Hall flowback after 3 months was 70% of fluid injected, and at the point of the email (Feb 2012) the well was still generating 20m<sup>3</sup> of produced water per day. Cuadrilla then predict the 1<sup>st</sup> year and subsequent year return rates for the two sites in question at the inquiry, though these estimates are redacted (INQ Feb 26 p2 38.40 – 41.16).

Watson then highlights a discrepancy he has discovered between the ESs and the Waste Management Plan (WMP, part of the EA permit). The WMP states that the overall quantity of flowback generated during initial flow testing is expected to be 22,000m<sup>3</sup> *per well*, whereas the ESs report a similar figure *per site* (there are four wells on each site). Watson explains that whilst he initially considered this likely to be a typographical error, he is no longer sure as the WMP total per site (roughly four times the ES figure) is more easily reconciled with the total volume of fluid injected figure. The 22,000m<sup>3</sup> per well figure would give a per site figure of 88,000 which added to the high-end scenario amount of flowback expected to remain in the ground (24,000, presumed by Watson to be per site – Cuadrilla 2014b, 35; EA 2015, 35) would roughly add up to the total water injected figure (112,000 – though this gives a return rate of ~80%). Watson cannot reconcile the ES’s per site figure in this way (Watson 2016a, 24–25). Furthermore, the EA accepts the larger figure and continues accepting it through to version 7 of a statutory document. If the WMP figure is not just a typographical error but is the real estimate then the projects can be expected to produce roughly four times as much waste as the estimate on which the assessment of treatment capacity demand in the ESs was predicated. This would result, explains Watson, in a massive increase in traffic generation, much more difficulty in coordinating between sites, and a much greater likelihood of exceeding both onsite storage and UK-wide offsite treatment capacity (INQ Feb 26 p2 41.16–51.22). Finally, Watson reiterates that it is not at all clear what level of reuse will be possible (INQ Feb 26 p2 47.00 – 48.15).

Turning to Quarles’ rebuttal note, Dehon asks Watson about the idea that the Barnett shale flowback rates are inappropriate comparators. Watson answers that Quarles’ hypothesis – that the higher rates are explained by the presence of an underlying prolific aquifer called the Ellenberger – has been considered and rejected by the EPA (EPA 2015, 7–11). Watson argues that the Barnett has previously

been considered as quite analogous to the Bowland as they are both carboniferous formations, and, in any event, the aquifer in question only underlies part of the Barnett which mostly sits on limestone. “Convenient as it would be to have that as an explanation for the high flow rates in the Barnett”, concludes Watson, “it doesn’t seem that it’s been accepted by the EPA, and it’s not consistent with the geology” (INQ Feb 26 p2 51.22-01.00.30).

Asked about a table in Quarles’ note setting out the US studies that helped inform Cuadrilla’s 40% figure, Watson urges caution about the specific definition when discussing studies on flowback. “You’ve got to make sure you’re talking about the same thing”, explains Watson, particularly regarding the timescale over which the flowback is measured. Watson argues that the studies in Quarles’ table (Quarles 2016a, 8, table 7.1) – with low flowback rates – are largely expected rates over short timescales (e.g. 10 days), and therefore exclude subsequent flowback contributing to final levels. He reiterates that Preese Hall is the most appropriate benchmark, though he “can quite understand why Cuadrilla don’t want to draw our attention to it, because it presents them with major problem with treatment” (INQ Feb 26 p2 01.00.30 – 01.06.40).

Watson then turns to Quarles’ distinction between vertical and horizontal wells. Watson suggests that the study Quarles relies on here uses a small sample of only 18 vertical wells. Furthermore, he suggests that whilst it may be true that vertical wells produce higher rates in the short term, horizontal wells can be expected to produce higher rates later in their life. Watson describes this as “a devil and the deep blue sea scenario” (the higher the early rates, the steeper the peak and the greater difficulty for volume treatment capacity; but the longer the tail, the more contaminated the flowback, and the greater difficulty for contamination level treatment capacity). A longer tail to flowback, Watson suggests, also has implications for re-use, as it may be either too late (because it may flowback after fracking operations have ceased) or too contaminated (because it has been in contact with the ground for longer) to reuse (INQ Feb 26 p2 01.06.40 – 01.10.00).

Finally, Watson suggests that there may be confusion between the planning applications and the EA documentation as to the specific timescale to which the term ‘flowback’ is being applied. Watson suggests that in the ESs ‘flowback’ refers to all phases of the development, whereas the EA refer to flowback as occurring “between hydraulic fracturing stages” (EA 2015, 22, 27). The implication is that the EA’s satisfaction with the impacts of flowback waste may be based on a limited proportion of that waste (i.e. Watson is not sure whether the EA’s assessment includes flowback produced from the IFT phase onwards) (INQ Feb 26 p2 01.10.00 – 01.12.45).

Cross-examination starts with this question of the timescale to which the 40% return rate relates. The EA decision document states that 10-40% of the injected fluid will return as flowback “between hydraulic fracturing stages” (EA 2015, 22). To Watson, the reference to ‘between the hydraulic fracturing stages’ from the EA suggests that they expect a 10-40% return rate during the hydraulic fracturing stage of the project, but then do not specify what is expected in the subsequent IFT and

Extended Flow Testing (EFT) phases. To Lieven, the EA are ‘clearly’ referring to the IFT, and she is expressly instructed by Cuadrilla that the 10-40% figure relates to the IFT. Watson suggests that the EA know the difference between the fracturing stage and the testing phase, and had they meant the latter they would have said so (AUD Feb 26 PM 06.15 – 14.45).

Lieven returns to the question of whether Preese Hall is an appropriate analogy. Watson accepts that generally vertical wells appear to produce higher flowback in the short term, though he repeats his point about the small sample size of verticals in the study on which Quarles relies; and that more flowback may come back later and overall, and be more contaminated with horizontal wells. Watson then dismisses Quarles’ point about the different nature of operations between Preese Hall and these proposals as very tenuous (AUD Feb 26 PM 27.20 – 32.30).

Lieven then questions Watson on his criticisms about the lack of clarity and disclosure in the applications about how the flowback rate estimates were arrived at. Watson’s primary concern is to review how the total IFT flowback of 21,250m<sup>3</sup> converts into the maximum weekly figure of 1,750m<sup>3</sup>. It is currently impossible to say, suggests Watson, whether this key part of the assessment “is reasonable and evidence based” (INQ Feb p4 02.58 – 06.00).

Lieven argues that the EA had all the data they required, including the ESs, when they were satisfied of the acceptability of the projects’ waste impacts, but Watson remains of the view that a lack of disclosure has prevented third parties from properly assessing the proposals and their demands on offsite treatment capacity. He argues that:

“The environmental assessment process is not just supposed to involve the Environment Agency on our behalf, but allow NGOs and the public to participate. Cuadrilla and the Environment Agency in this case have prevented that by not providing the data that’s needed to assess these things” (INQ Feb 26 p4 12.30-13.00)

On the discrepancy between the WMP and ESs, Lieven suggests that it’s clear that the per well figure in the WMP is a typographical error, and that the similar per site figure (i.e. approximately four times less) is the true estimate, though Watson does not agree (INQ Feb 26 p4 13.30 – 19.30).

Subsequent to the conclusion of all cross-examination on the issue of waste, Cuadrilla submit an inquiry document authored by Andrew Quarles to try and clarify a number of issues that arose in cross-examination (Quarles 2016b). In it, Cuadrilla clarify that they estimate approximately 40% of the injected volume of hydraulic fracturing fluid will return, and that flowback will be generated in the hydraulic fracturing phase as well as the two testing phases. They expect a return rate of 15-25% during the hydraulic fracturing phase, which they expect to be able to reuse. Assuming a 40% return rate, and reuse within the fracturing stage, this results in total per site flowback waste of 22,050m<sup>3</sup> (Quarles 2016b).

In response, FoE submit a further inquiry document (FoE 2016c). On the well/site discrepancy, they suggest that Quarles overlooks the ‘internal consistency’ of the WMP figures. On the question of the

timescale of return rates, they suggest that Quarles fails to address the EA's references to 10-40% returning 'between hydraulic fracturing stages', and how this is reconciled with Quarles' 15-25% figure. On the expectation of 100% reuse during the fracking stage, FoE point to the generally more cautious expectations throughout the ESs and WMP ('a proportion', 'wherever possible' – Arup 2014b, 568; Cuadrilla 2014b, 5, 25, 85), and that the EA has not endorsed this expectation.

In closing for FoE, Dehon reiterates that the site/well discrepancy cannot be dismissed as a typographical error because of the internal consistency of the WMP figures. In general, argues Dehon, the inconsistencies and errors within the applications regarding waste fall well short of the 'appropriate information' that DM2 requires (FoE 2016b). For Cuadrilla, Lieven reiterates that the 40% estimate is conservative, that there are good reasons to discount examples of higher rates (whether Preese Hall or the Barnett shale), and finally that the well/site discrepancy is merely a typographical error in the EA permit (Cuadrilla 2016b).

#### *Recommendation and decision*

On the flowback volume estimates the Inspector reasons that "it seems to me that they have provided valid and logical reasons for distinguishing the Preese Hall experience from what is likely to occur at the appeal sites" (McKay 2016, 394). The Inspector considers that "taken as a whole the review of the US information and the characteristics of the Bowland Shale in Lancashire do indeed provide strong grounds to support the Appellants' view that the flowback percentage estimate of 40% is appropriately conservative" (McKay 2016, 394). Regarding the ES/WMP discrepancy, the Inspector finds that "[i]n my view, the Appellants have provided a straight forward and plausible explanation for the discrepancy between the ES and the WMP and Permits", which is "most likely to be simply due to a typographical error and that the fault lies with the WMP and Permits, rather than the ES" (McKay 2016, 396). As such, the Inspector judges the flowback volume estimates to be epistemically credible, and the proper basis on which to judge the capacity demand impact. The SoS doesn't explicitly mention the flowback estimate contest, though is satisfied that Cuadrilla have demonstrated 'by the provision of appropriate information' that flowback disposal impacts would be reduced to an acceptable level (DCLG 2016, 8).

## 4.4 ECONOMIC IMPACTS

The issue of the economic impacts can be split into the impacts of these two specific exploration applications, and the more speculative impacts of these sites going into production and ushering in the emergence of an industry at scale across Lancashire and the UK more broadly. On the economic benefits of these exploration applications there was relatively little disagreement (though RAG did put forward a case on the negative economic impacts of these applications, which was contested by the CoC and Cuadrilla, and which the Inspector found to be localised and short-term and so not unacceptable). The ESs estimated that each exploration site would generate 11 full time jobs in the region (Arup 2014a, 151, table 9.6). As various parties pointed out this figure includes indirect supply chain effects and induced effects associated with increased spending by workers (Arup 2014a, 151). Furthermore, specialist labour is anticipated to be drawn from outside of the local area, with opportunities in the local area envisaged to arise largely from less skilled jobs such as security and cleaning (Arup 2014a, 153, table 9.7). The economic benefits of the exploration stage were expected to extend beyond Lancashire, though the ESs make no attempt to quantify such impacts (Arup 2014a, 151).

Cuadrilla, for their part, did not seek to derive a great deal of weight in support of the appeals from these site-specific, exploration phase economic benefits. For example, in closing on behalf of Cuadrilla, their QC Lieven states that:

“The Appellant has not sought to place much weight on the economic benefits of exploration. It is accepted that the job generation from exploration alone is limited” (Cuadrilla 2016b, 33).

The Inspector concludes that:

“[T]he local economic benefits of the exploration stage would be modest. There would be limited job creation generally in low paid unskilled jobs” (McKay 2016, 423).

The SoS attributes “little positive weight” to these exploration-phase economic benefits (DCLG 2016, 11).

### 4.4.1 ARE THE ECONOMIC BENEFITS OF PRODUCTION-PHASE, INDUSTRY-SCALE FRACKING MATERIAL?

The primary issue regarding economic impacts at the inquiry related to the procedural question of the materiality of production-phase, industry-scale benefits of shale gas development. The CoC were the party that most vigorously argued for the inclusion of these prospective benefits at the inquiry, though they were latterly joined by Cuadrilla. LCC, on the other hand, argued that it was clear that such an approach was not permitted by planning policy, and that determining exploration applications should be

limited to the impacts of the exploration phase only. FoE argued for a consistency of approach – if the Inspector was to consider the economic benefits of production-phase at scale, then she must also consider the adverse impacts of this later stage and wider scale too (on which FoE’s expert witnesses on climate change and public health, in particular, gave evidence). In what follows I will provide an account of the various parties’ arguments on this question, as well as the Inspector’s recommendation and SoS’s decision.

The key passages of planning policy relating to this matter were NPPF paragraph 147 and PPGM paragraph 120 which both stress the phase-by-phase separation of shale gas planning oversight (see A1.2.2 and A1.2.3).

#### *Pre-inquiry written evidence*

In her written evidence to the inquiry the CoC’s chief executive Babs Murphy set out her case on the importance of considering the prospective economic benefits for Lancashire of the emergence of a shale gas industry in the region. “The evidence presented by the Chamber”, she argues, “shows that there are potentially widespread benefits to the UK in terms of economic development and energy security that would arise from the development of the shale gas industry”, and these appeals “are at the leading edge of this new industry” (Murphy 2016, 2). She goes on to argue that rejection of these appeals may strangle this new industry at birth, or see Lancashire miss out to other regions. Her case relies on a number of reports on the potential economic benefits of a UK shale gas industry from the likes of Deloitte (Deloitte 2013), Ernst and Young (EY 2014), the House of Lords Economic Affairs Committee (HoL 2014), and the Institute of Directors (IoD 2013). Whilst there is variation in the precise scale of economic benefits across the aforementioned reports, Murphy argues that the direction of travel is clear:

“My view is that these reports demonstrate that, whatever scenario is most likely, the economic benefits from the development of this industry will be considerable and that Lancashire is well-positioned to gain if we seize the opportunity and allow shale gas exploration to take place on these sites” (Murphy 2016, 3).

Whilst they do not initially emphatically pursue the prospect of future production-phase at scale economic benefits in support of these appeals, Cuadrilla – through their planning expert Smith’s written evidence – do hint at doing so. For instance, in his written evidence Smith invokes the NPPF’s paragraph 144, which prescribes that in determining applications local authorities should “give great weight to the benefits of mineral extraction, including to the economy” (DCLG 2012, 34; Smith 2016a, 78). Furthermore, he suggests that the proposals help achieve NPPF objectives through the “[e]conomic benefits at the exploration stage and wider benefits to the local economy as well as the national economy that will follow if sites go into production” (Smith 2016c, 9); and criticises LCC’s initial decision for not taking the opportunity to “realise the wider economic benefits that would arise” (Smith 2016c, 10).

*Inquiry proceedings*

In their opening statement to the inquiry the CoC reiterate their argument concerning the importance of future economic benefits (CoC 2016a). In opening for FoE, Dehon argues that the proposed developments do not garner the support of NPPF 144, as Smith suggests in his written evidence above, because the economic benefits of the proposed developments are admitted to be minimal. Turning to the case of the CoC, Dehon argues that “[t]he evidence of the North West Chamber of Commerce in relation to the economic benefits that will flow from a commercial scale industrial shale gas industry are both speculative and of little relevance” (FoE 2016a, 9). There is, argues Dehon, a requirement for consistency of approach:

“If the assessment of the project is to be limited only to the developments as “exploration”, then the putative benefits of shale gas production cannot be taken into account, nor can they be balanced against the climate change, waste disposal, public health and other harms caused by the exploration... If, however, the assessment is to include putative benefits of developing a shale gas industry, then the adverse impacts of commercial scale production must also be weighed in the balance, including the climate change, waste disposal and public health impacts of high-volume hydraulic fracturing at scale” (FoE 2016a, 9–10).

At the point of cross-examination then, the CoC argued that the Inspector should take into account the prospective benefits of a production-phase industry at this exploration application stage. They certainly argued that she ought to do so, but – without any planning expertise – were a little light on the question of whether planning policy actually permitted such an approach. Cuadrilla, at this stage, only very tentatively pursued this line of argument through somewhat vague allusions to wider benefits to the national economy if sites go into production. FoE, on the other hand, hedging their bets somewhat, argued in the first instance that the case of the CoC was irrelevant, and in the second instance that if it was accepted then there was a requirement for a consistency of approach across potential benefits and harms.

In cross-examination, FoE’s barrister Dehon seeks clarification about whether Smith’s case relies on the wider economic benefits of production. “As I’ve clarified”, answers Smith, “only through exploration and testing will those potential substantial benefits... be realised”. Dehon then makes the point that whether exploration will lead to these potential benefits of production is at this point unknown. Smith replies that the WMS is quite clear that exploration could lead to those potential substantial benefits (INQ Feb 10 p3 17.30 – 24.40). Dehon points out that neither the ESs nor Smith in his evidence seek to assess the economic benefits from production. “I don’t seek to quantify them”, responds Smith. Dehon points out that Smith has nonetheless weighed unquantified general economic benefits in the planning balance in favour of the appeals. Smith responds that he did so on the basis of “the policy objectives, one being the statement that we’ve referred to a number of times [WMS], that recognises that through exploration there could be potential substantial benefits including to the economy”. Seeking clarity, Dehon asks directly whether Smith is asking the Inspector to take into account the economic benefits of the sites

going into production, to which Smith eventually gives a straight yes. “If the Inspector does take into account the economic benefits of production”, she follows up, “as a matter of principle she also has to weight in the balance the potential harms caused by the sites going into production does she not?” Smith replies that “if that information is available, clearly – I’m not aware if that information is available – [then it should be] taken into account”. Finally, Dehon points out that Smith, in his assessment, has not factored in such potential harms, in spite of his previous answer. Smith responds that those potential harms can be controlled by condition or other regulatory regimes (INQ Feb 10 p4 15.50 – 45.00).

In her EiC, the CoC’s chief executive Babs Murphy reiterates once more the chamber’s case on the need for the economic benefits of a prospective production phase industry to be included as a consideration in this exploration phase decision. Her advocate Whitehead asks her whether it is fair to say that the chamber’s approach is one of ‘looking forward’, “raising our eyes from the ground and looking into the horizon to see what may be available to Lancashire should exploration be successful”. “I believe”, answers Murphy, “that the chamber is duty bound to take a long-term view when it comes to promoting initiatives which will help secure the future of the county” (AUD Feb 18 morning 13.55 – 25.50).

In cross-examining Murphy, LCC’s barrister Alan Evans attempts to locate the CoC’s case on future economic benefits within the context of planning policy, which he begins by pointing out Murphy has barely mentioned. Evans starts with NPPF 147 (A1.2.2), and puts it to Murphy that “a clear distinction is made, is it not, between the various phases?” Murphy eventually answers that she is not a planning expert and cannot provide an adequate answer. “But you’ve treated the matter compendiously”, Evans persists, “as part of one overall process haven’t you?” “That’s correct”, replies Murphy. Evans takes Murphy to PPGM 120 (A1.2.3). “It’s telling us quite clearly, is it not”, proffers Evans, “that you look at the exploratory phase on its own merits, without having regard for what might happen in the future if a production phase takes place?” Murphy again suggest that she can’t answer the question because she lacks the expertise (AUD Feb 18 morning 36.10 – 54.40).

Evans’ cross-examination of Murphy is immediately followed by that of Dehon for FoE, who gratefully adopts Evans’ questioning on planning policy matters. Dehon, in reference to a Department for Environment, Food and Rural Affairs (DEFRA) report on the impacts of shale gas on the rural economy<sup>16</sup>, asks Murphy about the possibility of economic disbenefits to certain sectors of the rural economy, in

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<sup>16</sup> This report has a slightly chequered history. It was initially released, heavily redacted, in July 2014 following a Greenpeace FoI request. The Government came under sustained pressure to release the full report in early 2015, at the time when the Infrastructure Bill was going through Parliament, but resisted doing so. By June 2015, around the time LCC were initially determining these applications, the Government was ordered to release the report by the Information Commissioner. The report was finally released on July 1 2015, subsequent to LCC’s rejection of these applications. The unredacted report comes with a covering note stating that the “paper is an early draft; it is not analytically robust”, it relies on US evidence which cannot be extrapolated with any reliability, and that the author did not have an in-depth knowledge of the UK regulatory framework (DEFRA 2014[2015], no pagination). Murphy, in something of an oversight, has only seen the redacted version, which she relies on in part for her case. Dehon focuses in particular on the formerly redacted suggestion that “[t]here will also be sectors that gain from the expansion of drilling activity but others that may lose business due to increased congestion or perceptions about the region” (DEFRA 2014[2015], 11).

particular agriculture and tourism. Murphy replies that she doesn't believe that claims of a negative impact on agriculture are 'necessarily substantiated', and that she's "not aware of any evidence that tourism in this area would be negatively affected". Dehon responds that the DEFRA report suggests these sectors may be negatively affected, though Murphy picks out 'may' as the operative word. Dehon suggests that the benefits and disbenefits are unknown, to which Murphy attempts to suggest that the estimates of benefits are based on 'reasoned assumptions' (and that by implication the estimates of disbenefits are not) (AUD Feb 18 morning 1.34.00 – 1.49.00). "When making a general assessment of the economic benefits of shale gas", Dehon then asks, "it is relevant to consider adverse effects is it not?" Murphy replies that those effects could be a material consideration at production stage rather than looking at it today (AUD Feb 18 morning 1.51.50 – 1.52.55).

Dehon then turns her attention to several of the documents on which the CoC rely. Starting with the EY report (EY 2014), Dehon points to a disclaimer on the final page which states that the information in this publication "should neither be regarded as comprehensive nor sufficient for making decisions, nor should it be used in place of professional advice" (EY 2014, no pagination). Dehon then goes to page 37 – with the "little pictures of gas and pipelines and dollar signs" – to point out that the report was commissioned by the UK onshore oil and gas (UKOOG) industry body. "As you can see from the rainbows and dollar signs", Dehon asks in a slightly arch tone, "this report is essentially a piece of PR produced for the industry isn't it?" Murphy disagrees that EY would risk their reputation to co-author a biased report. Dehon then points out the EY report is based on the high-end scenario for a UK shale gas industry from the IoD report (IoD 2013). Moving on to that IoD report, Dehon points out that it was sponsored by Cuadrilla. Again, Murphy suggests that she doesn't believe that this would have influenced the IoD. Finally, they move onto the Deloitte report (Deloitte 2013), which, again, Dehon points out was commissioned by Cuadrilla (AUD Feb 18 morning 1.52.22 – 2.06.10).

In a final relevant section of inquiry proceeding, LCC's barrister Evans asks LCC's planning witness Katie Atkinson "whether the benefits and impacts of a potential future production phase... should be considered at this point in the decision-making process..." "No it shouldn't", replies Atkinson emphatically, "paragraph 147 of the NPPF clearly states that we should treat all three stages separately and this is supported by paragraph 120 of mineral planning policy guidance" (INQ 25 Feb p1 52.15 – 53.05).

At the close of cross-examination, then, the CoC had stood firm on their case that the Inspector should take the economic benefits of a production-phase shale gas industry into account in this exploratory decision. LCC had argued that planning policy plainly forbids this. The evidence of Cuadrilla's planning expert Mark Smith had sought to open up scope for interpretative flexibility in that policy position by arguing that the benefits of production phase should weight in favour of the exploratory projects on which their realisation is contingent. FoE, finally, challenged Smith on his weighing of prospective benefits in favour of the appeals and reiterated the requirement for a consistency of approach; and

challenged Murphy on the economic disbenefits of a shale industry and the credibility of the economic estimates on which she relied.

In closing for the chamber, Murphy acknowledges the difficulty of “putting a proportionate weighting on the possibility of future economic potential”, but suggests that the question should not be totally excluded, before concluding that:

“It’s our view that the approval of these planning applications could help to kick-start an important new industry that would bring significant economic benefits to Lancashire. We believe that these potential benefits should be taken into account in determining these applications...” (CoC 2016b, no pagination).

Closing for Cuadrilla, their QC Lieven mounts an argument for an inconsistent approach to the consideration of future, production-phase economic benefits on the one hand, and future, production-phase adverse impacts on the other, at the exploratory application decision-making stage.

“[I]t is a necessary truth that the UK and Lancashire will never get the potential benefits of SG extraction if the exploration phase is not allowed to go ahead. It is therefore not possible to wholly divorce the two. In other words whilst it is appropriate to limit the consideration of impacts to exploration because if there is a subsequent extraction application impacts will have to be considered all over again, the same is not quite the same for wider economic benefits. On the long term economic benefits these can only ultimately follow if these appeals are allowed and exploration goes ahead” (Cuadrilla 2016b, 33–34).

She then sets out the positive side of the planning balance, including the ‘great weight’ to be given to mineral extraction in the NPPF and to the benefits of shale gas exploration – energy security, economic growth, responding to climate change – set out in the WMS (Cuadrilla 2016b, 35).

Dehon, for FoE, argues again that there is “a clear requirement for consistency of approach”, and points out that Cuadrilla have drawn attention to the phase-by-phase separation of oversight prescribed in policy when it has suited them (on public health) (FoE 2016b, 22). In conclusion, she suggests that:

“If the assessment of the project is to be limited only to the developments as “exploration”, then the putative benefits of shale gas production cannot be taken into account, nor can they be balanced against the climate change, waste disposal, public health and other harms caused by the exploration... If, however, as Mark Smith suggested in his evidence, the assessment should include putative benefits of developing a shale gas industry, then the adverse impacts of commercial scale production must also be weighed in the balance” (FoE 2016b, 22).

Finally, Evans, closing for LCC, reiterates that the “potential benefits of any future production phase do not fall for consideration at this point” as is made clear in NPPF 147 and then ‘put beyond doubt’ in PPGM 120 (LCC 2016, 33). The CoC, he argues, has “stationed itself on the very territory which that policy places out of bounds” (LCC 2016, 34).

#### *Recommendation and decision*

In her recommendation, whilst recognising that the WMS references substantial benefits that exploring and developing shale gas resources could potentially generate, the Inspector nonetheless finds that “in

the light of the NPPF and PPGM guidance, the potential wider economic benefits of shale gas production at scale should be given very limited weight at this stage” (McKay 2016, 421). She concludes that:

“The national economic benefits would only flow from commercial production at scale at some point in the future depending to an extent upon the outcome of the exploration works. I attribute little weight to those wider benefits in the context of the exploratory works development which is the subject of these appeals” (McKay 2016, 423).

The SoS gives “no weight” – going slightly further than the Inspector - to the national benefits which could flow from commercial production at scale at some point in the future (DCLG 2016, 11). Ultimately, then, the Inspector finds that the future benefits of production at scale are procedurally prohibited from consideration by NPPF 147 and PPGM 120. As will be explored in the analysis to come, however, this apparent procedural exclusion did not prevent these envisaged economic benefits of a production-phase shale gas industry from having an influence on these decisions. This influence occurred indirectly via the support and national need set out in the WMS on the basis of these very, ostensibly immaterial benefits (alongside the energy security and emissions reduction benefits stemming from production at scale also envisaged in the WMS).

## 5. FINDINGS II: ANALYSIS – THE PRODUCTION OF JUSTIFICATION THROUGH FOUR FORMS OF CLOSURE

Having presented the near total failure of FoE's case across the four issues of climate change, public health, waste disposal, and economic impacts in the previous chapter, this chapter analyses the reasons for that failure. It will be argued that justification was produced for these proposals and shale development more broadly through four 'forms of closure' through which the inquiry was rendered insensitive to the concerns of FoE. Those four forms of closure are 'double compartmentalisation', 'vertical deference', 'horizontal deference', and 'selective scepticism and credulity'.

Each of these forms of closure will be explained in turn, along with their impact on the decision-making process. The term 'forms of closure' is used here to describe various mechanisms through which the inquiry is rendered insensitive to certain arguments and matters of concern. This insensitivity can arise from either procedurally excluding a matter from consideration or the conduct of consideration itself. The effect of these forms of closure is that arguments are either not given serious consideration and not weighted in the decision, or not given proper scrutiny yet registered. The first three forms of closure are procedural – arguments and concerns are excluded as immaterial because the rules are interpreted as prescribing as much. The final form of closure operates through the conduct of scrutiny – claims made by FoE and Cuadrilla are treated differently and scrutiny of the proposals is generally shallow.

## 5.1 DOUBLE COMPARTMENTALISATION

Double compartmentalisation is a procedural means of closure that dictates that the oversight of shale gas development is bounded and sequenced on an application-by-application, phase-by-phase basis. That is, arguments and matters of concern relating to a production-phase, and industry scale are immaterial, rendering the inquiry insensitive to such issues. The first, application-by-application compartmentalisation is a general convention in planning, whereas the second, phase-by-phase compartmentalisation is prescribed in planning policy specific to onshore oil and gas development. Key passages of policy here include paragraph 147 of the NPPF and paragraph 120 of the PPGM (see A1.2.2 and A1.2.3).

The compartmentalised approach to shale gas planning then is a means of closure through blunt procedural exclusion. Arguments and matters of concern relating to a potential production-phase and broader industry scale are rendered immaterial as they overflow the bounds of relevance drawn by double compartmentalisation. As will be argued below in relation to the issues of public health and climate change, the double compartmentalised approach produces justification through the exclusion of future phase and industry scale concerns whilst potentially promoting myopia and tunnel-vision in regulatory oversight. Furthermore, as will be discussed in relation to the issues of climate change and economic impacts, justification is also produced through the selective and partial suspension of double compartmentalisation when it comes to the Government envisaged benefits expressed in the WMS.

### 5.1.1 THE EFFECT OF DOUBLE COMPARTMENTALISATION ON THE ISSUE OF PUBLIC HEALTH

On the issue of public health Cuadrilla and FoE contested the procedural question of whether evidence on the public health impacts of a production-phase shale gas industry should be considered material to these applications. Cuadrilla argued that this was clearly not the case, relying primarily on NPPF 147. FoE argued, on the other hand, that production at scale health impacts should be considered at the inquiry because it was the very prospect of those impacts that was in large part causing ‘indirect’ health impacts on local residents manifesting at this point. The disagreement turned therefore on the question of whether these indirect health impacts necessitate the consideration of future production at scale health impacts. As we saw in the previous chapter, the Inspector sided with Cuadrilla’s interpretation of the correct planning approach in answering no.

The main consequence of this ‘double compartmentalisation’ for the issue of public health is the procedural exclusion of the public health impacts of the production phase of these sites (phase-by-

phase), and of a prospective shale gas industry (application-by-application). FoE's public health expert, Dr David McCoy, argued that the public health risks of production at scale are greater because of the potentially greater longevity, intensity and concentration of operations.

The phase-by-phase closure is of course only a delay, given that the public health impacts of a production phase application will be considered in a subsequent planning process. This delay, however, is itself potentially problematic given that it renders exploration application decisions myopic to possibly obvious issues on the horizon. It would of course be a waste of everybody's time and resources to grant exploration permission to sites that are unacceptable in planning terms for production in foreseeable ways. The point here is not necessarily that there are foreseeable ways in which these or other sites will be unacceptable for production, but that the phase-by-phase sequencing of oversight prevents consideration of that possibility. In this way, the phase-by-phase compartmentalisation is susceptible to producing 'lock-in' (see David 1985; see also Arthur 1994). In other words, the issue here is one of causing stranded assets (because sites that were acceptable for exploration turn out to be unacceptable for production) or the generation of pressure to force through unacceptable production applications (to avoid the stranding of assets).

Whilst the phase-by-phase compartmentalisation obscures future concerns, the application-by-application compartmentalisation obscures consideration of spatiality. That is, the possible cumulative impacts arising from an industry – many sites across the country or a region operating concurrently and in some cases closely together. If the phase-by-phase compartmentalisation risks myopia, then the application-by-application approach risks tunnel-vision. Of course, the notion of 'cumulative impacts' in planning has the potential to enable consideration of broader and snowballing issues that would begin to arise with the ramp up of an industry, though it remains to be seen how the concept will be wielded in planning decision-making in practice. Without a relatively expansive interpretation of the concept of cumulative impacts, planning processes are effectively prohibited from inquiring into the acceptability in planning terms of the public health impacts – or any other impacts for that matter - of a shale gas industry as a whole.

In sum then, the closure performed by double compartmentalisation on the issue of public health rendered the inquiry insensitive to potential matters of concern arising from production-phase operations (phase-by-phase) and a shale gas industry as a whole (application-by-application). The former type of closure is a delay in consideration, but carries with it the potentially foreseeable risks of 'lock-in' or stranded assets. The latter potentially prevents consideration of the acceptability of the impacts of an industry in planning terms unless a relatively expansive interpretation of the concept of 'cumulative impacts' counteracts its tendency towards tunnel-vision.

### 5.1.2 THE EFFECT OF DOUBLE COMPARTMENTALISATION ON THE ISSUE OF CLIMATE CHANGE

On the issue of climate change, FoE again claimed that the future phase and industry scale impacts of shale gas development – which FoE’s climate change expert witness Professor Kevin Anderson argued would be irreconcilable with UK climate change commitments – were relevant for consideration at this exploration decision stage. In this instance they argued that these future and wider impacts were relevant because Cuadrilla alluded to climate and energy security benefits relating to production at scale, to which Anderson provides a counter argument. Cuadrilla don’t actually contest the materiality of FoE’s climate change case on the grounds of it overflowing the scope of the inquiry as set by double compartmentalisation. Instead, they argue that Anderson’s case is immaterial on the grounds that it conflicts with Government energy policy as set out in the WMS. Here Cuadrilla appeal to the form of closure discussed in the following section - ‘vertical deference’. Nonetheless, in resolving the contest the Inspectors rejects FoE’s climate change case by appealing to both forms of closure. Not only is Anderson’s case rejected because “there can be no doubt that shale gas is seen [in policy] as being compatible with the aim to reduce GHG emissions by assisting in the transition process over the longer term to a low carbon economy” (McKay 2016, 407), but also because:

“For the purposes of these appeals, the analysis should be limited to a consideration of the project emissions during construction, operation and decommissioning, together with cumulative impacts as assessed by the ESs within the framework set by national and local policies” (McKay 2016, 407).

Anderson’s arguments that relate to the climate change benefits envisaged in the WMS are rejected, in part, because they relate to a future production phase, and wider industry scale (in so much as they relate to a role and carbon budget space for gas and shale gas generally, rather than the gas emitted by these applications). Therefore, double compartmentalisation performs part of the work of closure alongside the approach of vertical deference toward the Government view (see section 5.2 below).

Double compartmentalisation takes a key matter influencing the acceptability of the projects’ GHG emissions – what these emissions work towards (production, an industry), and whether that is acceptable on climate change grounds - off the table. Despite this question of purpose necessarily impacting on the judgement over the acceptability of the emissions considered here, it relates to a later phase (production) and a broader scale (an industry) than can be accommodated in this forum as a result of double compartmentalisation. What is left on the table – the Government view, which of course also relates to phases and scales beyond the scope of what’s material as dictated by double compartmentalisation – is therefore shielded from criticism. This shielding occurs both because of vertical deference (see section 5.2 below) and because criticising this view would entail an analysis, like Anderson’s, that goes beyond ‘a consideration of the project emissions during construction, operation and decommissioning’ to consider the reconcilability of a shale gas industry with climate change obligations.

In this way, double compartmentalisation is unevenly applied on the issue of climate change. Alongside vertical deference it closes Anderson's case on the negative impacts of production at scale on climate change as immaterial. On the other hand, this studious policing of the phase-by-phase, application-by-application bounding is not extended to the reasoning behind the Government support for shale development articulated in the WMS. This support is based on three anticipated benefits – economic, energy security, and climate change mitigation. Obviously, the Government-anticipated climate change benefits of shale gas will require production phase development, and any appreciable benefit would require production on an industry scale. The policy support set out in the WMS is given 'great weight' in favour of the appeals in spite of the benefits on which it is based only arising from phases and scales ostensibly beyond the remit of the inquiry as set by double compartmentalisation. The issue is compounded by the fact that inquiry participants cannot question these Government-claimed benefits – not only because as will be seen the possibility of doing so is closed by vertical deference, but also because double compartmentalisation prohibits arguments at the inquiry from straying to the future phases and wider scales that such questioning would entail. This bounding of materiality, however, appears to apply only to the arguments of inquiry participants and is overlooked when it comes to the expressed reasoning underpinning Government policy. The myopia and tunnel-vision of double compartmentalisation is partially lifted as the inquiry registers an optimistic vision of the climate change impacts (and indeed economic and energy security impacts) of future phase, industry scale shale development, whilst remaining in place to block the inquiry from considering any scrutiny of that vision.

In sum then, the closure performed by the double compartmentalisation of oversight rendered the inquiry insensitive to Anderson's case on the reconcilability of production at scale and the UK's climate change obligations by way of blunt procedural exclusion. Furthermore, the uneven application of double compartmentalisation between rule 6 party participants on the one hand, and the reasoning behind Government policy on the other, led the inquiry to register Government-expected climate change benefits in favour of the proposals whilst maintaining an insensitivity to any scrutiny of those expectations.

### 5.1.3 THE EFFECT OF DOUBLE COMPARTMENTALISATION ON THE ISSUE OF ECONOMIC IMPACTS

The uneven application of double compartmentalisation is repeated on the issue of economic impacts. The arguments of FoE and LCC were ostensibly successful here, as the Inspector rejected the CoC's argument on the materiality of future economic benefits of a shale gas industry. Here, double compartmentalisation initially appears to count against the appeals. This is potentially myopic too, as the exploration phase produces only limited benefits in its own right, but is a necessary step towards the development of an industry that – according to its advocates – represents a potential bonanza.

Employing their own sensory metaphor, the CoC's position was that the inquiry should raise its 'eyes from the ground and look into the horizon'. However, the effect of compartmentalisation is ultimately subverted in this application-hostile case. This is because the policy support of the WMS, based in part on precisely the same envisaged benefits that were immaterial in the hands of the CoC (who even rely on the same IoD report), is given great weight in favour of the appeals. The double compartmentalised approach is therefore effectively partially suspended on the one issue where it stood to exclude a benefit from weighting in favour of the appeals. These putative benefits are registered as counting in favour of the proposals, whilst the inquiry is rendered insensitive to potential future and cumulative adverse impacts through the myopia and tunnel-vision enforced by double compartmentalisation.

It is only a partial suspension because scrutiny of these economic benefits remains closed through a combination of vertical deference and double compartmentalisation - much in the same way as on the climate change issue above. That there is a national need for shale gas development in part because of the envisaged economic benefits of an industry at scale cannot be questioned because these matters are beyond the bounds set by double compartmentalisation and because the Government view is deferred to. Nonetheless these ostensibly immaterial benefits weight in favour of the appeals indirectly via the policy support established in the WMS.

The economic benefits anticipated in the WMS are referenced to the EY report (EY 2014). FoE's barrister Estelle Dehon pointed out during the cross-examination of Babs Murphy that this report includes a disclaimer that states that the publication "should neither be regarded as comprehensive nor sufficient for making decisions, nor should it be used in place of professional advice" (EY 2014, no pagination). Furthermore, she described it as "a piece of PR produced for the industry". The EY report was commissioned by UKOOG, and takes its assumptions about a future UK shale gas industry from the high-end scenario of the IoD report (IoD 2013). The IoD study's high-end scenario envisaged the drilling of 4,000 lateral wells between 2016 and 2032, and was 'sponsored' by Cuadrilla. In other words, the envisaged future economic benefits that weighed in favour of the granting of permission to Cuadrilla's exploration applications in this case whilst not being scrutinised by the inquiry were ultimately derived from a vision of a future UK shale gas industry from a report that Cuadrilla themselves sponsored. Furthermore, the inquiry also failed to consider the potential adverse impacts on climate change, public health and waste of the IoD's 4,000 lateral wells scenario from which those benefits are expected to arise. It was these very matters of concern that Anderson and McCoy unsuccessfully attempted to raise. However, their consideration was placed beyond the remit of the inquiry as set by the double compartmentalised approach, which in these cases was studiously observed. As such, all scrutiny of future phase and industry scale impacts (positive and negative) is closed at the inquiry, but the expected positive impacts are nonetheless selectively and blindly registered in the decision through the WMS.

This case, along with the climate change example discussed previously, demonstrates how the Government view is subject to different rules than the arguments of rule 6 parties. Government energy and climate change policy can be based on reasoning that would be excluded as immaterial through the

closure performed by double compartmentalisation were it expressed by a rule 6 party (as the fate of the CoC makes clear). However, because it comes from the Government that very same argument is treated with vertical deference, not scrutinised, and registered as a matter of great weight.

In sum then, the economic benefits of production at scale, which the CoC argued ought to be taken into account at the inquiry, seemingly suffered the same fate as FoE's similar arguments on climate change and public health. However, these very benefits ultimately still weighed in favour of the applications via the WMS. As such, the uneven application of double compartmentalisation led to the inquiry registering Government-expected economic benefits in favour of the proposals whilst the fog of double compartmentalisation continued to block both any scrutiny of those expected benefits and any consideration of matters of concern arising from a production-phase industry of the scale required to produce them.

#### 5.1.4 SUMMARY

*Table 3: The uneven effect of double compartmentalisation*

<b>Issue</b>	<b>FoE argument</b>	<b>Resolution</b>
<b>Public health</b>	The negative public health impacts of future production at scale (which McCoy claims will be more intense than for the exploration phase) should be scrutinised and taken into account now because their anticipation amongst the public is resulting in 'indirect' health impacts at this point	The negative (FoE claim) production at scale health impacts are immaterial
<b>Waste</b>	Did not robustly put forward an argument concerning the potential impacts of future production at scale on waste treatment capacity, though Watson does allude to the obvious point that the present level of capacity would be quickly overwhelmed	Resolution not required, though Watson's non-raising of the issue may have been because he anticipated the double compartmentalised approach
<b>Climate change</b>	The negative climate change impacts of future production phase at scale (which Anderson argues would be incompatible with climate change commitments) should be scrutinised and taken into account now because Cuadrilla allude to the supposed benefits of such production at scale in support of the proposals	The negative (FoE claim) production at scale climate change impacts are immaterial. The positive (the Government claim) production at scale climate change impacts are taken into account in favour of the applications via the WMS, whilst FoE's questioning of the purported climate change benefits is closed through a

		combination of double compartmentalisation and vertical deference
<b>Economic impacts</b>	There should be a consistency of approach. If future economic benefits are deemed material at this point then so should FoE's arguments concerning future adverse impacts on climate change and public health	FoE's argument is ostensibly successful, though the positive (the Government claim) production at scale economic impacts are taken into account in favour of the applications via the WMS, whilst FoE's questioning of the purported economic benefits is closed through a combination of double compartmentalisation and vertical deference

As can be seen in tables 3 and 4, where possible negative impacts of production at scale were raised by FoE, the inquiry was rendered insensitive to those matters of concern through double compartmentalisation. However, where the expectation of future industry-scale benefits underpinned Government policy support, that policy support was registered as counting in favour of the proposals (even where those very same benefits had been explicitly resolved as immaterial when put forward by a rule 6 party, as in the case of the CoC's arguments on economic impacts). Furthermore, questioning of these claimed benefits remained closed through a combination of double compartmentalisation and vertical deference. The bounding of the inquiry's remit according to double compartmentalisation is studiously policed in all cases except where production at scale benefits anticipated by the Government underpin policy support. This has the unfortunate and irrational effect of waiving through claims of benefits made by the Government (because of the status of their maker), whilst rendering the inquiry insensitive to both any scrutiny of those claimed benefits and any corollary negative impacts of production at scale. It appears, then, that either the ostensibly immaterial benefits were obscured and smuggled in behind the categories 'policy support' or 'national need', or that when they come into tension 'vertical deference' trumps 'double compartmentalisation' (i.e. double compartmentalisation's tendency towards closure on these future phase, industry scale issues was superseded by vertical deference's normative pull towards the realisation of Government policy).

*Table 4: The uneven effect of double compartmentalisation continued*

<b>Issue</b>	<i>Do the impacts weight in favour or against the proposals?</i>	<i>Are future production at scale impacts found material?</i>	<i>Are the impacts taken into account in the decision?</i>	<i>The effect of double compartmentalisation</i>
<b>Public health</b>	FoE argue against	No	No	Scrutiny and registration of claimed negative impacts are closed
<b>Waste</b>	n/a	n/a	No	The obvious argument is not made in the first place

<b>Climate change</b>	FoE argue against; the WMS argues in favour	No	The positive impacts are via the WMS	Scrutiny and registration of the claimed negative impacts are closed; scrutiny of the claimed benefits is closed whilst they are deferentially registered, partially subverting double compartmentalisation
<b>Economic impacts</b>	CoC and the WMS argue in favour; FoE argue against (they emphasise economic disbenefits)	No	The positive impacts are via the WMS	Scrutiny and registration of the claimed negative impacts are closed; scrutiny of the claimed benefits is closed whilst they are deferentially registered, partially subverting double compartmentalisation

In conclusion, the myopia and tunnel-vision caused by double compartmentalisation is compounded by the selective suspension of double compartmentalisation when registering Government-expected benefits in favour of the appeals whilst any scrutiny of those expectations remains prohibited. In this way, justification is produced through the insensitivity to future phase and industry scale matters of concern created by the blunt procedural exclusion of double compartmentalisation. This is supplemented by a selective receptiveness to Government-envisaged benefits whilst double compartmentalisation continues to block their scrutiny.

## 5.2 VERTICAL DEFERENCE

Vertical deference is a procedural means of closure arising from a deferential orientation to Government policy and the reasoning underpinning it. Where Government articulates claims about the benefits of shale gas development in general, any line of argument or matter of concern that conflicts with this Government view is rejected as procedurally immaterial. To be clear, these excluded arguments are not rejected on the basis of their intellectual merit – no such judgement is made one way or the other. They are simply procedurally excluded and so not considered or registered.

The WMS given by Amber Rudd to the House of Commons on September 16 2015 was the key expression of Government shale policy at the inquiry. The statement makes clear that there is a “national need to explore and develop our shale gas and oil resources” (DCLG/DECC 2015, no pagination). This national need arises because of anticipated energy security, economic and emissions reduction benefits from exploring and developing domestic shale resources (see A1.1.1, para. 2).

The expectation of ‘lower carbon emissions’ is explicitly based on the ‘bridging fuel’ argument (see A.1.1., para. 8). The ‘bridging’ argument sees coal-to-gas or indeed imported-to-domestic gas supply substitution as a positive and necessary, immediate short-to-medium term step towards meeting the UK’s GHG emissions reduction targets.

As will be argued below – using the example of climate change – the vertical deference of planning towards current Government policy (to encourage shale gas development) and the Government view (the reasoning and claims underpinning that encouragement) produces justification through the procedural exclusion of arguments and concerns contrary to the Government view. This results in the shielding of the claims underpinning policy as critique-protected beliefs.

The prospective economic benefits of a shale gas industry were another underpinning reason behind the policy position adopted in the WMS. However, unlike on the issue of climate change, the Government view on prospective economic benefits was not directly challenged by FoE, and so won’t be covered in detail here (FoE did of course challenge the plausibility of the CoC’s economic benefits case, which, as already seen, refers to the same benefits envisaged in the WMS).

### 5.2.1 THE EFFECT OF VERTICAL DEFERENCE ON THE ISSUE OF CLIMATE CHANGE

On the issue of climate change, Cuadrilla and FoE argued over whether the credibility of the Government view on the relationship between shale gas and climate change as set out in the WMS could be questioned at the inquiry. Ultimately, the WMS and the support for shale development it

expresses are given ‘great weight’ by the Inspector. Anderson’s first and third of three headline conclusions – the two relevant here – stated that:

“[U]nder the UK existing carbon budget, gas can only have a marginal and rapidly declining role in generating electricity post-2030” (Anderson 2016a, 8).

And that:

“If the UK is to abide by the explicit commitment of the Paris Agreement... then there is no viable emission space within the UK’s carbon budget for shale gas to fulfil even a transition role. This stark conclusion holds for shale gas in relation to electricity generation, as a source of energy for heating fuel or indeed as a transport fuel” (Anderson 2016a, 10).

The Inspector suggests that both headline conclusions are headed-off by the WMS, which is at present “the Government’s position in relation to the need for shale gas exploration and the need for gas to support its climate change target” (McKay 2016, 407). Furthermore, she agrees with Cuadrilla that:

“[T]he issues raised by Professor Anderson as to how shale gas relates to the obligations such as those set out in the Paris Agreement, and the Intergovernmental Panel on Climate Change (IPCC) carbon budgets, are a matter for future national policy and not for these appeals” (McKay 2016, 407).

In her conclusion on climate change, the Inspector states that “[t]aking an overall view of national policy, there can be no doubt that shale gas is seen as being compatible with the aim to reduce GHG emissions by assisting in the transition process over the longer term to a low carbon economy” (McKay 2016, 429).

The first headline conclusion stands irrespective of (though is exacerbated by) Paris, is not exclusively related to shale, and is not necessarily incompatible with the WMS. It’s distinguished from the WMS on the basis of the level of detail it provides about the likely timescale over which gas can play a role of any significance in electricity generation in the UK. Elsewhere Anderson also argues that neither DECC nor the CCC have been able to develop ~2 degree post-2030 scenarios that maintain a significant role in supplying domestic, commercial and industrial heat for gas (Anderson 2016a, 8). Whereas the WMS envisions a need for gas ‘for years to come’ (see A1.1.1, para. 3), Anderson envisions a need to move significantly away from gas – for power generation and heating – beyond 2030. So long as the WMS’s ‘years to come’ do not extend beyond 2030, the two statements are not in conflict.

FoE, no doubt conscious of the inquiry’s vertical deference, were careful to couch their approach on this issue as a matter of helping to understand the WMS as opposed to challenging it. On this headline conclusion that description is entirely apt. The credibility of the claim about the role for natural gas ‘for years to come’ is not challenged, Anderson merely provides greater detail on the timescale and the reasoning behind it.

The third headline conclusion, on the other hand, does blatantly challenge the WMS, albeit in the light of subsequent events. There being – in the context of Paris – no viable emissions space within the UK’s carbon budget for shale gas to fulfil even a transitional role clearly questions the credibility of the claim

that 'shale gas can create a bridge...'. Anderson argues that the Government view is rendered out-of-date by Paris and Bate makes much the same point regarding CCS. As such, FoE argue that the weight given to the support expressed in the WMS should be substantially reduced. This argument, and its inherent criticism of the Government view, is rejected by the Inspector because it is at odds with the policy position, and because the Inspector identifies national policy development as the site to respond to those subsequent events.

Furthermore, Dehon's procedural claim - that as a matter of law the correct approach to the WMS is for the Inspector to assess the weight to be given to it in the light of the evidence before the inquiry - is implicitly rejected. The approach is not, as Dehon suggests it should be, to assess Anderson's evidence, come to a view about whether the Government view remains credible in the light of subsequent events, and then adjust the weight given to the support of the WMS accordingly. The approach is, instead, to consider whether this inquiry has the authority to do the above - the conclusion being no. The assessment travels in the opposite direction - instead of looking to FoE's case first and then adjusting the weight of the WMS accordingly, the move is to look to the WMS first and foremost and assess whether FoEs' case is compatible with it. At no point is the credibility of, say, Anderson's claim about the effect of Paris on the continuing viability of UK shale gas policy assessed. The assessment is whether Anderson's claim can or needs to be considered in this forum. When the Inspector explicitly states in her reasoning that she has given 'careful consideration' to Anderson's evidence on the weight to be given to the Government view (McKay 2016, 283), she is being somewhat disingenuous. She has instead, I would argue, given (no doubt careful) consideration to whether she has the authority to, or is required to, consider the evidence of Anderson that leads to his first and third headline conclusions. The twin procedural closures of vertical deference and, as we saw in previous section, double compartmentalisation mean that such consideration is closed.

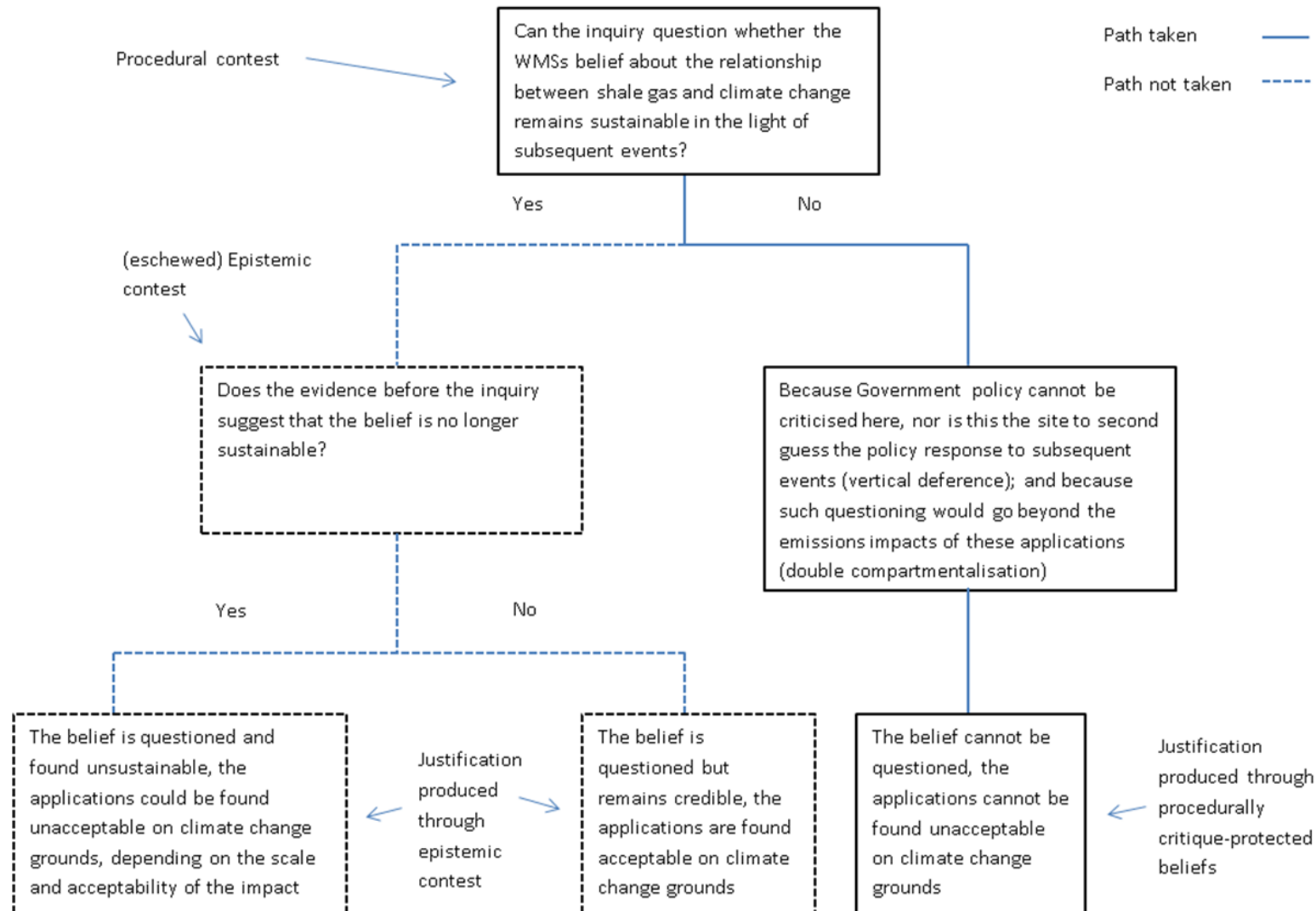
The contest, therefore, is entirely procedural - it concerns whether the rules of the process allow the argument to be considered; as opposed to epistemic - concerning the credibility of the beliefs on which the argument is based. What is closed from consideration at the inquiry is the debate about whether Paris and CCS undermine the belief that shale gas can act as a bridge, and so render Government shale policy problematic. That debate, resolves the Inspector, can only be conducted at the level of national energy policy. The effect of this is to shield the belief that shale gas can act as a bridge from criticism at the inquiry, in spite of a major change of circumstance and expert evidence before the inquiry suggesting that that change of circumstance now renders the belief problematic. The Government support based on this belief, therefore, cannot be undermined at the inquiry.

As such, the WMS is not just a material consideration to be weighed in the balance. In conjunction with vertical deference, it renders the issue of climate change necessarily and entirely closed at the inquiry. In other words, the WMS is not only weighed in the balance, but actively defines and excludes arguments that cannot add their weight to the other end of the scales. No GHG impact from the projects could have been considered anything other than an aid to the reduction of GHG emissions. The

approach of vertical deference taken to the WMS here, and so the closure of the contrary claims of Anderson concerning the beliefs about shale gas and climate change therein, render the assessment of the acceptability of the projects' GHG emissions a foregone conclusion. So long as the present WMS remains in place, and decision-makers don't take an entirely different approach to it, this will be the case at any shale gas planning decision-making exercise.

In sum then, as is demonstrated in figure 2 below, the procedural approach taken to the WMS was one of vertical deference, resulting in the shielding of the Government view from criticism. The Inspector deemed that the inquiry did not have the authority to question the beliefs about the relationship between shale gas and climate change on which the support expressed in the WMS was in part based. This was reinforced, as was previously demonstrated, by the double compartmentalisation of planning oversight. This twin procedural closure resulted in claims that questioned the Government view on this matter – most notably Anderson's third headline conclusion and Bate's arguments on CCS – being closed as immaterial, even though both were based on a change of circumstance subsequent to the WMS. Irrespective of the relative epistemic credibility of the FoE challenge and the Government's original view, the general relationship set out in the WMS – that shale gas helps reduce GHG emissions – could not be unsettled in this forum. As such, the contest over the acceptability of these specific projects' GHG emissions was rendered a foregone conclusion by the deferential approach adopted to the WMS. The inquiry therefore produced justification for these appeals and shale development more broadly through the blunt procedural exclusion of certain arguments and matters of concern as they conflicted with the Government view. As a result, this view could not be questioned at the inquiry whilst the policy support based on it weighed in favour of the appeals.

Figure 2: Procedural closure through vertical deference and the critique-protected nature of the Government view



### 5.3 HORIZONTAL DEFERENCE

‘Horizontal deference’ is a procedural form of closure based on a deferential orientation to other regulators and regulation in general. Where vertical deference imposed a deferential orientation upwards to Government policy, horizontal deference refers to a similarly deferential orientation across to other regulators (mainly the EA in this case) and the regulatory system in general. Horizontal deference can relate to the regulatory responsibilities of another regulator where particular issues are found to be immaterial at the inquiry because the EA have or will deal with matter in their permitting process. Furthermore, horizontal deference can relate to a more generic expectation of the consummate regulation of shale development. The former is to do with regulatory responsibility and excludes certain matters from consideration by the planning decision-maker; whereas the latter is to do with the regulatory system’s capacity to control potential hazards and closes concerns based around risk and uncertainty to serious consideration. I will refer to the former variant as ‘regulatory remit deference’ and to the latter as ‘consummate regulation deference’.

The key existing regulatory decision in this case was the EA’s decision to grant the projects the required environmental permits (see EA 2015). This had involved the EA scrutinising matters that had some degree of overlap with the issues raised by FoE at the inquiry. However, the precise degree of overlap was often slightly ambiguous. For example, on the issue of climate change the EA had scrutinised the effect of the projects’ emissions on local air quality, but not the impact of a subset of those emissions (i.e. GHGs) on climate change.

Regulatory remit deference excludes arguments and matters of concern considered by the EA in their environmental permitting process as immaterial. Below I will consider how the matter of waste disposal capacity was closed in such a way. Consummate regulation deference excludes arguments and matters of concern that contradict the assumption, enshrined in planning policy, that the regulatory system will operate effectively. Below I will consider how the issue of public health was closed in such a way. As such, and as will be argued below, horizontal deference produces justification through the procedural exclusion of arguments and matters of concern that either are interpreted as being the responsibility of another agency, or that violate the expectation of the consummate regulation of operations.

The approach of horizontal deference is established in planning policy, in particular paragraphs 122 and 112 of the NPPF and PPGM respectively (see A1.2.2 and A1.2.3). There is a discretionary possibility for a planning decision maker to override the approach of regulatory remit deference which arises from the Inspectors interpretation of the case of FFB vs. WSCC (see A1.3.1). The Inspector’s interpretation of this ruling was that:

“Mr Justice Gilbert did not, in that case, say that there is an irrebuttable presumption that matters which are addressed to any extent by a regulator cannot be taken into account by the planning decision-maker. He identified that the committee had sufficient information to

determine the application and that it could and should assume that the matters could and should be dealt with by the EA and the HSE. There were no gaps left in the environmental controls. However, he did not rule out the possibility that, in the exercise of its discretion, a decision-maker might consider such matters, particularly where there was any question of a gap being left in the environmental controls” (McKay 2016, 391–392).

As such, regarding waste disposal, the Inspector concludes:

“There are clearly matters such as this which could potentially be taken into account by the planning decision-maker in the exercise of its discretion, particularly if there would otherwise be a gap in the environmental controls” (McKay 2016, 392).

In other words, the approach of regulatory remit deference prescribed in planning policy can be overridden if in the judgement of the planning decision maker the available evidence indicates that such deference would leave a gap in regulatory oversight. This variant of horizontal deference is therefore not prescribed or automatic in the way that double compartmentalisation or vertical deference are, but it is imposed or revoked on the basis of an evaluation of the completeness of regulatory coverage in practice. There is though the possibility that the consummate regulation variant may militate against a decision maker from finding there to be a gap in the controls, and so revoking the application of the regulatory remit variant.

### 5.3.1 THE EFFECT OF REGULATORY REMIT DEFERENCE ON THE ISSUE OF WASTE DISPOSAL CAPACITY

On the issue of waste disposal capacity, Cuadrilla and FoE contested the procedural question of whether FoE’s case was material. Cuadrilla argued not, suggesting that the issue had already been considered and ultimately found acceptable by the EA, which they argued the Inspector must merely defer to. It was FoE’s case, on the other hand, that whilst the EA had regulated the method of treatment and the in-theory existence of capacity, they had not considered the in-practice availability of that capacity. Were the planning decision maker not to consider this matter, they argued, then this would amount to a gap in the oversight. The Inspector agrees with FoE that, as a point of principle, the case law does establish a discretion for the planning decision maker to consider matters of overlapping regulatory responsibility, “particularly if there would otherwise be a gap in the environmental controls” (McKay 2016, 392). As to whether the evidence before the inquiry pointed to such a gap in this case, however, the Inspector sided with Cuadrilla in resolving that the approach taken by the EA had left no such gap (McKay 2016, 399). The Inspector adds that any growing need for treatment capacity “would be dealt with via the normal and appropriate mechanism of the market and the planning system” (McKay 2016, 399).

The Inspector’s reasoning – which goes further than it did on the equivalent issue on the matter of public health – makes clear that regulatory remit deference prescribed in policy is not fully procedurally determined. The discretionary option to reconsider a matter of overlapping regulatory responsibility

and potentially arrive at a different conclusion in planning terms is open to a planning decision maker. What ultimately shuts the door on FoE's argument is the Inspector's judgement that the evidence before the inquiry does not demonstrate the gap in the controls that would necessitate further consideration of the matter at this inquiry, and so there is no reason to revoke the assumption of horizontal deference to the EA's existing decision.

With the availability of capacity not being assessed by the EA - who consider capacity a matter 'primarily' for the operator (EA 2015, 93) - and this not being considered a gap by planning; it is clear that the matter of treatment capacity is to be resolved between water treatment facilities and their clients, with clients potentially being forced to prevent the generation of waste in the event of a lack of available capacity. Furthermore, the Inspector makes reference to the EA's slightly vague allusion, in response to a query from Watson, that "the waste treatment industry is looking into increasing capacity nationally but they are waiting to see what is going to happen" (McKay 2016, 399; Watson 2016b, 4). In other words, what prevents the gap in the controls is the ability of operators to prevent the generation of new waste if necessary as a stop gap, and the longer-term anticipation of an increase in capacity. The matter is excluded from further consideration through the avoidance of the discretionary power to oversee the matter, with reliance placed instead on both waste generating industries and the waste treatment industry to resolve the matter in practice, amongst themselves, and post- planning permission and environmental permit issuing. As a consequence, no assessment of the availability of capacity (including, for instance, likely demands from other users) was produced or scrutinised by either the EA or the inquiry, rendering the regulatory oversight of these applications entirely insensitive to any potential matters of concern over the in-practice availability of capacity.

Of course, FoE's case concerns the demands on treatment capacity represented by these two exploratory projects. Although Watson alludes to the expectation of an increase in demand from the possible ramp up of a domestic shale industry, FoE do not pursue the argument on the future adverse waste management impacts of an industry at scale. Nonetheless it is worth pointing out that, if repeated, the passive horizontal deference and discretion-avoiding approach adopted here would leave the 'control' of the availability of treatment capacity down to the wastewater treatment and shale gas industries to muddle through in practice and post-permission (application-by-application compartmentalisation may also obscure the issue). The passive approach of horizontal deference adopted here would leave planning with no role in determining whether there can reasonably be expected to be capacity to treat the waste produced by the development it is granting permission to. It would see planning avoid concerning itself with the consequences of the potential creation of a bottleneck in the system due to limited waste treatment capacity or the imperfect correspondence between the ramp-up of a shale industry and an increase in the waste disposal capacity to service its waste.

In refusing to see the lack of oversight concerning the availability of treatment capacity as a gap in the environmental controls, the Inspector has arguably used ambiguity over spheres of regulatory

responsibility as a tactic of discretion avoidance and non-decision-making (Catney and Henneberry 2012). With neither planning nor the EA overseeing the matter, it has effectively been left to the operators and industries involved to figure it out in practice and post-permission.

In sum then, FoE's arguments were rejected because the inquiry eschewed the discretionary power to oversee the matter of availability of capacity, based on an apparent satisfaction with the issue being resolved in practice, post-regulatory consent and amongst the waste generating and treatment industries themselves. Furthermore, the inquiry was entirely insensitive to the potential intensification of the issue in a future production at scale scenario. The issue of waste disposal capacity is therefore closed through the avoidance of regulatory discretion which kept intact the approach of horizontal deference to the EA's prior decision.

### 5.3.2 THE EFFECT OF CONSUMMATE REGULATION DEFERENCE ON THE ISSUE OF PUBLIC HEALTH

Cuadrilla and FoE contested the procedural question of regulatory remits on the issue of public health as well, with Cuadrilla arguing that FoE's public health case was immaterial because the matter was the responsibility of the EA whose existing decision should be deferred to at this inquiry. However, the Inspector largely rejected FoE's public health case through the second variant of horizontal deference – consummate regulation deference. That is, FoE's arguments regarding the acceptability of health impacts contravened the policy-prescribed general expectation of effective regulation.

Regarding the competence of the EA's future regulatory oversight, FoE, in their initial objection to LCC, had sought to make an issue of the adequacy and efficacy of the regulatory system, though they did not fully pursue this line of argument at the inquiry. At the inquiry they argued that the indirect health impacts were unacceptable. Part of their case was that the indirect health impacts were based on public concern that is entirely reasonable because of inadequate regulation and ongoing scientific uncertainty. Finally, they also argued that general scientific uncertainty over the public health impacts of fracking is in itself a material consideration that necessitated a precautionary rejection of these appeals. Cuadrilla contended that the public concern underpinning the indirect health impacts was not reasonable because it was based on misplaced perceptions relating to the US experience and because the hazards to which it relates will be fully controlled by regulation. They also argued that any uncertainty in the scientific literature stemming primarily from the US is irrelevant in this case because regulation will be different in the UK, and because British regulators and statutory consultees (e.g. the EA, PHE) have assessed these specific applications and fracking more broadly and found low to negligible risk to public health.

Regarding direct criticism of the efficacy of the regulatory regime, made by many interested persons at the inquiry, the Inspector resolves that “their evidence does not lead me to find that the regulatory regime could not be relied upon to operate effectively in these cases” (McKay 2016, 404). She also sides with Cuadrilla on the matter of the acceptability of the indirect health impacts in granting them little weight. She does so on the basis that “all pathways that could potentially impact upon human health would be monitored and appropriately controlled”, and given this level of regulation, she did not consider that “the expressed fear and anxiety can be regarded as being reasonably engendered or a justifiable emotional response to the projects” (McKay 2016, 404). Finally, she pays little attention to the general uncertainty regarding the public health impacts of fracking in the scientific literature, though she does rule the US experience irrelevant given that the UK regulatory regime is ‘different’ (McKay 2016, 403).

The approach of consummate regulation deference, therefore, rendered the inquiry insensitive to matters of concern around the efficacy of the regulatory framework in general, particular regulators’ capabilities and competence, and the in-practice behaviour of operators. FoE had sought to make an issue of the adequacy of the regulatory framework in their initial objection to LCC; and many members of the public gave evidence at the inquiry as ‘interested persons’ raising concerns about Cuadrilla’s track record, the reliance on self-regulation and reporting, and staff and funding cuts to the EA and their competence as a regulator. However, none of these concerns were seriously considered or registered at the inquiry because they violated the expectation of consummate regulation prescribed in planning policy.

Furthermore, the approach of consummate regulation deference also played a key role in the Inspector finding the public concern on which the indirect health impacts were based unreasonable, and so finding those impacts acceptable. The indirect health impacts of the projects are found acceptable because the level of monitoring and controls imposed on the activities renders public concerns unreasonable and unjustifiable. In other words, the Inspector uses the generic expectation of effective future regulation to reject public concerns as unreasonable, and therefore find the indirect health impacts they give rise to acceptable.

The approach of consummate regulation deference, finally, also rendered the inquiry insensitive to concerns arising from the general scientific uncertainty over the public health impacts of fracking. The assumption of the effective operation of the regulatory system makes no distinction between situations of risk, uncertainty and ignorance. In other words, the regulatory system can be assumed to operate effectively in regulating all possible hazards, even potentially unknown and surprising ones. This effectively rids the decision maker of the troubles of accident and surprise in the oversight of shale gas development. In other words, what Brian Wynne would refer to as ‘indeterminacy’ (Wynne 1992b) – that is, the condition of incertitude arising from the dependence of assessments of risk on assumptions about the behaviour of human actors – is simply procedurally tamed by NPPF 122. The indeterminacy remains of course, but NPPF 122 banishes it beyond the scope of the inquiry by validating an entirely

implausible 'heroic' view of operators and regulators. In short then, the approach of consummate regulation deference plays a key role in closing uncertainty and indeterminacy over health impacts as matters of concern by effectively allowing the decision maker to feign certainty over the regulatory system's ability to ensure no health impacts arise. Furthermore, FoE's uncertainty case was undermined because it was based on extrapolating from the US experience, which of course was dismissed as unreasonable because of the expectation of superior – or indeed consummate - regulation in the UK.

In sum then, on the issue of public health, closure was performed by the approach of consummate regulation deference through which the regulatory system is assumed to operate effectively in line with NPPF 122. As such, arguments and matters of concern over the efficacy of the regulatory system, general scientific uncertainty, and indirect health impacts were all excluded from serious consideration through horizontal deference.

In conclusion, horizontal deference to the remit and existing work of the EA and the future efficacy of the regulatory system in general produced justification through the closure of FoE's arguments across the issues of waste disposal capacity and public health at the inquiry. The EA's permit decision was not judged to leave a gap in the environmental controls on the availability of waste disposal capacity, eschewing the discretionary power to oversee the matter and leaving the approach of regulatory remit deference intact. As a result, the EA's existing satisfaction was not to be re-visited, rendering FoE's case on the availability of capacity procedurally immaterial. Furthermore, as just seen, the approach of consummate regulation deference closed several matters of concern regarding the issue of public health from consideration and registration at the inquiry. Concerns over the efficacy of regulation, indirect health impacts, and scientific uncertainty were rejected as they either violated the assumption of consummate regulation, or are supposedly addressed through the 'heroic' view of regulation based on it.

## 5.4 SELECTIVE SCEPTICISM AND CREDULITY

The three forms of closure considered so far have been blunt forms of procedural closure more or less prescribed in planning policy and convention. Put simply, they exclude arguments and matters of concern as immaterial because the rules say so, and thus produce justification through the resultant insensitivity of the inquiry to such matters. The procedural contests over their use say little about the intellectual merits of those arguments or the material details of those matters of concern. They focus instead on whether they can or should be heard, scrutinized and registered in this particular forum at this particular time. The rules in question that perform the closure are often explicit – a particular passage of planning policy or a well-established convention. The fourth and final form of closure is however of a different kind. Instead of engendering insensitivity through procedural exclusion, ‘selective scepticism and credulity’ displays insensitivity in its very mode of engagement with the detail of Cuadrilla’s estimate knowledge claims. This insensitivity, in other words, is produced not through blunt exclusion but through the conduct of scrutiny itself.

The inquiry withholds scepticism over, and is therefore insensitive to, the problematic warrantability of Cuadrilla’s estimate knowledge claims. In the case of both Cuadrilla’s methane emission and flowback fluid volume estimates, the predicted scale of the impact of the projects is questioned by FoE. In both cases the Inspector is satisfied with the credibility of the estimate after ostensibly scrutinising them. The conduct of the scrutiny of these estimates however is in both instances shallow, and demonstrates an eagerness to avoid problematisation. In both cases then justification is produced by a shallow performance of scrutiny which partially obscures (though is on close inspection rather unconvincing) an orientation of credulity towards Cuadrilla’s estimates.

### 5.4.1 THE EFFECT OF SELECTIVE SCEPTICISM AND CREDULITY ON THE ISSUE OF CLIMATE CHANGE

The ESs estimate that each site will emit between 118,418 and 124,397 tCO<sub>2</sub>e. They suggest, furthermore, that “due to the conservative nature of the assessment there is potential for the actual GHG emissions to be even smaller” (Arup 2014a, 107). Anderson’s criticism of this estimate was twofold. First, he points to scientific uncertainty concerning leakage (or ‘fugitive emissions’) from natural gas production generally and shale gas in the UK in particular (Karion et al. 2013; McGlade et al. 2015). Second, he points to the use of a GWP conversion rate of 25 as opposed to 34, which he described as “the latest scientific assessment (IPCC AR5) of methane’s global warming potential” (Anderson 2016a, 30–31).

In response, Cuadrilla contest Anderson's claim on two grounds simultaneously. First, on the substance of the claim they argue that the estimates are reliable. Richardson's technical note tells us that for each emissions source more than one conversion factor was used, 'where possible', to account for uncertainty in the input data. Furthermore, the methane emissions data comes from a US study (Allen et al. 2013) chosen because it focuses on well completions rather than the whole lifecycle of production wells and hence is more relevant to these exploratory applications. The study surveys 27 such completions across "four geographical regions of shale formation in the US" (Richardson 2016, 3). Second, on the relevance of the claim, they argue – via Smith's evidence – that Anderson's methane emissions argument is in any case irrelevant because the EA (who regulate flaring, and emissions to air) have already assessed the proposals and are satisfied with them. In other words, they appeal to the Inspector to dismiss the matter of the methane emissions estimates through the mechanism of horizontal deference (the regulatory remit variant) considered in the previous section of this chapter.

The Inspector resolves that she is "satisfied that the method and assumptions, and the sources of data referred to, can safely be relied upon and there has been no material error in the ES estimate of methane emissions" (McKay 2016, 408). She does not explicitly rely on the EA's satisfaction, and that is the full extent of her reasoning on the matter. She therefore appears to have made a judgement that the ES methane emissions estimates are credible beliefs about the likely scale of the projects' emissions and that Anderson's claim that there is a significant likelihood that emissions could be substantially higher is less credible. The treatment of this issue (or rather lack thereof) demonstrates, I will argue, a problematic insensitivity to possible matters of concern caused by the withholding of scepticism over Cuadrilla's estimates. In order to do so I will have to delve a little deeper into the matter than the inquiry was evidently willing or able to do.

The ESs state that the data used in the assessment of GHG emissions is based on "the knowledge and experience that Cuadrilla have gained from drilling exploration wells and undertaking hydraulic fracturing in the UK", that this represents "the best available data at the time of assessment", and that as a result "secondary data source (such as GHG emissions in published data) have not had to be used" (Arup 2014a, 112). They then go on to list the 'embedded mitigation measures' adopted to reduce the projects' carbon footprint. These are the use and maintenance of all equipment and pipework in accordance with manufacturers specifications; hydrostatic pressure testing of pipework and equipment to identify potential leaks before their use; the use of an enclosed completions system to separate gas, solids and liquids so that gas is burnt via the flare instead of being vented from tanks or lagoons; and fugitive emissions monitoring across the site at regular intervals to identify and fix leaks or faulty equipment (Arup 2014a, 113).

The assessment calculates that approximately 70% of the projects' total emissions are attributed to flaring (that is, completed combustion from the flare, and so not methane emissions) (Arup 2014a, 117). This assumes that 130,000m<sup>3</sup> of unprocessed natural gas will be flared per day over a 90 day period *per well* (Arup 2014a, H4). The daily gas flow rate assumption (130,000m<sup>3</sup>) is described as a worst-case

scenario (Arup 2014a, 108). The flare is expected to have a 98% combustion efficiency, and the assessment has “assumed that the remaining 2% [a fugitive] consists entirely of methane” (Arup 2014a, H4). The 98% combustion efficiency assumption is referenced to Allen et al. (2013) in the ES (Arup 2014a, 121). The EA, on the other hand, in their decision document, suggest that the 98% flare efficiency figure is “known from technical specification provided by the flare supplier” (EA 2015, 63).

It is not clear whether flaring accounts for all fugitive emissions or whether there are expected to be additional non-flaring fugitives. The assessment estimates that each site will emit 16,016 tCO<sub>2</sub>e of fugitive emissions (Arup 2014a, 121, table 8.8). This estimate does not change between the lower and higher range unlike most other sources, so as a proportion of total GHG emissions fugitives account for between 12.88%-13.52% (as a proportion of the higher and lower total project emissions estimate respectively) (Arup 2014a, 117, table 8.3). With the above mitigation measures, “fugitive emissions from the Site are expected to consist of un-combusted methane as a result of incomplete combustion in the flare, [and] account for 13% of the total emissions” (Arup 2014a, 117). However, this is contradicted in Appendix H of the ES, where it is suggested that:

“With the proposed embedded mitigation measures fugitive emissions from the Project will be significantly reduced. As a consequence the main source of fugitive emissions that have been assessed are associated with unburnt methane emitted from the flare” (Arup 2014a, H4).

So, are flaring fugitives the only or the main source of fugitives? If they are the only source then the 16,016tCO<sub>2</sub>e figure is based on the assumption of the consummate prevention of all non-flaring fugitives from accidental releases, which would amount to a ‘best-case scenario’ assessment. Working through the calculation using the assumptions and figures provided (with the exception of one claimed assumption which is false), it becomes clear that the assessment has used a 2% fugitive emissions rate (by volume of gas, not proportion of total emissions in tCO<sub>2</sub>e) which is exclusively accounted for by flaring emissions, and so assumes the consummate control of all other fugitives (see A2.1). It is worth pointing out that the inquiry failed to clarify the key assumptions underpinning the estimate in this way.

Several questions arise from the figures and assumptions used in the methane emissions estimate, which I will now deal with in turn. The inquiry rendered itself insensitive to these questions by the closure performed by the withholding of scepticism.

#### *Are the conversion rates correct?*

The first and most obvious thing to point out is the two conversion rates that are, in the first instance, officially marginally incorrect, and in the second, whilst officially correct potentially scientifically inaccurate. In the first case, the conversion rate for the density of methane (kg/m<sup>3</sup>) recommended by DEFRA/DECC is in fact 0.72 as opposed to the 0.71 figure used in the estimate (DEFRA/DECC 2012a). This marginally increases the resulting fugitive emissions estimate from 16,016 to 16,241tCO<sub>2</sub>e. There demonstrably has been an error in the methane emissions estimate then, though a marginal one not

likely to be significant enough to problematize the Inspectors satisfaction that ‘there has been no *material* error in the ES estimate of methane emissions’ (my emphasis). However, if ‘material error’ means one significant enough to render the projects unacceptable on climate change grounds, then in the light of the closure performed by vertical deference on the issues of climate change, the statement – that there has been no material error - is a truism. As a result of the approach of vertical deference adopted towards the WMS, no error – no matter how big – could be material in that sense given that any revision upwards of the total GHG emissions estimate cannot undermine the critique-protected belief that shale gas exploration (and its emissions) necessarily and in general helps to reduce GHG emissions.

The second potentially problematic conversion factor used is – as pointed out by Anderson at the inquiry – the (100yr) GWP figure of 25. A GWP of 25 is referenced to the 2007 IPCC Fourth Assessment Report (IPCC 2007, 33, table TS.2) in the ES (Arup 2014a, A8, table 1). Anderson describes a GWP of 34 as “the latest scientific assessment (IPCC AR5) of methane’s global warming potential” (Anderson 2016a, 30–31) (see A2.2 for further details).

It is worth pointing out that IPCCAR5 was published in 2013 (IPCC 2013), and the ESs subsequently in 2014. At the time of the inquiry, the latest (2016) Government GHG Conversion Factors report (BEIS 2016a), however, maintained the use of a 100 year methane GWP of 25. It justified doing so on the basis that IPCCAR4:

“[I]s the report which is accepted for use in national GHG reporting under the UNFCCC. Although the IPCC have prepared a newer version since [i.e. AR5], the methods have not yet been officially accepted for use under the UNFCCC” (BEIS 2016a, 8).

The use of a GWP of 25 is therefore undoubtedly the procedurally correct approach for now. An assessment of the fugitive emissions of each site using the correct methane density figure of 0.72, and the IPCC5 GWP figure of 34 results in methane emissions of ~22,088tCO<sub>2</sub>e. This represents an absolute increase of 6,072tCO<sub>2</sub>e, which would increase each sites’ total emissions to between 124,490-130,496 (tCO<sub>2</sub>e).

*Table 5: Conversion rates and their effect on estimated emissions*

	<i>Figure used in ES</i>	<i>ES estimate</i>	<i>Alternative figure</i>	<i>Amended estimate</i>
<b>Density of methane</b>	0.71	16,016 (tCO <sub>2</sub> e)	0.72	<u>16,241</u> (tCO <sub>2</sub> e) (with GWP of 25)
<b>GWP of methane</b>	25	16,016 (tCO <sub>2</sub> e)	34 (procedurally incorrect, but the ‘latest scientific understanding’)	<u>22,088</u> (tCO <sub>2</sub> e) (with 0.72 density)

The question of whether the increased IPCC5 GWP of 34 should be used was not explicitly addressed by the Inspector, though could easily have been procedurally closed by the continued official status of the

IPCC4 figure. One way or another, the inquiry did not have to consider, nor Cuadrilla defend, the acceptability or otherwise of 22,088 tCO<sub>2</sub>e of methane emissions. Furthermore, as already discussed, the deferential approach to the Government view in the WMS ensures that any increase in the emissions estimates could not render the projects unacceptable on climate change grounds. As Smith himself suggested, the actual figure of estimated GHG emissions is irrelevant given this deference to the Government view that shale development helps to achieve climate change objectives. Nonetheless, irrespective of the likely material effect (or lack thereof) of different conversion rates on the acceptability of the projects, the point here is that the inquiry failed to delve into the details of the estimates and subject them to proper scrutiny.

*Is 130,000m<sup>3</sup> per day per well a reasonable worst-case scenario?*

Another key assumption made in the methane emissions estimates is the daily per day per well gas flow figure of up to 130,000m<sup>3</sup><sup>17</sup>. This daily flow rate is described as a worst-case scenario (Arup 2014a, 108), and appears to be based on the ‘knowledge and experience’ of Cuadrilla. I assume this means the figure is a worst case absolute daily figure, as opposed to a worst case average daily figure. The very purpose of the IFT is to – as the name rather gives away – test, amongst other things, the flow rate. As the EA put it in their decision document when justifying the use of flaring:

“It is also not reasonably practicable to connect the flow of extracted natural gas to the gas grid during the initial flow tests. This is because the flow rates are unknown and the quality of the gas produced may not be compatible with gas grid requirements without further processing” (EA 2015, 61–62).

Comparing gas flow rates during well completions<sup>18</sup> from the US to the UK is problematic because of differences in geology and regulation. In this particular case a key difference concerns the length of time of the IFT (which is effectively an elongated completion) and the US completions that constitute the evidence base. In the US completions rarely last more than 2 weeks - the EPA assumes they last between 3-10 days (EPA 2011a); Allen et al.’s sample of 27 completions (on which Cuadrilla rely) last between 5–339hrs (approx. 2 weeks) (Allen et al. 2013). One would assume Cuadrilla have factored the knowledge and experience from Preese Hall (in spite of it being a vertical well) into their 130,000m<sup>3</sup> worst-case scenario daily flow rate (and so not relied exclusively or even at all on the US completions evidence base of dubious relevance because of the massive difference in duration), however this

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<sup>17</sup> The EA, however, refer to the figure of 15,444 tonnes per year of what is described as “surplus natural gas” (EA 2015, 36, table 6.13), as opposed to 8,775 tonnes per well or 35,100 tonnes per site yielded from the maximum 130,000m<sup>3</sup> figure (density of natural gas of 0.75 – BEIS 2016b). It is suggested that this surplus gas is flared to the atmosphere at a maximum rate if 130,000m<sup>3</sup> per day, yet 15,444 tonnes would amount to 57,200m<sup>3</sup> of gas flared on average per day over 360 days of flaring. This may be a mistake by the EA or by Cuadrilla (who may have supplied contrasting figures), or, alternatively, it may be an average flow rate estimate supplied to the EA but not explicitly made public elsewhere.

<sup>18</sup> The period between the beginning of flowback and the well being connected to gathering lines.

evidence (the Preese Hall completion flow rates) was not before the inquiry and is not in the public domain.

*Table 6: Estimates of gas flow rates during completion* (adapted from Mackay and Stone 2013, 42, table A3)

Source	Play	Total volume of gas flow during well completion (i.e. total emissions potential per well)	Assumed average duration of completion	Approximate per day average (volume/duration)
<i>Jiang et al. (2011)</i>	Marcellus	603,000m <sup>3</sup>	9.5 days (base case)	63,000m <sup>3</sup> per day
<i>Howarth et al. (2011) (widely considered an outlier)</i>	Haynesville	6,800,000m <sup>3</sup>	10 days	680,000m <sup>3</sup> per day
<i>Howarth et al. (2011)</i>	Barnett	370,000m <sup>3</sup>	9 days	41,000m <sup>3</sup> per day
<i>O'Sullivan &amp; Paltsev (2012)</i>	Haynesville	1,180,000m <sup>3</sup>	9 days	131,000m <sup>3</sup> per day
<i>O'Sullivan &amp; Paltsev (2012)</i>	Barnett	273,000m <sup>3</sup>	9 days	30,000m <sup>3</sup> per day
<i>O'Sullivan &amp; Paltsev (2012)</i>	Fayetteville	296,000m <sup>3</sup>	9 days	33,000m <sup>3</sup> per day
<i>O'Sullivan &amp; Paltsev (2012)</i>	Marcellus	405,000m <sup>3</sup>	9 days	45,000m <sup>3</sup> per day
<i>O'Sullivan &amp; Paltsev (2012)</i>	Woodford	487,000m <sup>3</sup>	9 days	54,000m <sup>3</sup> per day
<i>Arup (2014) (these applications)</i>	Bowland	11,700,000m <sup>3</sup> (if 90 days)	60-90 days	'Worst case scenario' of 130,000m <sup>3</sup> per day <sup>19</sup>

As can be seen in Table 6 above, the 130,000m<sup>3</sup> estimate is at the top end of average completion gas flow rates when compared to the US evidence base, especially if the Howarth et al. (2011) outlier is excluded. However, the 130,000m<sup>3</sup> figure looks to be a maximum rather than average figure. The literature tends not to disclose maximum daily completion gas flow rates, using average figures to calculate total potential emissions instead. The apparent use of a maximum per day gas flow rate therefore appears to be a conservative assumption. However, it must be reiterated that the US cases above are much shorter in duration, and so, depending on the ramping assumptions used (see A2.3), the elongated completion (IFT) in these proposals may result in a higher average. If these wells are assumed to ramp up in a similar way to the US cases in the literature – and they may not, we simply do not know because the figure wasn't scrutinised - that would potentially mean an average daily flow rate not too

<sup>19</sup> Assumed to be an absolute per day maximum – with a lower per day average. The 57,200m<sup>3</sup> figure potentially let slip by the EA may be the estimated average, or may simply be a mistake.

much smaller than the maximum rate (because the average is taken over 90 days, and so potentially includes a high number of post-ramp up days). The lack of disclosure over the assumptions used regarding daily gas flow during the IFT, though, leaves interested third parties only able to speculate as to whether the operations in table 6 are remotely comparable to the operations under consideration in these proposals. At the inquiry, of course, Cuadrilla were neither forced to disclose nor defend the assumptions used to arrive at the 130,000m<sup>3</sup> figure due to the closure produced through the withholding of scepticism.

The EA cap the amount of gas that can be flared daily at 130,000m<sup>3</sup> (EA 2015, 21), so a higher than anticipated flow rate wouldn't necessarily cause higher emissions given that Cuadrilla would have to slow the rate using the choke manifold (assuming the cap was actually enforced). It is unclear, however, what impact this would have on their testing and whether the IFT would potentially be extended as a result. The principle point here though is the lack of scrutiny the assumption received at the inquiry.

*Will flaring only occur for 90 days per well? Are fracking and IFT the discreet blocks of activity presented by Cuadrilla?*

The other side of the total emissions potential equation is the duration of the completion. The ESs state that the IFT will last for between 60-90 days per well (see A2.4 for a possible source of this assumption), potentially ten times longer than the typical duration of the equivalent process in the US.

So far this discussion has assumed that gas is only flared during the IFT, which is the general impression given by the ESs and the EA decision document. For example, the ES states:

“Natural gas produced during the initial flow test (but not extended flow test) will be burned via the two on-site enclosed flare stacks. Flaring of natural gas would only occur during this relatively short initial flow test period” (Arup 2014a, 51).

This tallies well with the 130,000m<sup>3</sup> of gas flared over 90 days per well assumption used in the emissions calculation (i.e. a worst-case scenario of the maximum duration of IFT is used for each well), as well as the EA's 90 day limit on flaring (EA 2015, 98).

However, the ESs also suggest that flowback (potentially including increasing quantities of gas), testing, and flaring also occur during the fracking phase.

“Although initial flow testing is described below as a standalone stage there is potential for some initial flow testing to be undertaken while hydraulic fracturing is also being implemented (i.e. in between fracturing stages)” (Arup 2014a, 50).

“At some point the well will start to produce *mainly*<sup>[20]</sup> natural gas, and diminishing volumes of flowback fluid. It is at this point when the initial flow test begins. This test will run for up to 90

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<sup>20</sup> This 'mainly', furthermore, suggests that the elongated completion in this case (IFT) will not in fact 'ramp up' from 0, but begin at a point when the well is already producing mainly gas. This further brings into question the comparability of US average daily flow rates and potentially provides support for the notion that the average daily completion flow rate in this case may be reasonably expected to be higher than the US evidence base.

days by burning the gas in the flare system to establish an initial production rate or “IP”. If the findings are favourable, it may be followed by an extended flow test (as described below)” (Arup 2014b, 51, my emphasis).

“The methodologies for assessing flaring and fugitive emissions are detailed in Appendix H. Although these two types of emissions occur during both hydraulic fracturing and initial flow testing, their effects have been assessed as a whole under initial flow testing” (Arup 2014a, 112).

Table 8.2 (Arup 2014a, 110), furthermore, suggests flaring and fugitives occur during fracking and the IFT, with fugitives occurring during the EFT and a flare present for safety and emergency reasons. This tallies with the eventual clarification on the flowback fluid issue (see section 4.3.3 above) – where flowback (potentially including some gas and so need for flaring) occurs during the fracking stage but the fluid, once any gas is removed (and flared), is 100% reused.

Two wells will be fracked in 30 stages and the other two in 45. The ESs assumes the 30 stage wells will take 50 days and that the 45 stage wells will take 65 days (Arup 2014a, B13).

What is not clear is whether any day’s worth of testing and so potentially flaring that occurs within the 50 to 65 days of fracking is one fewer day of testing and flaring during the IFT phase – which would leave the maximum 90 days of flaring estimate intact. Alternatively, if it were to be additional as opposed to subtractive this would render the supposed worst-case scenario for flaring duration (in days) incorrect and result in the projects breaching their 90 days of flaring per well limit set by the EA. What is also not clear – in relation to the third quote above – is how any flaring or fugitive emissions occurring during the fracking phase are ‘assessed as a whole under initial flow testing’ given that the IFT is stated as lasting between 60-90 days.

The ES suggests that “[i]t is likely that flow testing and hydraulic fracturing activities will run in parallel providing sufficient gas flows from the well” (Arup 2014a, 26). This rather suggests the ‘subtractive’ scenario. In other words, any overlapping with the fracking phase shifts the IFT forwards, rather than further elongating it. However, this is contradicted by the (more recent) indicative timetable in Smith’s written evidence (Smith 2016a, 15), which clearly depicts IFTs as discreet blocks starting as fracking finishes. One possibility appears to be that gas returns during the fracking phase (and so is flared), but not at sufficient rates to test (and possibly not at sufficient rates for the assumed flare combustion efficiency – see AEA 2012, 36; Zeng, Morris, and Dombrowski 2016, 77). In this scenario days of flaring would be being used up without yielding any testing (for which the days of flaring – limited by permit – will still be required later). Cuadrilla would require written approval from the EA to flare beyond 90 days for the purpose of testing, with any significant extension requiring a permit variation (EA 2015, 20–21). This, furthermore, raises the question of what constitutes a day of flaring in the EA’s eyes?

Finally, it is unclear how flow testing during the fracking phase would be reconciled with the aim of achieving a constant flow during testing. The EA, for example, state that:

“The aim of the well testing activity is to establish the quantity and composition of the gas, and its flow rates to forecast potential future production flows from the well. The data will be

gathered over a period not exceeding 90 days for each well, during which the aim is to achieve a constant flow” (EA 2015, 99).

One would assume injecting fluid down the well would fundamentally interrupt the flow out of the well. This again raises the possibility of gas being flared before it can be satisfactorily tested (and so using up flaring days whilst not yielding testing days).

The short answer to the question ‘will gas only be flared for a maximum of 90 days per well?’ is yes, because the EA permit limits flaring to that figure (assuming an extension isn’t requested and granted). The longer answer is that the methane emissions estimate uses the upper estimate of the duration of the IFT (90 days) for its duration of flaring figure, apparently without accounting for the possibility of flaring during the fracking phase of operations. Days of flaring during the fracking phase subtracting from days of testing required in the IFT would require a flow rate sufficient and constant enough to enable adequate testing, which does not appear to be a given. Once again, the source of the maximum of 90 days of flaring per well estimate (see A2.4) and its in practice plausibility were not required to be disclosed and defended by Cuadrilla at the inquiry due to the withholding of scepticism from the methane emissions estimate.

*Where does the 98% flare efficiency assumption come from, is it reasonable, and how is it monitored?*

Because the estimated methane emissions appear to arise entirely from incomplete combustion in the flare (and so are perhaps not strictly ‘fugitives’, given they are intentional and anticipated), a key determinant of the estimate is the combustion efficiency of the flare. As already seen the ES and the EA have different ideas as to where the 98% flare efficiency assumption comes from (see above).

An at least 98% flare efficiency figure is in fact a common assumption used in unconventional gas GHG emissions estimates, including Allen et al. (2013) (see also Jiang et al. 2011; O’Sullivan and Paltsev 2012b)<sup>21</sup>. The figure originates from the EPA (EPA 1991; EPA 2012), who state that:

“The degree of combustion depends largely on the rate and extent of fuel-air mixing and on the flame temperatures achieved and maintained. Properly operated flares achieve at least 98 percent combustion efficiency in the flare plume, meaning that hydrocarbon and CO emissions [sic] amount to less than 2 percent of hydrocarbons in the gas stream” (EPA 1991, 13.5–3).

Some have questioned how often this widely used assumption is achieved in practice, and especially how this is monitored. For example, a recent paper by Zeng et al. (2016) notes that it is current practice to assume a 98% flare efficiency “provided that some surrogate parameters (e.g., heat content of the vent gases and exit velocity of gases at the flare tip) are within established ranges” (Zeng, Morris, and Dombrowski 2016, 77). Field studies and monitoring analyses in Texas, they suggest, have

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<sup>21</sup> Interestingly Bond et al. claim that “[i]n the UK, silent flaring technology allows 100% efficient burning of methane” and then use that as the assumed flaring efficiency in their assessment (Bond et al. 2014, 46). The EA – who consider Cuadrilla’s proposals to be the best available technique for disposing of gas – are either not aware of this possibility, or it is not in fact a possibility.

“demonstrated that these assumptions regarding flare CE [combustion efficiency] may be inaccurate, and total flare emissions in this airshed could be significantly underestimated” (Zeng, Morris, and Dombrowski 2016, 77). A flare combustion efficiency study by Allen and Torres (2011) demonstrated that even when operating in accordance with federal regulations, a flare may not achieve the widely assumed 98% combustion efficiency figure (Allen and Torres 2011). Finally, an AEA report suggests that for exploratory and development wells the efficiency of combustion “is expected to be 95% on average during completion / recompletion of the well” (AEA 2012a, 36).

The ability of operators to achieve high flare efficiency in practice, Zeng et al. argue, is:

“[S]everely limited by the lack of real-time measurement of the flare CE. Currently there is no technology that can provide real-time autonomous and direct measurement of flare CE” (Zeng, Morris, and Dombrowski 2016, 77).

The EA, who regulate flaring, concur that directly monitoring combustion efficiency is technically impossible. Instead the efficiency must be calculated using ‘surrogate parameters’:

“We are satisfied that assessing the emissions from the flare using the feed gas flow rate, the feed gas composition and the flare efficiency is appropriate considering that direct monitoring of the flare is not technically possible. This level of assessment will demonstrate whether the combustion is working at the correct level of efficiency to minimise harmful emissions” (EA 2015, 63).

The 98% flare combustion efficiency assumption originates from the EPA and is the current practice assumption, though some studies have raised questions over its achievement in practice and in particular how the efficiency of the flare is monitored. Again, consideration of these matters was closed at the inquiry through the withholding of scepticism.

*Is Allen et al. (2013) a sound basis for assuming a 2% fugitive rate for this project? Do Cuadrilla understand the 2% figure supposedly being relied upon?*

The methane emissions estimates assume a 2% fugitive emissions rate, accounted for entirely by gas escaping un-combusted through the flare. The 98% flare efficiency figure and the 2% emissions rate are therefore two sides of the same coin. As has just been discussed, the 98% flare combustion efficiency figure originates from the EPA. However, the ESs reference both a 97-98% reduction in fugitive emissions achieved by the proposed mitigation measures, and a ‘fugitive emissions rate’ of 2% from flaring to Allen et al. (2013).

Allen et al. (2013) conduct direct measurements of the methane emissions of 27 well completions across various regions of the US. They find that, on average across 24 completions (3 are discounted because of ‘partial data loss’), measured emissions are 1.6% of potential emissions. Potential emissions are “the methane that would be emitted if all of the methane leaving the wellhead during the flowback were vented to the atmosphere” (Allen et al. 2013, 17769). The range in fugitive rates across the 27 completions measured is between 0.01% - 100% (Allen et al. 2013, S–21, table S1–6).

Of the various surface equipment configurations and completion processes represented in the sample of 27, 'configuration 3' most closely matches the Cuadrilla proposals. Configuration 3 operations saw flowback:

"Flow directly from the well to a separator or multiple separators, with no initial flowback to an open tank; gases from the separator either to sales or flare; liquids from the separator to a flowback tank" (Allen et al. 2013, S-8, table S1-1).

In these proposals, of course, during the IFT gas is flared once separated. There were five configuration 3 operations in the Allen et al. sample, and of those only 2 involved flaring. The fugitive rates from those two wells were 11% and 24%. In fairness this is misleading because in spite of these operations conforming to configuration 3 a high proportion of fugitives in both cases arose from venting. The other three configuration 3 cases involved no flaring. Even in these cases there was a small level of fugitives measured from what is described as "[a]tmospheric Vent from Tank handling liquid water stream from Completion Separator" (see Table S1-4, pg. S17). These three completions are totally incomparable to the Cuadrilla proposals (because of the lack of flaring) and are also far and away the lowest fugitive rates (all three are 0.01%).

Allen et al. (2013) themselves suggest that:

"Some of the other relatively high emission completion flowbacks (~3 Mg to 6 Mg of methane) involved large amounts of flared gas (up to 130 Mg of methane to the flare), which was assumed to combust the methane at 98% efficiency" (Allen et al. 2013, 17769).

Two key points emerge here. First, Allen et al. (2013) does not support a 2% fugitive rate for completions in which 100% of the gas is sent to the flare<sup>22</sup>. Second, Allen et al. (2013) does not support the anticipation of the consummate prevention of all non-flare fugitives (there isn't a single operation sampled where fugitives were exclusively accounted for by un-combusted methane escaping through the flare).

Allen et al. (2013) is not a sound basis for assuming a 2% fugitives rate in this case (see A2.5 for a summary), and the references to Allen et al. in the ESs suggest a misunderstanding of that study and its findings. There are three similar key percentages in Allen et al., one of which is an input assumption (98% flare efficiency), and the other two of which are very different findings (98.6% is the average proportion of total potential emission controlled across a sample of 24, and 97-98% is the reduction that this finding represents against the EPA's emission estimates at the time of the study's publication). These three figures appear to have been confused by the authors of the ES. Allen et al. (2013) – to the extent that it is relevant at all – justifies a fugitive rate assumption at least marginally higher than 2%. The suitability of Allen et al. (2013) as the basis of the claims referenced to it in the ES was neither

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<sup>22</sup> Two cases come close to this description, though both have small levels of fugitives on top of the flaring methane emissions. Neither of these cases were used in calculating averages because of 'partial data loss' (Allen et al. 2013, S-16). Furthermore, neither of these cases were configuration 3 operations.

scrutinised nor defended at the inquiry due to the closure performed through the withholding of scrutiny.

*Is 2% a reasonable assumption in relation to the broader literature? Is the consummate prevention of all non-flare fugitives a reasonable assumption?*

The ESs themselves are confused on this point, as Appendix H suggests that:

“With the proposed embedded mitigation measures fugitive emissions from the Project will be significantly reduced. As a consequence the *main* source of fugitive emissions that have been assessed are associated with unburnt methane emitted from the flare” (Arup 2014b, H4, my emphasis).

Furthermore, the EA add that:

“It is not possible to apply a limit on fugitive emissions as by definition they are unplanned *and from a variety of sources* so it is not possible to measure all emissions of them” (EA 2015, 103, my emphasis).

They go on to suggest that:

Without measures being taken, fugitive emissions may arise from other parts of the process (e.g. in the event of a leak from any pipes). The permit requires the Operator to take necessary measures to prevent and/or minimise these emissions (EA 2015, 110).

As already demonstrated the methane emissions estimate is calculated on the basis of a 2% fugitive rate, accounted for entirely by the flare fugitives resulting from the expected 98% efficiency of the flare, and so assumes the consummate prevention of all non-flaring methane emissions.

Interestingly, The Sustainable Gas Institute criticise Bond et al. (2014) for their assumption of a 100% flaring scenario, stating that:

“The assumption that gas is either 100% captured or 100% flared will result in an underestimate of well completion emissions: even with the use of RECs [reduced emissions completions], an initial venting of gas often occurs while flow increases such that it is suitable to connect to the routing and collection equipment” (Balcombe et al. 2015, 44).

As is demonstrated in table 7, Cuadrilla’s proposed ‘100% capture and flare’ (at 98% combustion efficiency) scenario is not typical of either the assumptions used in bottom-up estimates or the findings of direct measurement studies in the literature on the methane emissions of unconventional gas completions.

*Table 7: Assumed and measured completion fugitive rates in the literature*

Proportion of total potential gas emissions (all gas passing the wellhead during a completion)
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	<b>directly emitted<sup>23</sup></b> (i.e. not accounting for the CO <sub>2</sub> emissions of successful flaring combustion, where flaring is involved a 98% combustion efficiency has been assumed)
<b>Assumed scenarios in bottom-up estimates</b>	
<i>EPA, 2010</i>	10%
<i>AEA, 2012</i>	Various scenarios, but of interest here: Flaring – 11.8% Green Completion – 10%
<i>Balcombe et al., 2015</i>	1-10% range of emissions lost in RECs found in the literature (Balcombe et al. appear to consider flaring as a type of REC)
<i>Mackay and Stone, 2013</i>	Four scenarios - 100%, 11.71%*, 10%, 0%
<i>O'Sullivan and Paltsev, 2012a</i>	Current field practice scenario – 22.33%** Industry survey scenario – 12.38%**
<i>Jiang et al., 2011</i>	Base case – 25.53%
<b>Direct measurement findings</b>	
<i>Allen et al., 2013</i>	1.4% (average across sample of 24, range 0.01%-100%)
<b>ES proposal before the inquiry</b>	
<i>Arup, 2014</i>	2%

\*Assumes that the scenario of “90% capture and flare (90% of gas is captured and 95% of that gas is flared)” means the gas that is captured but not flared is used.

\*\*Both assume capture is 90% effective, consistent with the approach of the authors (O’Sullivan and Paltsev 2012b, 25).

The comparability of the Allen et al. average has already been discussed, suffice to say that this figure and the Mackay and Stone 0% scenario (an operator floated scenario, the possibility which is yet to be demonstrated in practice) – the two figures that are under the ESs 2% scenario - have question marks against them. On the other hand, the higher rates also involve various proportions of vented gas, a practice not permitted in the UK regulatory system<sup>24</sup>. Nonetheless, the consummate prevention of all non-flaring methane emissions is obviously a best-case case scenario. The inquiry, however, simply failed to fully scrutinise the underlying assumptions behind the methane emissions estimate, instead displaying credulity towards it.

Having gone through each key assumption involved in the methane emissions estimate, the “method and assumptions, and the sources of data” which the Inspector was satisfied could “safely be relied upon” (but which remained largely obscure during the inquiry due to the withholding of scrutiny) are summarised in table A2 (see A2.6).

<sup>23</sup> Gas emissions is used instead of methane emissions because large differences in the assumed composition of unprocessed gas would skew a comparison on the basis of methane emissions as a proportion of, say, a daily completion gas flow rate figure.

<sup>24</sup> The venting of gas is only permitted on these sites “for safety reasons” (EA 2015, 21).

*Did the EA consider the reasonableness of the methane emissions estimate and its impact on the projects' carbon footprint? Was there a gap in the controls?*

Though this was not explicitly done by the Inspector, rather than being satisfied with the questionable scientific credibility of the methane emissions estimate on the basis of clearly shallow scrutiny, she could have relied procedurally on the EA's satisfaction to close the matter through horizontal deference. Cuadrilla certainly pursued this line of argument. Put another way, it might be argued that the level of scrutiny afforded to the methane emissions estimate at the inquiry doesn't ultimately matter, because the EA had already scrutinised the projects and found them satisfactory. This begs the question of whether the EA did specifically assess the methane emissions estimate.

As part of their assessment of emissions to air from the proposals the EA turn very briefly to the 'greenhouse gas impacts' of emissions to air:

"This section summarises the assessment of greenhouse gas impacts which has been made in the determination of this Permit. Emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases differ from those of other pollutants in that, except at gross levels, they have no localised environmental impact. Their impact is at a global level and in terms of climate change. Nonetheless, CO<sub>2</sub> is clearly a pollutant for IED [Industrial Emissions Directive] purposes.

The principal greenhouse gas emitted is CO<sub>2</sub>, but the plant could also emit small amounts of methane (CH<sub>4</sub>) arising from the combustion process. We expect combustion efficiency of at least 98%, therefore there is potential for a small amount of unburnt CH<sub>4</sub> to be emitted from the flare. (Fully efficient combustion converts CH<sub>4</sub> to CO<sub>2</sub> and water vapour). CH<sub>4</sub> has a global warming potential 21 times that of CO<sub>2</sub><sup>25</sup>].

The major source of greenhouse gas emissions from the installation is however CO<sub>2</sub> from the combustion of natural gas. BAT for greenhouse gas emissions is to maximise energy recovery and efficiency. We are satisfied that flaring the gas is the best available option" (EA 2015, 61).

That is the sum total of the consideration given to the GHG impacts of the project. The general impression given is that the 'localised' impacts of emissions on air quality are of interest and assessed but not the 'global level' impacts of emitting GHGs. Some of the key assumptions used in the methane emissions estimate do therefore come up, but only in so far as they are relevant to the assessment of localised air quality impact. There has been no specific assessment of the credibility of the projects' methane emissions or GHG emissions estimates (they do not refer to the figure of total CO<sub>2</sub>e emissions), or their acceptability in climate change terms. The EA then have clearly not scrutinised the estimate of the projects' methane emissions and any attempt to close the issue at the inquiry through horizontal deference would have left a gap in the environmental controls.

In sum then, a series of issues and questions have been raised about the assumptions involved in the methane emissions estimate, and the process – or lack thereof – through which the inquiry found the

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<sup>25</sup> A 100 year methane GWP of 21 comes from IPCC2 from 1996; this was revised upward to 23 in IPCC3 in 2001, fully 16 years prior to the publication of this decision document (IPCC 2001, 47, table 3; IPCC 2007, 212, table 2.14). As has been discussed previously, it was subsequently revised upward to 25 in 2007 (IPCC4) and then 34 in 2013 (IPCC5) (IPCC 2007; IPCC 2013).

estimate satisfactory and safely reliable. The estimate is clearly highly uncertain, though not inevitably an underestimation as Anderson suggests (a much lower than assumed flow rate could cancel out the GWP underestimation, for example). Whether or not the issues raised add up to a reasonably likely underestimation (and they may very well do) is impossible to say with any confidence because of the uncertainty, lack of disclosure and remaining unanswered questions. The key finding here, however, concerns process not outcome – so much remains ambiguous precisely because the matter was not thoroughly scrutinised at the inquiry. Serious scrutiny of these matters at the inquiry was closed by an apparent withholding of scepticism and aversion to problematisation, or, put the other way around, an orientation of credulity towards the estimate. Unlike the blunt procedural exclusion of the forms of closure considered in the previous sections of this chapter, here justification is produced through a shallow performance of scrutiny whilst key assumptions behind the estimate remain obscure through the withholding of scepticism.

#### 5.4.2 THE EFFECT OF SELECTIVE SCEPTICISM AND CREDULITY ON THE ISSUE OF WASTE DISPOSAL CAPACITY

Closure performed through the withholding of scepticism was also evident in the treatment of the flowback fluid estimates. This contest concerned the ES's estimate of the volumes of the flowback fluid expected to be produced by the sites (on which the waste treatment capacity demand assessment was based). FoE, through their waste expert Alan Watson, contended that the estimate potentially underplayed the scale of the sites' demands. Watson queried the ES's silence on nearby Preese Hall – the only 'real local data' available – which had a flowback rate of 70%. Watson also questioned the applicability of the US evidence, for the very same reason already discussed concerning methane emissions. The key period for both flowback of liquid and gas waste is the completion phase which typically lasts around 10 days in the US, but in these applications the IFT is expected to last between 60-90 days. He also questioned the reasons for excluding the (generally higher flowback rate) Barnett shale from the comparison. Finally, Watson highlighted a discrepancy between the WMP's 22,000m<sup>3</sup> per well figure and the similar per site figure in the ESs. He suggested that this could mean that the actual flowback volume estimate is four times higher than the figure in the ES on which the assessment of treatment capacity demand was based. As such these estimates fell well short, argued FoE, of the 'appropriate information' that DM2 requires.

Cuadrilla on the other hand contended that the estimate of a 40% worst-case scenario flowback return rate was suitably conservative. They argued that most US formations experience lower rates than 40%, and that the higher rate Barnett shale should be excluded because of specific geological conditions not analogous to the Bowland. Furthermore, Preese Hall is also an inappropriate analogy, they argued, because the EPA suggest that vertical wells experience higher rates, as well as because the operations at Preese Hall differed. On the discrepancy Cuadrilla maintained that it was merely a typographical error, and that the smaller ES figure was the correct one.

The Inspector resolved that Cuadrilla's estimates were credible. She ruled that Cuadrilla have provided 'valid and logical' reasons for discounting the higher Preese Hall rate, and that the US evidence taken as a whole in combination with the characteristics of the Bowland "do indeed provide strong grounds to support the Appellants' view that the flowback percentage estimate of 40% is appropriately conservative" (McKay 2016, 394). Regarding the discrepancy, the Inspector concludes that this is "most likely to be simply due to a typographical error and that the fault lies with the WMP and Permits, rather than the ES" (McKay 2016, 396).

Compared to the methane emissions issue above Cuadrilla are made to work harder to defend their flowback estimates as a result of Watson's persistence, and the matter receives comparably closer scrutiny at the inquiry. The matter starts out as highly confused but is clarified to an extent throughout the proceedings of the inquiry. By the end of the inquiry then, many of the figures and assumptions

used in the estimate of flowback volumes had been clarified in a series of inquiry documents (Quarles 2016b; Cuadrilla 2016d) (see A3.1 for a summary). As such, there is greater clarity about the claims that the Inspector finds credible.

However, whilst the estimate had to an extent been clarified by the end of the inquiry (notwithstanding a series of remaining inconsistencies – see A3.1), scepticism continued to be withheld from the key assumptions on which it was based. There were three such key assumptions. First, the 40% worst-case scenario return rate during the fracking and IFT phases. Second, the 100% reuse rate during the fracking phase. Third, how these figures were then turned into a peak weekly flowback figure during the IFT. Ultimately, Cuadrilla do not clarify the calculations used to go from a total flowback figure, to the peak weekly flowback figure which was assessed against weekly identified capacity to produce the 65% demand on capacity for one site at peak time figure (68% for both sites together owing to staggering). Furthermore, the source for the 40% worst case scenario flowback rate remains an unpublished Cuadrilla report. Finally, the feasibility of the assumption of 100% reuse of flowback during the fracking phase went largely unscrutinised by the inquiry (no doubt in part because this assumption was clarified after Watson appeared at the inquiry, in inquiry document Quarles 2016b). I'll now explore each of these matters in turn to demonstrate how closure by the withholding of scepticism and resulting shallow performance of scrutiny at the inquiry again played a key role in the production of justification.

*Can 100% of the flowback during the fracking phase be re-used?*

The first key assumption in the assessment of demand on waste treatment capacity, clarified in Cuadrilla's inquiry documents, was the reuse of 100% of flowback during the fracking phase. This means that of the worst-case scenario 40% return rate during the fracking and IFT phases, only the IFT flowback, or approximately 20% of the total fluid injected (or 22,050m<sup>3</sup>), requires offsite treatment and disposal. This is all the more important because flowback tends to be most intense immediately after fracking, tailing off as the well increasingly returns gas rather than liquid, meaning that during the relatively short (1 to 2 months) fracking phase high volumes of flowback return relatively quickly. Furthermore, because of the proposed staggering of operations at the sites, the fracking phases of wells 2 and 4 occur entirely during the beginning of the IFTs of wells 1 and 3. Any fracking phase flowback from wells 2 and 4 not able to be reused would be additional to the waste demands from the beginning of the IFTs of wells 1 and 3 (Smith 2016a, 15). This scenario could potentially create peak weekly flowback higher than the 1,750m<sup>3</sup> figure (and so 65% of demand) given in the ES which assumes 100% reuse, although it is impossible to know for sure given that the method and assumptions used to calculate the peak have not been disclosed.

The stridency of the clarification documents in assuming 100% reuse is not always repeated in the prior documentation. For example, the ES section on water use suggests that:

“To reduce the water demands some of the flow back fluid from the hydraulic fracturing process could be re-used in subsequent hydraulic fracturing stages (embedded mitigation). Depending on the availability and quality of flow back water the proportion of re-used water could be increased” (Arup 2014a, 613).

Likewise, the WMP states that:

“Between stages of hydraulic fracturing a mixture of injected hydraulic fracturing fluid and any produced fluid present, which we refer to together as flowback fluid, will return up the wellbore to the surface lifted by the release of pressure in the well. This flowback fluid will be captured and stored in enclosed containers and subsequently reused *wherever possible*” (Cuadrilla 2014b, 16, my emphasis).

Finally, the EA suggest that:

“The returning flowback fluid will be stored on site and will be reused during future hydraulic fracturing stages if its composition, which may require dilution with mains water, is compatible with the friction reducer which will be added to it” (EA 2015, 13).

“Flowback fluid that it is not suitable for reuse will be sent to an appropriately permitted waste facility for treatment or disposal” (EA 2015, 23).

“The operator will be required to reuse flowback fluid from the fracturing process in subsequent fracturing phases, wherever possible, to reduce the generation of waste requiring disposal. Flowback fluid will be monitored to ensure that it remains fit for reuse; the fluid that can be injected must remain non-hazardous” (EA 2015, 85).

The broader literature is of little help in trying to establish whether the 100% reuse during fracking assumption is reasonable, because, firstly, it doesn’t split the process up into phases, instead estimating reuse rates across the entire period for which the well is producing flowback (and the timescale is often unclear). Second, the literature tends to estimate a rate without distinguishing between flowback that couldn’t be reused because of a lack of opportunity (not a problem in the fracking phase), and flowback that couldn’t be reused because it was unsuitable. For example, when Jiang et al. suggest that between 30-60% of flowback can be reused (Jiang et al. 2011b), it is hard to say what proportion of the unusable remainder is down to unsuitability, and whether that unsuitability would likely arise during a period of operations like Cuadrilla’s proposed fracking phase.

In any event the assumption of 100% reuse during fracking is demonstrably a best-case scenario, and the supporting documentation prior to the clarifying inquiry documents does not appear to consider its achievement is guaranteed. As discussed, according to the indicative timetable, this would particularly be an issue if fracking phase flowback fluid from wells 2 and 4 proved unsuitable for reuse, as this would create extra waste demand additional to the early IFT flowback for wells 1 and 3. This would potentially cause a higher peak than the one on which the peak demand on capacity (65%) assessment was based. Dehon suggests in closing that Cuadrilla provide ‘no cogent justification’ for assessing the best-case scenario for reuse and not assessing the worst-case of no reuse. However, given her general satisfaction with the estimate, the Inspector is evidently satisfied with the use of the best-case scenario, in spite of the apparent prior use of a less optimistic scenario (i.e. ‘a proportion’) and no explanation for the change. Taking the EA’s own words at face value brings into question whether they knew that 100% reuse during the fracking phase was a key assumption on which the flowback volume estimate and

waste disposal capacity demand assessment were based. Questions over the credibility of this key underlying assumption were closed through the withholding of scepticism and a shallow performance of scrutiny.

*Is a 40% flowback rate during the fracking and IFT phases a reasonable worst-case scenario?*

The second key assumption was that a worst-case scenario 40% of the fracking fluid would flow back during the fracking and IFT phases combined (a period of around 3-5 months per well). In the ESs the 40% figure is referenced to an unpublished Cuadrilla report entitled '4 Wells Combined – With Reuse – Rev 5' (Cuadrilla 2014a)<sup>26</sup>. In his technical note Quarles suggests that it is based on published literature on North American operations and Bowland shale geology and data (Quarles 2016a, 6). Quarles includes two tables of published US data to defend the 40% flowback worst case scenario assumption. Quarles' table 1 references six studies reporting flowback rates from the US (Quarles 2016a, 7, table 1). Quarles' table two summarises the findings of the EPA's (draft) review of flowback rates (Quarles 2016a, 8, table 2). They do not differ in the final version (EPA 2015, 7-4-7-5, tables 7-1 and 7-2; EPA 2016, 7-6-7-8, tables 7-1 and 7-2). All sources relied on by Quarles to defend the 40% figure are summarised in table 8 below.

Watson considers 40%, which he initially misinterprets as applying to the IFT only, to be conservatively low. His scepticism was no doubt compounded on learning that the assumption is 40% of the total injected volume over the fracking and IFT phases combined - the rate during the 60-90 days of IFT only is approximately 20%. To justify his scepticism, Watson makes reference to a DECC strategic environmental assessment, which assumes that 30-75% of the total fluid injected returns as flowback (DECC 2013). This assumption is referenced to an AEA report (AEA 2012b), who in turn reference it to a number of US sources (see table 8 below).

*Table 8: Return rate estimates*

	<b>Return rate</b>	<b>Timescale</b>	<b>Play</b>	<b>Source</b>
Cuadrilla (these proposals)	40%	3-5months (approx. 20% over the first 1-2months – i.e. the fracking phase; approx. 20% over the following 60-90 days – i.e. the IFT)	Bowland	Cuadrilla (the unpublished '4 Wells Combined – With Reuse – Rev 5' report)  Bowland data and geology

<sup>26</sup> Intriguingly, the WMP references the assumption to Mitschanek et al. (2014) (Cuadrilla 2014b, 32). Mitschanek et al. (Mitschanek, Thonhauser, and Prohaska 2014; see also Mitschanek 2013) in turn reference the claim to Slutz et al. who provide no source for the claim (Slutz et al. 2012). Further confusion is added by the fact that figure 13 in the appendix of Mitschanek et al. suggests that they consider the 10-40% flowback rate as applying to a 10 day period (Mitschanek, Thonhauser, and Prohaska 2014, 11).

				North American literature
<i>The sources of the figures relied on by Watson</i>				
US Department of Energy (DoE) (2009)	30-70%	The majority recovered over several hours to a couple of weeks, can continue for several months after beginning production (the EFT in Cuadrilla's proposal)	Various	Personal communication with numerous operators and service companies
EPA (2011b)	25-75%	Typically several weeks	Various	Veil (2010), Pickett (2009), Horn (2009)
Horn (2009)	34%	First two weeks	Woodford	Sample of 13 shale wells
Pickett (2009)	70-75%	Several days	Barnett (probably)	David Burnett (probably)
Veil (2010)	30-70%	First few days to weeks	Various	DoE (2009)
Cuadrilla (Preese Hall, vertical)	70%	3 months	Bowland	Cuadrilla (emails between Cuadrilla and the EA obtained by FoE – see Watson 2016a, 19–20)
<i>Quarles' table 1 (Quarles 2016a, 7)</i>				
Alkouh and Wattenbarger (2013)	10-40% 15-30%	Not specified	Not specified	Chekani et al. (2010) – the relevance of which is hard to ascertain
Blauch et al. (2009)	40%	Not specified	Marcellus	Single example well
Kuijvenhoven et al. (2013)	4.5-12.7% 11.9-23.3% 4.5-81.4% 15.8-308.7% (Barnett)	10 day / final	Various	Not specified
Lan et al. (2014)	3-32%	30 days	Horn River Basin	18 well sample
Slutz et al. (2012)	10-40%	Not specified	Not specified	Not specified
Susquehanna River Basin Commission (2013)	7-10%	Not specified	Marcellus	Not specified
<i>Quarles' table 2 (Quarles 2016a, 8)</i>				
Mantell (2011; 2013)	9-29% 7-22% 5%	10 days	Various	Chesapeake data
Clark et al. (2013)	10% 20% 5% 10%	10 days	Various	Personal communication with Mantell
Hansen et al. (2013)	8%	30 days	Marcellus	West Virginia Department of Environmental Protection data

Hayes (2009)	24-25%	90 days	Marcellus	14 well sample (8 horizontals)
Nicot et al. (2014)	60->100% (median)	1-4 years	Barnett	Company reporting to Railroad Commission
Ziemkiewicz et al. (2014)	10-30%	115 months	Marcellus	One West Virginia company estimate
Nicot et al. (2012)	<20%	Lifetime	Eagle Ford	Not specified

As table 8 demonstrates, Quarles' claim that these sources show Cuadrilla's 40% worst-case scenario return rate to be conservative is somewhat misleading for two main reasons. First, Cuadrilla's 40% return rate relates to flowback during the fracking and IFT phases combined. The North American literature tends to count timescale from the completion of fracking. In fact, there is no mention of the possibility of flowback between the hydraulic fracturing stages (when the literature talks of reuse the assumption tends to be that the flowback will be transported to another well in the vicinity, as opposed to reuse in the same well from which it returned or on the same site). As such the rates in the table above are comparable with Cuadrilla's estimated flowback rate during the IFT only, which is approximately 20%. Second, the 20% IFT rate estimate refers to a timescale of between 60-90 days. The majority of the rates in the above table relate to shorter timescales. The picture painted in table 8 is mixed and comparison is impaired by the variability between wells and plays, the various definitions of flowback and produced water<sup>27</sup>, and the lack of disclosure regarding samples and timescales in some cases. Nonetheless, the table above demonstrates Quarles' claim that the 40% rate is conservative is problematic because the IFT flowback rate of 20% is the more appropriate comparator, most of the studies concern much shorter durations (even than the 60-90 days of IFT only), and many of the sources do not provide clear details about how their figures were produced.

Of course, Watson makes much the same point at the inquiry when asked about Quarles' rebuttal and the tables therein supposedly justifying the 40% rate. Pointing to definitions and timescales of 'flowback', Watson suggests that "you've got to make sure you're talking about the same thing", and, "so it's crucial when you're talking about flowback you look at a particular period" (INQ Feb 26 p2 01.00.00 – 01.03.35). These warnings were evidently overlooked when the Inspector resolved that the US evidence does "indeed provide strong grounds to support the Appellants' view that the flowback percentage estimate of 40% is appropriately conservative" (McKay 2016, 394). The flowback fluid volume estimate appears to have been taken at face-value without any serious scrutiny of its underlying

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<sup>27</sup> The definition of flowback is not standardised, and the precise distinction between flowback and produced water appears to be a matter of debate. For example, Mantell uses 'produced water' as a catch-all term for all the water that is returned to the surface through the well, including both the water injected and natural formation water (sometimes distinguished as flowback and produced water respectively) (Mantell 2013, A-21). West Virginia state defines flowback fluid as either all fluid recovered in the first 30 days after injection, or 50% of the injected volume depending on which comes first (see Hansen, Mulvaney, and Betcher 2013, 20). Finally, Horn suggests that flowback becomes produced water when a well has returned over 100% of the fluid injected (Horn 2009, 2).

assumptions, and treated in a mode of credulity rather than scepticism by the Inspector. As such, questions over the estimate and its underlying assumptions have been overlooked with the inquiry rendered insensitive to them through the closure performed by selective scepticism and credulity.

*How was the IFT peak weekly flowback volume figure produced and is it reasonable?*

The final key assumption used in the estimate of treatment capacity demand was the sites' peak weekly flowback figure. When assessing just these sites what really matters is not how much waste is created in total but the most intense period of waste generation. To assess peak demand Cuadrilla calculate a peak weekly flowback figure during the IFT of 1,750m<sup>3</sup> which represents 65% of the 2,700m<sup>3</sup> identified weekly treatment capacity (for one site alone, but this only rises to 68% for both sites because of the staggering of operations). Watson expressed frustration at not being able to scrutinise Cuadrilla's estimated week-by-week flowback assumptions which were not disclosed. The simple answer to the questions in the sub-title is that we don't know on both counts because of a lack of disclosure.

Cuadrilla do not disclose when this peak week would occur. One would assume, going by Smith's indicative timetable (Smith 2016a, 15), and assuming 100% reuse of fracking phase flowback, that it would likely occur at the beginning of the IFT of well four (which coincides with the midpoint of the IFT of well 3 and the EFTs of wells 1 and 2). There would also be a slightly smaller peak during the beginning of the IFT of well 2 (which would coincide with the midpoint of the IFT of well 1, but without any additional EFT produced water). It is questionable as to whether any EFT phase produced water has been included in the peak weekly figure given that the figure is presented in the IFT section of the ES's assessment, and a separate EFT assessment follows in the subsequent section.

The 1,750m<sup>3</sup> peak weekly figure is only 5% of the total amount of fluid injected into wells 3 and 4 (33,725m<sup>3</sup> each, 45 stage wells – see Quarles 2016b, no pagination, table 1). Given that the peak weekly figure inevitably includes some flowback from the midpoint of the IFT of well 3, as well as potentially some EFT produced water from wells 1 and 2, the first week of IFT flowback from well 4 cannot account for the entirety of the peak weekly figure, and so must be <5% of total injected fluid. When compared against the 10 day rate estimates in table 8 above this first week rate of <5% is at the lower end of the range (4.5-29%). The point is underlined by the 8 horizontal Marcellus wells in Hayes' sample, which after 5 days had returned an average of 15% of the total fluid injected (Hayes 2009). Of course, this is somewhat speculative owing to the lack of disclosure from Cuadrilla over the precise well-by-well and site-total cumulative flowback volume over time assumptions behind their figures.

The Inspector provides no explicit reasoning on the peak weekly figure, in spite of it being the key figure on which peak demand on waste treatment capacity is based. Nonetheless we must assume that she was satisfied with the figure provided and the lack of disclosure over how it was produced. Cuadrilla's

key assumption was again taken at face-value, with the inquiry withholding scepticism and displaying an apparent aversion to problematisation.

In sum then, the Inspector found the flowback volume estimate on which the projects' demands on waste treatment capacity were based credible and that the provision of information was sufficient for her to be satisfied (DM2). However, none of the three key assumptions behind the estimate – 100% reuse of flowback during the fracking phase, the 10-40% return rate during the fracking and IFT phases combined, and the peak weekly flowback figure – were thoroughly scrutinised. Much like in the case of the methane emissions estimate considered previously, justification was produced through selective scepticism and credulity. This withholding of scepticism resulted in a shallow performance of scrutiny, rendering the inquiry insensitive to the issues detailed here.

In conclusion, the section immediately above has demonstrated the closure performed by selective scepticism and credulity at the inquiry across the issues of waste disposal capacity and climate change. As well as this form of closure arising from the credulous mode of the inquiry's engagement with key knowledge claims made by Cuadrilla, this chapter previously argued that closure was also performed by three 'procedural' mechanisms. In these cases, arguments and matters of concern were bluntly excluded as immaterial in reference to planning policy and convention. In total, then, this chapter has considered four key forms of closure operating at the inquiry – double compartmentalisation, vertical deference, horizontal deference, and selective scepticism and credulity. Taken together these forms of closure, it has been argued, played a key role in rendering the inquiry insensitive to the arguments and matters of concern raised by FoE and therefore establishing it as a site for the production of justification for these specific appeals and shale gas development more broadly.

## 6. DISCUSSION AND CONCLUSIONS

This chapter will draw out and reflect on some of the key implications of the study. The first two sections will refer back to the literature review and conceptual discussion presented in chapter 2. Section 6.3 will then reflect on the conceptual approach taken, followed by reflections on methods and the scope for generalising the findings of the study in section 6.4. In the final two sections a series of implications of the research will be offered to a range audiences, before, finally, the research is summarised and its conclusions stated.

## 6.1 CONTRIBUTIONS TO LITERATURE

The ‘framing fracking’ literature discussed in section 2.3.1 catalogued the diversity of frames found amongst publics, policy-makers, and industry actors. These frames included a variety of views and judgements concerning the process (fracking) and product (shale gas) of shale development, as well as the actors and processes of its governance. Therefore the framing contest over fracking involves not just perceptions of risk but judgements on institutional ‘body language’ (see Wynne 1996) and procedural justice (see for example Cotton 2017). This focus on procedural justice – the extent to which publics and communities are able to participate in and influence policy and regulatory decisions – positions processes such as the one studied here as potentially both *sites for addressing public scepticism* and *the subject of public scepticism themselves*. In other words, opportunities for public participation in planning decisions could potentially help address concerns over procedural injustice or they could confirm and exacerbate such concerns. This will depend a great deal on the fine-grain detail of the design and conduct of such participatory opportunities, and the treatment of participating publics therein. This thesis has provided just such a fine-grain account.

Some of the ‘framing fracking’ literature went further than ‘cataloguing’ frames to argue that dominant forms of industry, government or scientific discourse frame the issue in such ways as to potentially marginalise public views from sites of policy- and decision-making. These studies explicitly connected divergence at a broad discursive level between public and institutional frames and the ability of formal processes of policy- and decision-making to accommodate public views. These studies, however, did not go into concrete details about the design features and modes of conduct of such participatory sites that might orientate them toward receptiveness or insensitivity.

The literature on ‘closure through planning’ considered in section 2.3.2, however, did provide some insights regarding these concrete details, harvested largely from work on planning disputes over energy development. In particular, four forms of closure were identified which are closely related to the forms of closure reported in the previous chapter. A lack of investigatory capacity and ability to scrutinise technical claims is related to what I have termed ‘selective scepticism and credulity’. The procedural exclusion of matters as beyond the scope of the inquiry describes the same blunt exclusion as the three forms of procedural closure reported above (double compartmentalisation, and vertical and horizontal deference). Issues around contrary views gaining decisional influence within a centralised and prescriptive statutory system and broader institutional context resonate strongly with the notion of closure by ‘vertical deference’. Finally, the ‘scaling’ or ‘salami slicing’ of issues, their oversight, and opportunities for participating on them, resemble the move I refer to as ‘double compartmentalisation’.

These two literatures in combination located planning decision-making on shale gas development as potentially fertile ground for studying processes of closure curtailing the role of expert and public participation geared towards the production of justification for a particular form of development. Some

research related to this subject has been conducted and this was considered in section 2.3.3. I will argue that the present study makes a considerable contribution to these early efforts. This emergent literature demonstrated a concern over the extent to which certain sceptical frames and local publics are accommodated within or are able to influence planning decisions. It included some normative argument on the importance of public participation in regulatory decision-making, as well as some assessment of opportunities for such participation. The analysis just presented offers a series of insights to this literature.

### 6.1.1 CONTRIBUTIONS TO THE 'PARTICIPATION IN THE PLANNING OF SHALE DEVELOPMENT' LITERATURE

The previous chapter makes obvious the barriers to objecting communities gaining the kind decisional influence over planning decisions on shale gas proposals that Cotton and Whitton et al. argue they ought to have. There's a slight ambiguity between the *opportunity* to participate and that participation amounting to *influence* or *control* in this work. Decisional influence may or may not be the outcome of the opportunity to participate, but there's relatively little detail on what may enable or prevent such an outcome.

Whitton et al. warn that without adequate public engagement on both the broader social and ethical viability of shale development and specific siting decisions "decision-making will solely reflect the choices of central, institutional actors rather than those that are directly affected" (Whitton et al. 2017, 17). This thesis demonstrates how a more closed process of national policy generation than the participatory technology assessment envisaged by Whitton et al. has already established a series of commitments about shale development and its regulation that then filter through and constrain public participation at the downstream stage of siting decisions. Furthermore, as the discussion of double compartmentalisation demonstrated, the very separation of appraisal of and public participation on broader 'policy' on shale development on the one hand, and specific proposals for that form of development on the other (i.e. a site-by-site basis), potentially obscures many cross-cutting, cumulative and broader issues.

This thesis therefore complements these normative arguments with a fuller appreciation of the extent to which participation on planning decisions can be highly conditioned by commitments already made in policy (e.g. the relationship between shale gas and climate change, the efficacy of regulation). By the time opportunities for communities and publics to participate in planning decisions arise key issues may no longer be on the table for discussion. Where local community, public, expert and NGO views differ from a planning or energy policy commitment already made, there is little hope for decisional *influence* on these grounds irrespective of how many *opportunities* to participate are granted. Therefore, what

emerges as more crucial than participatory access to ‘downstream’ sites of regulatory decision-making is the ability for publics and communities to influence or challenge policy commitments that subsequently circumscribe those sites.

The findings reported here confirm Hilson’s largely anticipatory assessment regarding the ability of regulatory processes to accommodate key public fracking-sceptical frames (Hilson 2015). Hilson established two scalar frames – a local risk frame and global climate frame – and a novelty frame amongst fracking opponents. He then went on to assess the prospects of these oppositional frames gaining a hearing within planning and environmental permitting decision-making processes. Hilson suggested that many elements of the local oppositional frame can be considered by planning decision makers, though points out that certain issues are the responsibility of specialist regulators to which planning must defer. Regarding the global climate frame, he suggested that whilst it is ambiguous as to whether the ‘end use’ of fuel could fall under ‘indirect effects’ covered by EIA regulations, these arguments are in any event ruled out by the deference to Government energy policy established in planning. The subsequent FFR case has demonstrated (section 2.3.3) it is highly unlikely that ‘end use’ fuel emissions would be considered an indirect impact of a project. Hilson also pointed out that the clear separation between phases will also constrain the consideration of global climate arguments on exploration applications. Overall, on the prospects for the global climate frame, Hilson suggested that although the planning and environmental permitting regimes can register argument concerning direct and some indirect GHG emissions, the receptiveness of both to “indirect ‘final fuel use’ emissions from the production stage appears to be at best unclear and, at worst, completely excluded insofar as this might be taken to call into question national government policy choices on energy” (Hilson 2015, 202). The findings presented here suggest that this assessment was if anything a little optimistic.

The approach taken to the WMS given by Amber Rudd to the House of Commons on September 16 2015 (shortly after the publication of Hilson 2015) by the Inspector effectively prohibits any argument concerning the negative impact of shale gas applications on climate change from gaining decisional influence. Hilson is correct that planning policy accommodates consideration of direct and some indirect emissions, though he fails to anticipate the effect of energy policy and the approach of deference to it. As demonstrated in the previous chapter, the approach of vertical deference to the Government view as set out in the WMS effectively makes it impossible to find a fracking application unacceptable on climate change impact grounds. This includes arguments concerning the impact of the direct emissions of projects (like the GHG emissions emitted through flaring in this case). The global climate oppositional frame is incompatible with the Government’s positive ‘bridging’ climate frame. This positive frame expressed through the WMS defines shale development as necessarily and in general good for climate change. The decision maker, unless they take an entirely different approach to the WMS or the WMS is replaced, is compelled to defer to the Government view.

This finding is particularly relevant to Hilson’s discussion on the significance of statutory climate duties for the planning oversight of unconventional hydrocarbon development (Hilson 2014). Hilson identifies

the key statutory climate duties relevant to planning oversight of shale gas development in the UK, but writing prior to the WMS, does not consider how such statutory duties aimed at climate change mitigation are sensitive to such an intervention. The statutory duties identified by Hilson impose a duty on particular authorities to, in various ways, mitigate climate change. However, they say nothing about the kinds of developments that may contribute to or detract from that aim. The WMS works in that void, defining shale gas development as an aide to climate change mitigation. Given planning's vertical deference to this Government view, once defined in such a way, shale development, rather than being constrained by such duties, is seen as working towards them. In short, Hilson identifies the statutory basis of the duty to consider climate change in planning oversight generally, though the WMS seemingly determines the outcome of that dutiful consideration in the case of shale development.

The previous chapters also confirm Hilson's anticipation of some aspects of the local risk frame being the responsibility of specialist regulatory regimes. Section 5.3 in the previous chapter makes clear that FoE's arguments on waste disposal and public health were largely closed through the approach of horizontal deference towards the existing work of the EA and the efficacy of the regulatory system more generally. Given, for instance, that the EA regulate the processes that give rise to direct public health risks (e.g. contamination of land, air or water), the approach of horizontal deference rendered the inquiry unreceptive to public framings that view fracking as risky to public health (this would have been the case even if the permit had not yet been granted as the inquiry would have deferred to their prospective competence). This is because policy prescribes that planning should respect the remit of other regulators and defer to their completed and prospective work unless there is evidence of a gap in the controls (regulatory remit deference), and assume the effectiveness of the system more generally (consummate regulation deference). In other words, and relating to the work of Stokes (Stokes 2016), the fact that these issues are covered by another regime and by regulation in general is taken to mean that there is no issue to consider here. Hilson doesn't quite capture just how restrictive the assumption of the effective operation of regulation is in practice to oppositional frames and arguments concerning risks to health. This form of closure makes planning processes totally unreceptive to the issue of direct health risks, but also key 'sociological and historical' (see Wynne 1982) objector arguments concerning the efficacy of regulation and the trustworthiness of operators and regulators. Furthermore, concerns over ongoing scientific uncertainty and expert disagreement over the health risks associated with shale development are headed off by a 'heroic' view of regulation encouraged by this assumption.

Hilson actually largely overlooks oppositional framings of fracking that concern not the technology itself or even shale development more broadly, but the conduct of its implementation. This includes issues around both the trustworthiness of operators, regulators and policy actors; and the extent to which policy and regulatory decision-making processes are inclusive of and responsive to public views. In fact, Hilson overlooks the oppositional frame concerned with the very same question that interests him – 'will our views be heard within regulatory decision-making?' Of course, the conduct of the policy's implementation may be seen as a distinct entity from the subject of that policy, but section 2.3.1 makes

clear that public framings of fracking tend not to make such a clear-cut distinction. He therefore makes no assessment of planning's capacity to accommodate argument concerning the track record and trustworthiness of operators, the competence of regulators and the efficacy of regulation, and the adequacy of opportunities for participation in policy- and decision-making – all of which are closed as matters to be taken seriously.

Hilson also identifies an oppositional 'novelty frame', though he doesn't pursue the question of its accommodation. This relates to the work of Stokes on distinct regulatory strategies and their different ways of framing fracking as a regulatory object (Stokes 2016). Hilson identified that oppositional publics frame fracking as a novel technology whereas industry and policy-makers tend to frame it as already existing, widely used and altogether more familiar and mundane. Hilson also pointed out that these 'diagnostic' frames have very different 'prognostic' implications regarding the required regulatory approach. Building on this, Stokes argues that each these very different framings-of-fracking-as-a-regulatory-object underpin two distinct regulatory strategies which she terms 'domain' and 'dexterity'. Stokes' insight is to appreciate that UK Government does not exclusively see or present fracking as mundane and familiar, but selectively views it as exceptional, novel and even 'revolutionary' when it comes to justifying and enabling benefit realisation. In other words, this novel framing of fracking underpins the regulatory strategy of 'dexterity' which focuses on removing regulatory barriers in order to unlock fracking's apparently extraordinary promise. The mundane framing, on the other hand, gives rise to the regulatory strategy of 'domain' which is selectively applied to matters of risk, health and the environment. This strategy focuses on the coverage of fracking by generic existing regulation, which is then taken to reflect the adequacy and efficacy of that existing regulation and so the lack of need for additional, specific and burdensome regulation. Stokes detailed how these strategies work in concert resulting in a normative pull in legal and regulatory practice towards a particular technological trajectory. She suggested that this 'straightjacketing effect' requires critical scrutiny.

The previous chapter has made clear some of the mechanisms through which this 'straightjacketing effect' filters down to the 'coalface' of decision-making in practice. The risk normalisation of 'domain' is given clearest expression, as anticipated by Stokes, in the assumption of the effective operation of regulators and the regulatory framework in general. As already discussed, concerns over uncertainty, regulators and regulation can effectively be swept away through this generic assumption of comprehensive and consummate regulation. The impulse to benefit realisation of 'dexterity' on the other hand is clearly seen in the role of the WMS. This is especially evident in the indirect and unscrutinised weight granted in favour of the proposals through the WMS' expectations of economic and climate change benefits which would have been ruled immaterial were they voiced by a rule 6 party (as indeed was the case with the CoC).

As well as *implementing* these risk normalisation and benefit realisation strategies, the inquiry as a whole *expressed* the Government framing of fracking from which they arise. Mundane and typical planning nuisances were given a hearing (noise, landscape, traffic) and potential decisional influence,

whilst more extraordinary issues were closed from serious consideration and influence (FoE's case on climate change, waste and health). Furthermore, Government-promoted benefits are given decisional influence without scrutiny (climate and economic benefits). The inquiry was a site through which these dominant broader frames could shape the issues and arguments that could be included and taken seriously, and where they could not be contested by oppositional frames (i.e. extraordinary risk frames, or underwhelming benefit frames).

In sum then, the findings presented here complement normative arguments about the requirement for public participation in and control over planning decisions with a more fine-grain understanding of the treatment of participating publics within such a process. In particular, meaningful opportunities for participation in 'downstream' siting decisions are constrained by the conditioning effects of policy commitments already made. This is compounded by the separation of 'national policy' and 'siting decisions', where the former cannot be questioned in the latter through a combination of vertical deference and double compartmentalisation. With regard to work on the capacity for planning to accommodate oppositional 'frames', planning decision-making in practice plays out largely in line with the expectations of Hilson. Hilson's approach to whether frames can be 'heard' manages to anticipate certain blunt procedural exclusions ('end use' fuel arguments, production phase emissions during exploration phase appraisal), but fails to fully anticipate the difficulty of *any* oppositional arguments on the matters of risk to public health and impact on climate change gaining decisional influence.

Furthermore, Hilson could not have anticipated the closure of 'selective scepticism and credulity' from analysing policy and regulations because it is not a procedural form of closure but is achieved through conduct. Finally, the 'straightjacketing effect' described by Stokes was in evidence in the way 'domain' regulatory coverage provided the basis on which to close arguments concerning extraordinary risks associated with fracking. The dexterity strategy was in play when an energy policy intervention in the form of the WMS was key to promoting and securing benefit realisation through the planning system. As such, the inquiry excluded arguments associated with framings contrary to the Government framing (e.g. arguments associated with the extraordinary risk framing), and indirectly granted weight to arguments associated with Government framings that would otherwise be excluded as immaterial (e.g. arguments associated with the extraordinary benefits framing voiced in the WMS).

## 6.2 INSIGHTS INTO THE PRODUCTION OF JUSTIFICATION

The three normative decision-making theories pointed to two key phenomena of interest in the study of collective decision-making processes. The potentially distorting influence of the role of power in decision-making and possible ‘frontstage/backstage’ dynamics between the actual basis of decision selection and the means of decision justification. Both of these phenomena were approached through the concept of justification discussed in section 2.2. The potential for power to distort decision-making was understood as operating through the tacit or deliberate conditioning of the design and conduct of appraisal, channelling such processes toward particular outcomes. To the extent that appraisal processes are geared to closing down towards a (particular) decision outcome in ways that are unitary and prescriptive, and where the outcome is at least implicitly presented as objectively compelling or democratically legitimate, the process can be said to be misleadingly expressive as well as instrumentally restrictive. In other words, it can be said to exhibit frontstage/backstage dynamics where the justification produced through the, in a sense, performative process of appraisal is at odds with the actual process of selection, which occurred previously and on the basis of different and obscured imperatives.

It was recognised that there are two separate tasks facing the imperative to strong justification which are potentially in tension. The first is to instrumentally secure the particular favoured outcome by deliberate manipulation or inadvertent bias shaping the design and conduct of the appraisal process. That an option has been selected by an appraisal process may be sufficient to produce justification for that option, but often sceptical audiences will require further persuasion. The second task is therefore the expressive one of persuading relevant audiences that the process of appraisal confers compelling justification upon the selected option. The simplest means of securing a preference (dictatorial edict) is the least likely to succeed in expressing the justifiability of that preference. On the other hand, the most effective means of justification (forms of appraisal widely seen as legitimate – e.g. not biased or unfairly restricted in some way) typically tend to cede the most control over decision selection and so risk selecting and justifying the ‘wrong’ option. (i.e. non-preferred according to prior incumbent commitments).

### 6.2.1 DID THE INQUIRY PRODUCE JUSTIFICATION FOR SHALE DEVELOPMENT?

It has been argued throughout this thesis that the inquiry studied here produced justification for the appeals in question and UK policy on shale gas more broadly. As an appraisal process the inquiry arrived at the recommendation that the PNR site should be granted planning permission, and that the RW site should be refused permission on the grounds of unacceptable traffic impacts. Therefore, on the face of

it, the inquiry comes to a conclusion that at least happens to align with central Government preferences on one site but not the other. The contention of this thesis was that any alignment with the centre is not happenstance, but the result of imperatives towards the justification of shale gas development in the UK operating through the planning system.

Of course, the rejection of RW on traffic grounds superficially appears to undermine the argument here. The procedural materiality of the local nuisance issues that have not been considered here – noise, traffic, landscape and visual impacts – was not in question, leaving the parties to argue over whether they amounted to unacceptable impacts. These local nuisance issues are clearly accommodated within the planning appraisal of shale development, and participating publics can potentially achieve decisional influence through arguments concerning them. The imperative to strong justification, therefore, does not occur uniformly across the process (i.e. on all issues) but operates through the conditioning of the process' sensitivity to particular issues.

As is made clear in the WMS it is government policy to support only shale gas development that is safe, sustainable and timely (DCLG/DECC 2015). In other words, the expressed government commitment to shale gas development is conditional. What the treatment of FoE's case demonstrates though is the way energy policy and planning policy, convention and conduct restrict appraisal of shale development through planning in terms the aspects of safety, sustainability and timeliness that can be considered. The appraisal of the extent to which fracking planning applications satisfy these conditions is highly circumscribed by the commitment to a particular framing of fracking as a regulatory object imposed on the process through both vertical and horizontal deference. Justification is produced through the closure of arguments that go against the grain of a mundane framing of fracking's negative impacts, as well as the indirect registering of arguments from an 'extraordinary' framing of fracking's benefits. For instance, appraisal of the safety of the proposals was effectively limited to the impact of noise and traffic and so excluding the 'extraordinary' safety concerns that largely preoccupy oppositional publics. Furthermore, appraisal against these conditions is also stunted by 'double compartmentalisation' which blinkers oversight, potentially obscuring cumulative and broader issues around the sustainability, timelessness and safety of an industry at scale. Finally, even if such consideration had not been largely blocked through these procedural forms of closure, the selective scepticism and credulity in the conduct of the consideration of estimate knowledge claims when they were engaged with suggests both a lack of capacity and willingness within planning to effectively investigate whether shale developments satisfy these conditions. For instance, if the question was not avoided through procedural closure, would an inquiry have the ability or proclivity to assess the plausibility of a project's estimated GHG emissions, or the authority to judge their acceptability in relation to carbon budgets?

### 6.2.2 THE PROBLEM WITH THE BOUNDING OF THE MATERIALITY OF ISSUES

Some will argue that the restrictive approach to relevant issues is not a problem given that any issue deemed beyond the scope of planning will only have been deemed so because it is to be or has already been overseen elsewhere. This argument however overlooks a series of problems. First, the planning system arguably offers the most expansive opportunities of any formal site of public participation on shale development. For instance, it seemingly offers a clear route to decisional influence. This is not the case with, say, ad hoc public engagement exercises without an explicit promise of or mechanism for policy influence (for example TNS 2014). The EA's environmental permit regime offers opportunity for public participation through consultation. Publics can raise concerns and questions which in principle could be investigated by the agency but often are responded to by either reassurances that the issue is under control or clarification that the issue is beyond the scope of the agency's remit. There is therefore a degree of distance between consulted public and the process of appraisal leading to the regulatory decision. There is a greater sense of proximity to the decision for publics participating in planning (perhaps encouraged by literal co-presence with the decision maker or at least recommender). Furthermore, in the case of rule 6 parties, there is seemingly scope to shape appraisal in a hands-on fashion by building a case around their chosen issues and cross-examining the witnesses of other parties. Therefore, if these issues are dealt with elsewhere in the regulatory and policy system they are done so more remotely from would-be participating publics. This problem is particularly acute in the case of the Government view on the relationship between shale development and climate change. In comparison to a planning inquiry, this view was committed to after a relatively closed process of appraisal without a clear locus for contrary publics and experts to coalesce around. This view once committed to then goes on to highly circumscribe opportunities for participation downstream, to the extent where climate change arguments cannot be successfully raised against fracking proposals because they contradict an already formed Government view.

A second problem is that it was self-evidently perceived by participating parties (in particular FoE, but also the CoC) that these procedural questions of issue-relevance were not set in stone. FoE obviously would not have wasted precious resources raising issues they didn't think were material. The inquiry did not draw conclusions as it went, but heard the whole suite of arguments together. The relevance of certain substantive arguments were evidently contingent on the outcome of certain procedural arguments. How the Inspector had adjudicated these scope-setting procedural arguments only became clear long after the fact in her report to the SoS. One possible consequence of this is a misleading impression of comprehensiveness. For instance, that the public health and climate change impacts of the projects have been overseen through planning and are accounted for in the decision. Of course, the inquiry primarily considered whether it ought to consider these issues. In reality, claims about public health impacts or climate change impacts are largely batted away through forms of procedural closure, and where specific claims are scrutinized the analysis is rather superficial.

A third and final problem is that in some cases it is far from clear that oversight has occurred elsewhere, or that other processes of appraisal are not also subject to similar conditioning influences. For example,

the EA's environmental permitting regime is subject to the same constraints of double compartmentalisation and deference to Government energy policy. Furthermore, in spite of Cuadrilla at one point claiming that they had done so, the EA did not oversee the acceptability of the projects' impact on climate change through GHG emissions. They assessed the projects' impact on local air quality which included consideration of some GHGs, but in terms of their impact on air quality rather than climate change. Similarly, at the conclusion of the inquiry, FoE's argument about there being a gap in the controls concerning the oversight of the availability of waste treatment capacity was not really addressed, in spite of the Inspector's declaration to the contrary.

Finally, regarding the formation of the Government view on the relationship between shale development and climate change as presented in the WMS, this is presented as resting on the appraisal conducted by Mackay and Stone. They study the expected GHG emissions associated with the extraction and use of shale gas, and compare the expected emissions intensity of power generation from shale with coal and imported liquified natural gas (Mackay and Stone 2013). However, the commitment made in the Government view does not necessarily follow from the Mackay and Stone analysis. As has been pointed out by the UKERC, and indeed by Anderson at the inquiry, the Mackay and Stone findings are also perfectly consistent with the view that there is effectively no scope for shale gas to act as a 'bridge' in the UK (McGlade et al. 2015; McGlade et al. 2016). A more investigatory inquiry not circumscribed by an arguably prematurely settled Government view might very well have been sensitive to the fundamental contestability and contingency of the interpretation put forward in the Government view.

The splintering of oversight and participatory opportunities in this way gives the impression from one point in the system that issues have or will be dealt by, and that participation did or should have occurred at, another point in the system. This in turn tends to give the impression of a comprehensive and open whole, when in fact, as seen here, matters of concern and questionable interpretations may slip through the cracks. Furthermore, the publics and experts that voice or question them may find that once they are formally invited to do so much of the debate has already been had.

### 6.2.3 WAS THE CONDITIONING OF APPRAISAL DELIBERATE OR INADVERTENT?

Another key point to address is the thorny question of whether the 'channelling' of planning appraisal toward the production of justification for shale development amounts to deliberate manipulation or inadvertent bias. The WMS is undoubtedly a deliberate intervention from the Government designed to help bring a particular future about. It doesn't pre-determine decisions – applications can evidently still be refused permission on account of traffic impacts. It does though narrow the scope of debate by ensuring that the ostensibly settled issue of climate change cannot be reopened and reappraised through the planning system. The closure performed through vertical deference can be said to be a deliberate intervention in planning in order to prevent the intrusion of 'extraordinary' framings and

arguments concerning the negative impacts of shale development on climate change. The WMS also enabled the indirect registering of arguments associated with the 'extraordinary' benefit frame which would be immaterial in the hands of a rule 6 party.

The case for intentionality on the remaining forms of closure is more fuzzy. 'Horizontal deference' is the result of an approach to regulation that is obviously intentional – an attempt to both improve efficiency by preventing unnecessary overlap between regulators and express authority by preventing criticism between regulators. This doesn't mean that the justification it produces for shale development in the ways detailed here were intentional. The closure performed through the regulatory remit variant appears to be the unintended consequences of an, on the face of it, understandable approach to regulation. Not going over old tracks on the existing decisions of specialist regulators is of course perfectly sensible in many situations, but where new evidence is put forward or a gap in the controls is identified reappraisal should be possible. The Inspector ruled that this was possible in principle on the issue of waste but then demonstrated a reluctance to do so that gave the impression of a desire to avoid discretion. The consummate regulation variant resulting from the assumption of the effective operation of regulation more generally however expresses unrealistic expectations of control and a hubristic attitude to incertitude. It results in generic pressures towards not problematising the task of regulation (both existing decisions and future work), and in this case an inadvertent bias toward the justification of these applications and shale development more broadly.

The case-by-case half of 'double compartmentalisation' is a long-standing planning convention, although there is precedence for inquiries taking a broader approach to the interpretation of the scope of their remit (Kemp, O' Riordan, and Purdue 1986; Owens 1985). The phase-by-phase approach is specific to fracking and the result of intentional planning policy development, though the intent behind the intervention seems likely to be to make the decision process more efficient and the proposals in question more tractable. Production plans are obviously contingent on the outcome of exploration and appraisal schemes and to consider the impacts of all phases at the outset would rather 'front-load' the decisions-making process. This would no doubt lead to protracted processes replete with uncertainty and vague proposals. Furthermore, double compartmentalisation, equitably applied, ought to render exploration appraisal processes insensitive to any future economic benefits as well as any future risks (though this was covertly side-stepped through the WMS here). Selective scepticism and credulity, finally, seems likely to be a mode of practice borne out of a lack of technical and investigatory capacity, as well as a lack of willingness to problematise in keeping with the NPPF's instruction that planning decision taking should be about looking for solutions rather than problems (DCLG 2012, 45, para. 187). These forms of closure then (horizontal deference, double compartmentalisation, selective scepticism and credulity), arise more from generic pressures toward decisiveness, efficiency, tractability, and the avoidance of discretion and problematisation; and amount to inadvertent forms of bias toward the production of justification for shale development in this case.

#### 6.2.4 THE EXPRESSIVE TASK OF PERSUASION

Also still unaddressed is the question of whether, for its evident success in instrumentally selecting an outcome aligned with existing Government commitments (i.e. PNR), the inquiry actually succeeded in the expressive task of conferring compelling justification upon these applications and Government policy more broadly. As will be discussed in section 6.5 below, this is undoubtedly a matter for further research into public perceptions and experiences of participatory opportunities in shale gas policy and regulatory decisions. What can be said for now is that when it comes to the persuasion of a broader audience the devil may very much be in the detail. Scope for persuasion may be closely related to levels of awareness, attention and engagement with a process. Most people's engagement with the process described here in unusually detailed fashion is likely to amount to an altogether more cursory glance at a news headline or story, with the intricacies of how the decision was arrived at detailed here understandably eluding them. This more distanced mode of engagement with the decision is likely to be more fertile ground for the expressive task of justification than those who were involved in the process or who are familiar at the level of detail presented here. This was what was meant at the end of section 2.2 when it was suggested that the expressive task of justification does not require an audience to be outright deceived, but may simply occur through a lack of reflection or attention. A final question to raise on this matter is whether the authority of a planning decision even actually rests on its ability to persuade an audience of its justifiability (in say rational or participatory terms), or whether authority is primarily derived from its quasi-judicial statutory role. Whilst not able to fully explore the question here, it seems reasonable to suggest that although planning decisions derive authority from multiple sources – some of which are given and some of which must be earned from an audience – the intention is for the process and its decision outcome to be perceived as legitimate as widely as possible.

#### 6.2.5 THE EXTENSION OF THE CONCEPT OF JUSTIFICATION

In his discussion of the concept of justification as a tool or political resource, the kinds of cases Stirling has in mind differ from the case I've applied his insights to here. Justification is initially considered in the context of analytic appraisal through technology assessment techniques (Stirling 1994), before these ideas are extended to also cover participatory forms of technology appraisal (Stirling 2006; Stirling 2008). In both cases Stirling's focus is on the relatively broad level of technology choice. The case considered here focuses on the more specific and downstream point of siting decision-making. Furthermore, the process considered here is more routine and automatic than the appraisal processes considered by Stirling which tend to be commissioned, bespoke and *ad hoc*. These differences in empirical focus extend the concept in a couple of ways.

First, the focus on the 'downstream' location of siting decisions provides additional insights into how high-level commitments in technology choice and policy development filter through to regulatory and siting decision-making. The thesis has demonstrated how such high-level policy commitments can constrain appraisal and shape the participation of experts and publics at the point of regulatory and siting decision-making. This occurs through both specific interventions in planning (vertical deference to the WMS), as well as the 'latching' onto existing pressures and tendencies in the planning system towards weak justification and generic pro-development justification (double compartmentalisation, horizontal deference, selective scepticism and credulity). In the latter case, the more structured and routine status of planning appraisal (compared to one-off, *ad hoc* participatory or analytic processes of technology appraisal) means that it is endowed with a large repertoire of existing policy, rules and conventions already geared toward closure. As such, imperatives toward strong justification for a particular form of development operate more through interventions to overwrite certain tendencies whilst harnessing others, rather than the bespoke design of a process from scratch.

Another difference already considered is that planning appraisal has a form of statutory, quasi-judicial authority not present in Stirling's appraisal processes. As such a planning decision's authority does not entirely rest on being seen to achieve particular standards of analytic rigour or participatory legitimacy, but is at least in part granted to it irrespectively. This may in turn mean that whilst being potentially highly effective forums through which to secure particular outcomes, planning decision-making processes may not be particularly successful in the expressive task of persuading a broader audience of the wisdom of that outcome. This is because they do not face quite the same pressures to justify their selection but can within constraints (e.g. possible legal challenge) merely assert their authority to choose. A final difference to consider is that the justification produced through these processes is ostensibly only conferred upon the application considered rather than the type of development more broadly. Of course, in reality, such processes do indirectly produce justification for the broader policy as well as the specific site. The closure of the 'extraordinary' framing of the risks of fracking, alongside the registering of the (unchallenged) 'extraordinary' framing of the benefits of fracking expresses and promotes the Government view of the technology whilst marginalising contrary expert and public voices. It is more indirect than in Stirling's cases, but justification is produced for the broader policy commitment as well as the specific applications officially in question.

In sum, it has been argued that the inquiry studied here produced justification for the particular sites in question as well as the broader government commitment in favour of shale gas development. This occurred through conditioning influences in the design and conduct of the process channelling it towards a particular outcome through the closure of certain arguments and matters of concern. These conditioning influences, however, did not occur uniformly, but were particularly engaged in the closure of FoE's case and the 'extraordinary' framing of fracking's risks (and corollary mundane or sceptical framing of claimed benefits) that underpinned it. The exclusion of these issues and arguments as beyond the scope of the inquiry is problematic for three reasons. First, in spite of the problems

highlighted here, planning arguably offers participatory opportunities not repeated elsewhere. Second, it was not necessarily clear from the outset that certain issues were beyond the inquiry's scope, and it will not necessarily be clear in retrospect that they haven't been covered (potentially giving a false sense of comprehensiveness). Third, in some cases it is far from clear that these excluded issues have or will be dealt with elsewhere, or that such processes are not also subject to similar justificatory pressures. The question of intent behind these conditioning influences was then broached. The forms of closure analysed here largely fell into the inadvertent bias category. The role of the WMS in 'vertical deference', however, is arguably an intentional intervention designed to both express the Government-promoted framing of fracking as selectively mundane and extraordinary, and to materially impact planning decisions. The two tasks of the production of justification were then raised. The process' success in preferred option selection is clear, however the expressive task of audience persuasion is a matter requiring further research. Finally, a handful of differences between the empirical contexts in reference to which Stirling's rendering of the concept of justification was forged and the case studied here were highlighted and some possible implications for the 'extension' of the concept sketched out.

### 6.3 REFLECTIONS ON THE CONCEPTUAL APPROACH

As discussed in section 2.2 and as a result of insights garnered from section 2.1, the approach to the concept of justification was one that enabled seeing decision-making as both expressive (designed to persuade an audience) and instrumental (designed to select particular outcome). Stirling's approach provided the insight that these two tasks may be in tension. In other words, the actual basis of selection and the way that decision is presented and justified may be separate. Stirling's rendering of the concept also enabled the recognition of the possibility of strategic behaviour and systemic bias.

This approach entailed rejecting Boltanski and Thevenot's sincere approach to justification (Boltanski and Thevenot 2006). Boltanski and Thevenot are more interested in explaining why actors disagree, suggesting that this is explained by the use of distinct principles of evaluation according to which the same course of action might variously appear justified or unjustified. What Boltanski and Thevenot do not provide insights into is the potential for the management of disagreement in decision-making. That is, the ways in which appraisal processes might be channelled towards a swift and authoritative non-specific resolution (weak justification) or a particular outcome (strong justification). In the latter case existing commitments are pursued, whilst the impression of a rigorous assessment fuelled by a comprehensive airing of disagreement is given. Boltanski and Thevenot's sincere approach to justification, with its direct link between selection and persuasion, prevents the recognition of the scope for justification to amount to a political resource contributing to the momentum towards an existing commitment. An approach inspired by Boltanski and Thevenot would have involved interpretively excavating distinct principles of evaluation underpinning the arguments of disagreeing parties at the inquiry. This would have attempted to explain why disagreement exists rather than demonstrating how the process is tilted in favour of a particular side of the debate. Though both approaches are perfectly legitimate and interesting, the approach adopted here was favoured because Boltanski and Thevenot's scepticism about scepticism was felt to be overly optimistic in the context of both the concerns established in section 2.1, and broader societal concerns often referred to as the crisis of legitimacy.

Connected to this sceptical approach to justification is a deeper theoretical commitment to approach claims and arguments at the inquiry in a constructivist and symmetrical fashion, as inspired by work from STS. That is, I have largely avoided making judgements as to the epistemic truth of arguments, instead assessing their treatment by the Inquiry. As it happened the inquiry largely avoided making such judgements in the treatment of FoE's case as well, instead largely rejecting their arguments through blunt procedural exclusion. Where the Inspector did make a judgement as to the intellectual merits of knowledge claims (methane emissions, flowback fluid) the approach taken here was to explore the basis of evidence on which that judgement rested, and the extent to which underlying assumptions were interrogated or even recognised. Here my constructivism took on a critical realist inflection as once their production and assumptions were laid bare, the validity of Cuadrilla's knowledge claims were at times

directly questioned (e.g. the reliance on Allen et al. 2013). This is in line with the approach of van Zwanenberg and Millstone, who whilst being supportive of the *a priori* agnosticism of constructivists on the question of what constitutes reliable knowledge, argue that in certain cases after their analysis sociologists of science can and should discriminate between better and worse constructed scientific knowledge claims (van Zwanenberg and Millstone 2000). Therefore, for the most part, the argument advanced here has not been that the inquiry necessarily made an incorrect decision, or that it overlooked the better argument. The more modest claim advanced here has been that the inquiry was insensitive through procedural exclusion to the arguments of contrary voices and the matters of concern they raised, where the question of the significance of this exclusion was viewed symmetrically and left largely open. The argument goes slightly further on Cuadrilla's estimates though. Here the details of the knowledge claims overlooked by the inquiry's cursory oversight have been presented and in some cases their validity questioned. In other words, amongst the estimates found satisfactory by the inquiry, poor arguments have been identified raising questions about the adequacy of oversight.

A final conceptual matter to reflect on here is the focus on arguments and their treatment as the study's object of analysis. The argument has been that an extraordinary framing of the benefits of fracking and a mundane framing of the risks is dominant within UK government and that the inverse frames are promoted by sceptical publics (and NGOs). The contention is that FoE's arguments at the inquiry were rooted in and expressed the latter sceptical framing, as well as that their treatment and closure at the inquiry expressed and was in part driven by the Government framing (e.g. this proponent framing is evident in the WMS). In a sense, the inquiry has been viewed as a site for the selective inclusion, reification and amplification of frames. For example, the treatment of FoE's arguments demonstrates how an extraordinary framing of the negative impacts on public health and climate change is largely procedurally filtered out leaving the Government-promoted mundane framing intact. Furthermore, the extraordinary framing of the benefits of shale development is voiced and registered through the WMS. In short, the inquiry's receptiveness to particular frames can be charted through the focus on the treatment of arguments adopted here.

## 6.4 REFLECTIONS ON METHOD & SCOPE FOR QUALIFIED GENERALISATION

### 6.4.1 REFLECTIONS ON METHOD

As sections 6.1 and 6.2 attest, the planning of shale development in the UK case has indeed proven fertile ground for generating insights on the production of justification through the closure-oriented conditioning of decision-making. In turn, the field-site of the RW and PNR appeals inquiry yielded rich empirical material on how planning oversight's design and conduct was oriented toward the closure of certain arguments and matters of concern. As such, a series of insights have been contributed to the literature on participation in the planning of shale development.

A single field-site has been sufficient for the purposes of this study because, whilst there may be scope for another decision maker on another day to make different judgements on a range of matters, planning is nonetheless a rule-based system and some of the forms of closure identified here are the result of particularly unambiguous passages of planning policy and long-established conventions (e.g. double compartmentalisation, vertical deference and horizontal deference). As an early and significant example of planning decision-making on shale gas development in the UK, the inquiry studied here will also likely have a precedent-setting role and will be taken into account by future decision makers. Similarly, a single case has also been sufficient for the purposes of this study in respect of the broader conceptual interest in the production of justification. The case has operated as an 'extreme case' (Flyvbjerg 2006), in the sense of being a rich source of information on 'strong justification'. This is because of the Government's strong and explicit support for the development of a shale gas industry; the Government's evident capability to influence planning oversight; and planning's nonetheless at least implicit claim to produce rational (through the role of expert witnesses and in the practices of legal rationality such a cross-examination), democratic (through the opportunities extended to participating publics) and so legitimate decisions. The case also provided the opportunity for 'theory extension' given that it took the concept out of the empirical contexts of Collingridge (broader policy processes) and Stirling (technology assessment techniques and participatory technology appraisal processes) and into fresh terrain. This has enabled the 'extension' of the concept in the ways argued in section 6.2.

The retroductive approach has resulted in the near total failure of FoE at the inquiry being rendered more intelligible. The construction of the research problem was underpinned by an ontological commitment to the 'myth of the best argument' (Pellizzoni 2001). That is, FoE's failure cannot be simply attributed to any inherent weakness in their case (or, in Pellizzoni's terms, a lack of power internal to communication). Instead an explanation has been built around forms of power external to communication ('forms of closure' here). This is because of fundamental scepticism over the existence

of objective, independent, and uniquely and universally compelling grounds against which to determine the best argument (certainly for issues of any complexity amongst parties of any diversity). The construction of the research problem is also justifiable at the political level fitting as it does within the STS tradition committed to the democratisation of science, technology and innovation. In other words, the research makes clear the means through which certain voices have been marginalised and excluded from a process of technology regulation.

Moving to the epistemic level, the validity of the explanation put forward here can be justified against five criteria. The first is the richness of the description presented in chapter 4, which enables the strong claim that critical detail has not been overlooked. Connected here is the second criterion - the sheer weight of evidential support presented detailing the source, operation and consequences of the each of the forms of closure across chapters 4 and 5. The third is the clarity that the forms of closure explanation brings to the problem of FoE's failure. The explanation lifts the confusion that a cursory engagement with the process might engender. It clarifies that the production of justification for these applications and shale gas development more broadly at the inquiry rested upon the exclusion and insensitivity induced by the four forms of closure elaborated here. It does so whilst avoiding the 'myth of the best argument'. An account of the failure of FoE based on a purely objectivist 'best argument' view would have had to overlook the largely procedural biases that, as evidenced here, clearly shaped the conduct and outcome of the inquiry.

The fourth is the responsiveness of the process of the explanations production. As detailed in section 3.3.2, the recursive nature of the retroductive approach means that the explanation put forward here has been built on several rounds of failed proto-explanation, with the lessons of those failures then fed back into another loop of the retroductive spiral. This notion of responsiveness also captures the ability of case details to 'talk back' (Flyvbjerg 2006). In short, the greater the responsiveness of an explanation's production, the more avenues and opportunities for the feeding back in of empirical details and 'extended' insights, and the closer one hones in to a compelling explanation. Fifth and finally is the consistency with the forms of closure identified in the 'closure through planning' literature as noted in section 6.1 above. In short, these or similar tendencies toward closure in planning have been identified by other studies. It should be noted that the review of this literature was conducted *after* the completion of analysis, and therefore this consistency represents an external validity check rather than evidence of verification bias.

The key methodological contributions of this thesis are, firstly, the interaction between abstract and foreign insights and concrete and local case details, and their explicit and accountable co-mingling through the employed retroductive approach (see section 3.3.2). A second contribution is the recognition of both an initially centrifugal movement of this approach toward a more context-attuned explanation and a possible subsequent centripetal movement through which insights produced here may be put to work in new contexts. Through this bespoke approach, inspired by but building on Glynos

and Howarth, a disparate set of academic influences and case details were cycled through in a centrifugal movement resulting the identification of the four forms of closure presented here.

#### 6.4.2 SCOPE FOR QUALIFIED GENERALISATION

The purpose of the study has been to explain the failure of FoE at the inquiry and to produce insights into the concept of justification. As such, as well as the highly context-attuned explanation of the particular process studied here, the question of the scope for qualified generalisation of the insights produced arises. In chapter 3 it was noted that Glynos and Howarth's approach to retroduction seemed likely to hone-in centrifugally toward a context-attuned explanation. Chapter 3 also saw the introduction of the notion of theory-extension, my attempt at a subsequent centripetal movement. This notion described how concepts and insights that were generated through engagement with a particular empirical context might be put into potentially risky and productive engagements with different empirical contexts. In other words, the notion of theory extension is concerned with the question of 'generalisation', or, put in a different language, the question of whether insights can travel to and be productive within new empirical contexts (by, say, rendering them more intelligible). The insights produced here are likely to be productive at two distinct scales of ambition, where ambition denotes the distance or difference between the empirical context studied here and the prospective new context. First, the forms of closure elaborated here are highly likely to be repeated in subsequent planning decisions on shale development in England unless and until there are changes to Government policy on fracking or major planning policy reform. There is of course scope for another decision maker on another day to arrive at different judgements on procedural or substantive matters, but this thesis has demonstrated the procedural constraints that circumscribe the action of not only participating experts and publics but also local authorities and other planning decision makers. In other words, these insights are 'generalisable' because the policy from which the forms of closure mostly emanate is general (within England).

A second level of ambition concerns planning and regulatory oversight more broadly. There are good reasons to believe that the forms of closure identified here may also play a role in curtailing participation in the oversight of other forms of development. For instance, as already mentioned, section 6.1 above noted a striking consistency between the forms of closure presented here and those found across the 'closure through planning' literature on various forms of energy development and beyond. On this second level of ambition the specific detail of the forms of closure will vary but the more general way that processes of appraisal are designed and conducted will exhibit similarities. In other words, there will be a resemblance rather than perfect correspondence. For example, oversight of other forms of development will not be bound by para. 147 of the NPPF or para. 120 of PPGM, but they

may nonetheless be bound by procedural rules that slice and sequence oversight in ways that produce similar forms of exclusion and insensitivity.

A final point to make here is that none of this generalisation, or as I prefer to say 'extension', will occur without work. Generalisation or 'extension' is viewed here as a practical accomplishment that requires researchers to put academic insights generated in a particular empirical context into potentially risky (because the insight may be transformed through the process) and productive (because the insight may contribute to the generation of an explanation that renders the situation more intelligible) encounters with new and different empirical contexts. There is therefore nothing automatic about the qualified form of 'generalisation' envisaged here. It is the result of a researcher applying 'foreign' insights to new empirical territory and of the unruly particularism of the case which will never quite be captured by insights abstracted from elsewhere. This approach shares much with that of Glynos and Howarth. For Glynos and Howarth, cases can be 'generalised' to contribute to the explanation of related cases and empirical contexts, but "the way they shed light is not straightforward" (Glynos and Howarth 2007, 190). Similarly to legal reasoning through which arguments are derived from precedents, the researcher must articulate the network of similarities and differences in order to justify the resemblance between two contexts. This is the task that was carried out regarding Stirling's empirical contexts and the context studied here in section 6.3, and that will have to be carried out anew when generalising or 'extending' the insights produced here.

## 6.5 IMPLICATIONS FOR FURTHER RESEARCH, POLICY AND BEYOND

### 6.5.1 FURTHER RESEARCH

This thesis has focused primarily on the mechanics of conditioning effects operating through the design and conduct of a planning decision-making process and the way these ‘forms of closure’ shaped the process towards a particular outcome. Less has been said about the expressive task of persuasion through which the decision outcome and the process through which it was selected are presented to an audience in potentially misleading ways. What has been overlooked is the perceptions of external audiences about the process and outcome of the inquiry. Further research might therefore delve into public perceptions, expectations and experiences of planning appraisal processes. Assessments might be made of the persuasiveness of such processes amongst various parties, or the extent to which they are viewed as being shaped by inadvertent bias or deliberate manipulation. In other words, are processes of strong justification obscured or are they widely perceived and suspected? Another possibility to be explored is that there exists a kind of ‘expectations gap’ between participating publics and the institutions extending the participatory invitation over the depth of the opportunity and the ability to influence decisions. This work would amount not to public perceptions of fracking, but public perceptions and expectations of the governance of fracking with a focus on the perceived procedural justice and justificatory persuasiveness of decision-making processes. Research into the way these processes are viewed and experienced by publics is particularly important given the concerns over procedural justice identified in section 2.3.1. Much of the controversy over shale development arises from perceptions of the extent to which such processes accommodate or exclude publics, and are responsive or insensitive to their views.

On the oversight of shale gas development in the UK more specifically, key questions remain about how oversight will differ on production phase applications, as well as later applications in areas with existing sites (i.e. industry scale). Of importance here will be whether the notion of ‘cumulative impacts’ is interpreted and implemented in an expansive enough fashion to cut through some of the insensitivity encouraged by ‘double compartmentalisation’. Furthermore, it will be interesting to chart whether questions that were closed at this inquiry due to the phase-by-phase separation of oversight are actually considered during production phase applications. The impression was certainly given that these issues were being deferred rather than ignored. Another point of interest will be how the emergence of local mineral plans with specific unconventional hydrocarbon policies will affect the forms of closure discussed here (see, for example, Hayhurst 2018c). Moreover, the impact that reforms to the planning system have on the forms of closure discussed here will be of interest. For instance, recently announced proposals to treat non-fracking exploratory projects as permitted development and production phase operations as nationally significant infrastructure projects (NSIP) will certainly have implications for

public participation in the planning of shale development (BEIS 2018b; BEIS 2018c; Ministry of Housing, Communities and Local Government 2018). Whilst the exact nature of these proposals is yet to be determined, it is widely anticipated that these reforms will limit scope for local input in planning decision-making on shale development (House of Commons Housing, Communities and Local Government Select Committee 2018), and the NSIP system has been criticised for curtailing scope for public participation in the planning of nuclear power development (Johnstone 2014).

A final suggestion is provoked by the potentially dispiriting message of this thesis to public and civil society groups seeking to influence UK energy policy. The message of this thesis is, in short, that the planning system is heavily circumscribed in ways that make it an unpromising candidate for a site through which to contest energy policy or technology choice. This provokes the question ‘if not planning then where?’ In other words, where else in the ‘ecology of participation’ (see Chilvers and Kearnes 2016; see also Burall 2015) are the openings and pressure points, and what are the methods, through which such influence might be achieved?

### 6.5.2 POLICY

With regards to policy, this research yields no recommendations concerning the merits of shale gas or its role within Government energy policy. Instead it offers a series of recommendations regarding the processes of policy-making and regulatory decision-making on shale development. The headline recommendation is that sites of public participation on policy- and decision-making are both potentially *sites for addressing public scepticism over fracking and the subject or cause of public scepticism themselves*. As established in section 2.3.1, the governance of shale development; the trustworthiness of policy-makers, operators and regulators; and the openness, inclusivity, and procedural justice of policy- and decision-making exercises are seen by some publics as part of the problem. Therefore, the public acceptability of shale development is driven not just by perceptions of the process of fracking and its risks, or of the product of shale gas and its relationship with climate change, but also by how decision- and policy-making processes are designed and conducted. Depending on their design and conduct, therefore, participatory opportunities are capable of exacerbating scepticism as well as resolving it. They are especially likely to do the former wherever they’re perceived as insufficient or unduly circumscribed in some way, or viewed as having been shaped through bias or intervention to exclude sceptical public views and produce justification for shale gas development. When attempting to address these issues, it is worth bearing in mind the insight that the task of expressing the legitimacy of a process to an audience is in tension with retaining controlling influence over the outcome that process selects.

With that expressive task in mind, several more practical issues have arisen. The closure performed through selective scepticism and credulity highlights the benefits of a more investigatory style of public inquiry – with the authority, resources and time to produce its own evidence on issues where the debate between rule 6 parties leaves matters in an ambiguous state. Also crucial here is the technical capability to assess knowledge claims such as Cuadrilla’s methane and flowback estimates, which section 5.4 strongly suggests the inquiry simply lacked. The analysis of horizontal deference raised questions about gaps in the environmental controls. On both the matter of the availability of waste treatment capacity and the matter of the GHG emissions’ impact on climate change there was ambiguity about precisely where oversight is situated and the possibility these issues will slip through the cracks between planning and the EA. In spite of Cuadrilla’s suggestion that they had, the EA did not assess the impact of the projects’ emissions on climate change (they assessed local air quality impact, which included the air quality impact of some GHGs). Whilst the inquiry had such an assessment before it from Professor Anderson it ultimately simply deferred to the general rule set out in the WMS – shale development is necessarily and in general good for climate change. That Government view not only falls well short of adequate oversight, it is, of course, also contestable and contingent (McGlade et al. 2015; McGlade et al. 2016). It was a similar story on waste management where *laissez faire* appeals to the market only strengthened the suspicion that the waste management capacity to service an industry will be ensured neither by planning nor the EA.

If these *meso* and *macro* issues overflow the oversight capacities of the site-by-site planning and permitting regimes then they will have to be considered elsewhere. The tendencies of the double compartmentalised approach toward myopia and tunnel-vision have already been discussed (see section 5.1). Suffice to say that whilst this approach undoubtedly saves resources through tightly binding the scope of the inquiry’s remit (to a specific site and a specific phase) it is potentially susceptible to producing lock-in or sunken assets, as well as generating cynicism by excluding arguments concerning an industry at scale from the debate. The assumption of the effective operation of other regulatory regimes, furthermore, might fall into the category of a regulatory ‘necessary fiction’ however its clear consequence is to deny planning processes from considering some of the key concerns that preoccupy anti-fracking publics (e.g. the efficacy of regulation and capabilities of regulators). Though there is no guarantee that allowing these concerns to be considered in planning processes would allay them, excluding them in a blunt procedural fashion does nothing to inspire confidence and gives the unfortunate impression of a regulatory system unwilling to countenance its flaws. Finally, with regards to vertical deference, such a blatant intervention asserting the authority of Government policy and preventing the questioning of its underpinning reasoning - for all (or precisely because of) its evident success in shaping the process toward a particular outcome - is of course entirely counter-productive to the task of persuading an audience of the wisdom and legitimacy of the appraisal process and its outcome.

In section 2.2.2 it was made clear that for Stirling analytic and participatory appraisal processes were not doomed to operate as a tool for the production of justification. Instead they could ‘open-up’ technology choice by acknowledging and interrogating the susceptibilities through which scope for the production of justification exists. Given that Stirling’s notion of ‘opening-up’ offers a basis for reform, this begs the question of whether and how planning might open-up. The first thing to recognise is that the appraisal of the applications was already ‘open’ to a slight degree given that two contrasting perspectives were aired at the inquiry. Therefore, the debate preceding and informing the decision was plural though not conditional (with each party presenting their case as prescriptive). However, this openness only pertains to one dimension of appraisal - the airing of plural perspectives – within an otherwise highly regimented and restricted process (e.g. the question under consideration is set, as, to a great extent, are issues that are likely to be included and the types of argument likely to be received). Any inability of planning appraisal to open-up therefore stems from the constraints prescribed in planning policy and other material considerations (e.g. Government energy policy). In fact, a potentially misleading air of openness is given because much of this closure only fully occurs after appraisal when the decision and the reasoning behind it are published, retrospectively rendering much of the appraisal redundant. At the outset there is the perception of scope for interpretative flexibility in how to implement the policy in practice (otherwise there would be no procedural debate). In this case the Inspector sided with the restrictive interpretation of the scope of the inquiry’s remit on every occasion (with the marginal exception of horizontal deference where she ruled that in principle the inquiry’s hands weren’t tied, but that in practice the facts of this case did not require any action). A restrictive interpretation and implementation of an already closure-oriented set of rules led this inquiry to be characterised by the avoidance of the consideration of certain arguments and issues.

Opening-up the appraisal of shale gas development siting proposals would require a more activist approach to discretion, a more investigatory approach to knowledge claims, and, of course, the loosening of certain procedural constraints. Most notably in this case the approach of deference toward government policy, the assumption of the effective operation of regulatory regimes, and the phase-by-phase separation and sequencing of oversight. These reforms would, of course, most likely render inquiries slower and more unwieldy and they would possibly cede a degree of control over decision selection outcomes. On the other hand, they would bring the benefit of selected outcomes likely being viewed as less dependent on closure through exclusion and insensitivity and so potentially more legitimate. The site-by-site separation and sequencing of oversight, finally, prevents the participatory opportunity of a planning inquiry from being an occasion through which broader technology choice might be informed and this broader level of appraisal opened-up to a greater diversity of perspectives. The argument that participation on this broader policy question should occur somewhere else and another time is often fundamentally flawed, as already discussed. This is not to say that such participatory opportunities have to be located in the planning system, but that any argument suggesting that they shouldn’t needs to demonstrate where such opportunities do or should exist elsewhere.

### 6.5.3 BEYOND

This work also contains potentially useful lessons for fracking-sceptical publics and civil society groups. These are, in truth, likely already to have been learnt through direct experience of the kind detailed here, though it is nonetheless worth briefly reiterating them. The empirical chapters include a great deal of useful information regarding the likely boundaries of issues that can or will be included and taken seriously within the planning system. Rightly or wrongly climate change, direct risks to public health and the availability of capacity for offsite treatment of waste all currently appear unlikely routes to decisional influence, irrespective of the intellectual merits of the case made. This is not to say that another Inspector on another day would necessarily see the procedural arguments in exactly the same way, although all of the Inspector's procedural reasoning was accepted by the SoS which will likely have precedent-setting repercussions. A particularly glaring finding in this regard is that for as long as the current WMS stands, and unless subsequent decision-makers take a different procedural approach, no shale development proposal can be refused permission on the grounds of having an unacceptable impact on climate change. The assumption of regulatory efficacy has similarly restrictive impacts on issues such as the acceptability of direct public health impacts, ongoing scientific uncertainty over public health risks, and the efficacy of regulation itself.

The broader general message to these groups concerns carefully identifying which processes are productive forums for voicing particular issues and arguments, as well as recognising the costs of invited or formal participation. Planning appears to be largely unreceptive to arguments associated with an 'extraordinary' framing of the negative impacts of fracking not shared by the current Government. On the other hand, it evidently affords scope for decisional influence through more mundane nuisance matters. There is little scope for participating publics to shape these conditioning influences and so alter the kinds of issues and arguments that can be received within such processes. Participation in local plan making seems superficially to be an avenue for precisely this kind of influence, though local plans have to be tested for soundness against national policy before they're accepted. In spite of the apparently 'local', decentralised nature of the system, local plans ultimately have to cohere with the centre. Broader arguments may then be more effectively voiced through uninvited, informal forms of participation free from the constraints, biases and closure detailed here. The lure of the apparent prospect of influencing decisions may mask the cost of participating in formal processes where publics have a contrasting view on an issue to the Government. Ultimately these publics have to capitulate to the Government framing of the issue or face the closure of their arguments through blunt procedural exclusion.

## 6.6 SUMMARY AND CONCLUSIONS

### 6.6.1 SUMMARY

Chapter 1 briefly introduced the case, field-site and broad thematic terrain of the study, before setting out the structure of what was to come.

In chapter 2, three normative theories of decision-making were reviewed. The purpose here was to highlight a series of academic concerns about decision-making spanning various theoretical perspectives. Two key implications emerged. First, the theories, through their various prescriptions, all attempted to regulate the role of interests, power and strategy in decision-making. Second, critiques of the analytic-rational and deliberative models in particular were concerned about the prospect of a potentially misleading front-stage rationality or legitimacy obscuring the actual backstage process of selection potentially driven by altogether less worthy or agreeable forces. The concept of justification was identified as key to understanding these theory-derived interests and then explored in greater detail. Boltanski and Thevenot's sincere conceptualisation was initially considered but rejected. There were two reasons for this. Their approach seemed to strip both actors of their strategic capacity in ways difficult to reconcile with common experience, and analysts of their critical capacity in ways that would potentially render the analysis intellectually implausible and politically redundant. Furthermore, the role of potentially shared underlying principles of evaluation and the sincerity with which actors ordinarily appeal to them defined the means of selection and justification as one and the same thing. In other words, there is no distinction between the way an actor decides upon a course of action and the way that actor attempts to justify taking that action to others. Stirling's alternative conceptualisation was then identified as furnishing the analysis with the capacity to both recognise the potential for strategic behaviour in decision-making and distinguish between the means of selection and justification. Furthermore, Stirling's approach recognised scope for inadvertent bias as well as strategic action in decision-making. The key insight of Stirling's approach was that justification as a resource for a preferred option can be produced through the deliberate or inadvertent conditioning of appraisal processes channelling them toward particular outcomes in potentially obscured ways.

Having established a conceptual interest in the scope for the production of justification through the design and conduct of decision-making processes, the relevant literatures connecting this interest with the chosen case were surveyed. Literature on 'framing fracking' demonstrated the diversity of ways that fracking is framed by distinct groups, and many authors pointed to a divergence between the views of policy and industry actors on the one hand and publics on the other. This divergence gave rise to concerns over the extent to which policy and decision-making processes marginalise or accommodate public views. The 'closure through planning' literature highlighted several forms of closure that have been found to prevent both public and expert arguments from being voiced or taken seriously within

the planning appraisal of energy development. In many cases, these processes were argued to be geared towards the legitimisation of particular forms of development. The literature considered in section 2.3.3 bridged these two sets of insights by considering both the necessity and capacity for planning and regulatory appraisal processes on fracking in the UK to accommodate sceptical public views. It was noted that this work has tended to overlook the fine-grain detail of how participating publics and their arguments are treated in practice within participatory settings, the key influence of prior commitments at the broader level of Government policy, and the treatment of participating experts and their arguments in such processes.

The methodology chapter started with a brief guide to the field-site – namely the planning inquiry into Cuadrilla's appeals over the RW and PNR sites. The concept of retroduction was then introduced, which was followed by critical engagement with it and an elaboration of the approach taken here inspired by it. This approach was adopted in part in response to events, but was also favoured because it was problem and empirically driven, recursive and open to case insights being fed back into the development of proto-explanations and theorising, and enabled the simultaneous generation of an explanation that rendered the situation studied more intelligible and the extension of the concept of justification. The practical methods of data collection and the analytic approach were then detailed. The latter consisted of a summary of the recursive process through which several rounds of problematisation and research question development, gathering insights from the case and academic literature, and the development and testing of proto-explanations were cycled through. Finally, the study's research questions were formally stated.

The first empirical chapter described the treatment of FoE's case at the inquiry structured around the four key issues they participated on. This section detailed how the arguments unfolded on the issues of climate change, public health, waste disposal and economic impacts, and how these arguments were resolved by, first, the Inspector in her recommendations, and ultimately the SoS in his decision. As was seen, the Inspector and SoS sided against FoE on almost all occasions. The argument developed in the remainder of the thesis was that the failure of FoE's case was not simply because their arguments were in some sense inherently weak, or Cuadrilla's better. Instead, this failure was a result of the inquiry being, through various features of its design and conduct, rendered insensitive to certain framings of fracking and associated arguments and matters of concern.

Chapter 5 analysed four 'forms of closure' through which this insensitivity was brought about. These forms of closure amounted to conditioning influences channelling the inquiry toward finding the appeals acceptable on certain 'extraordinary' frame related issues and the production of the justification for broader Government policy on shale gas. They were termed 'double compartmentalisation', 'vertical deference', 'horizontal deference', and 'selective scepticism and credulity'. The first three arose from procedural rules governing the scope of the inquiry's remit and the materiality of issues. The fourth arose from the conduct of appraisal itself. For each form of closure the analysis demonstrated how

appraisal was circumscribed, how FoE's arguments fell foul of this, and some of the broader implications for planning oversight of shale gas development.

Finally, the present chapter has reflected on several of the insights, limitations and implications of the research. In reference to the existing literature, normative arguments over the importance of public and community participation in decision-making have been complemented, if not complicated a little, by the constraining influence on participatory opportunities of both existing policy commitments and the compartmentalisation of oversight. Hilson's anticipations were largely confirmed, though if anything he underplayed just how insensitive planning decision-making would be to sceptical public frames in practice. The 'domain' and 'dexterity' strategies highlighted by Stokes were identified as filtering through to planning decision-making, as was their 'normative pull' toward shale gas development.

On the concept of justification, it was recognised that the production of justification for shale development at the inquiry did not occur uniformly across issues, but occurred through the inquiry being insensitive to the 'extraordinary' risk framing underpinning FoE's case, as well as through the indirect registering of the 'extraordinary' benefit framing promoted through the WMS. The argument that such closure in the planning system is not a problem because these matters are properly considered elsewhere was problematized. The question of intent was then raised. It was argued that the WMS did amount to an intervention deliberately designed to produce justification for shale gas. The other forms of closure were seen as arising through various kinds of inadvertent bias and pressures toward generic decisiveness and in favour of development more broadly. The expressive task of justification was also discussed where the need for further research was acknowledged. Finally on the concept of justification, a series of differences between the cases Stirling applied the concept to and the case in question here were identified, as were the ways these empirical differences have resulted in the 'extension' of the concept.

Some of the limitations of and alternatives to the conceptual approach were briefly considered. The decisions to reject Boltanski and Thevenot's conceptual approach and adopt a symmetrical and constructivist approach were defended. Finally, the relationship between arguments and frames was clarified. Section 6.4 reflected on methodology and set out the scope for my particular approach to qualified generalisation. Case and field-site selection were justified and the underpinning ontological commitment to the 'myth of the best argument' was briefly reflected on. The validity of the explanation put forward here was then defended in relation to five criteria – detail, evidential support, clarity, responsiveness and external consistency. The section ended with a discussion on the scope for qualified generalisation based on the notion of 'extension' in which two distinct scales of ambition were identified. Finally, turning to section 6.5, a series of implications for further research, shale gas governance, and participating public and civil society groups were discussed.

### 6.6.2 CONCLUSION

The four forms of closure presented here narrowed and deadened the inquiry's sensitivity to various issues, arguments and matters of concern. As demonstrated, this willingness or ability to sense, consider and attend to particular matters has a direction or tilt to it. Arguments associated with an extraordinary framing of the risks of fracking are filtered out, whilst arguments associated with an extraordinary framing of the benefits of fracking are indirectly registered without scrutiny. This is the channelling of regulatory sensitivity referred to in the title of this thesis. It was argued that these forms of closure, and the resulting 'geography' to what can be registered by the inquiry, establish a gradient exerting force toward the enabling of and production of justification for shale development. This focus on sensitivity stems from the inquiry itself, where participants often employed sensory metaphors, particularly relating to vision. Dehon spoke of 'turning a very blind eye', and Whitehead implored the Inspector to raise her eyes from the ground and look to the horizon. Perhaps the best analogy though was Murphy's slightly farcical reliance on the redacted version of the DEFRA economic impacts on the rural economy report. Here we had a report in which the negative economic impacts had been obscured in a rather rudimentary fashion (literally 'black boxed'), whilst more positive passages better aligned with Government policy remained visible for public consumption. There was a quite blatant, rather unpersuasive, and actually likely counter-productive modulation to what could be sensed, with an agency behind it and a direction to it. In short, sensitivity was being channelled toward the production of justification for shale development.

In conclusion, it has been argued that the planning inquiry studied in this thesis can be seen as a site for the production of justification for the specific sites in question and for broader Government shale policy. These justificatory pressures arise from the design and conduct of the process resulting in an insensitivity toward certain kinds of issues and arguments. Four key conditioning influences have been identified and presented. These 'forms of closure' are 'double compartmentalisation', 'vertical deference', 'horizontal deference' and 'selective scepticism and credulity'. The thesis has detailed how each of these forms of closure played a role in rendering the inquiry insensitive and inhospitable to the case of FoE. The production of justification occurs unevenly through the closure of arguments associated with an 'extraordinary' framing of the risks of fracking, whilst more mundane issues are left in play to potentially influence the decision. Furthermore, the inquiry indirectly registered arguments associated with the 'extraordinary' benefits frame expressed in the WMS in spite of their ostensive immateriality. Here justification was produced not only through the closure of certain rule 6 party arguments and matters of concern, but also through something like the dextrous regulatory strategy toward benefit realisation identified by Stokes (Stokes 2016). The thesis demonstrates how certain broader framings dominant amongst incumbent interests shape and gain material influence through more grounded processes of planning decision-making at the expense of contrary framings of the issue. Public and expert participation in the planning of shale development has been found to be deeply circumscribed.

This circumscription shapes the planning system toward the delivery of decisions that are aligned with broader Government energy policy and technology choice commitments. However, planning decision-making seems likely to be less successful in generating compelling legitimation for shale development in the eyes of broader audiences because of likely reactions to the justificatory pressures detailed here. This final point, however, requires further substantiation through additional empirical research.

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## APPENDIX 1: KEY PASSAGES OF ENERGY POLICY, PLANNING POLICY AND CASE LAW

### A1.1 ENERGY POLICY

#### A1.1.1 'THE WMS'

The 'Shale Oil and Gas Policy Statement' was given by the then Secretary of State for Energy and Climate Change Amber Rudd to the House of Commons on September 16 2015 ('the WMS'). The WMS plays a key role in the form of closure 'vertical deference'.

Para. 1 (the WMS does not have paragraph numbers but for the purposes of this thesis key paragraphs shall be assigned numbers in the following way):

"My Rt Hon Friend Greg Clark (Secretary of State for Communities and Local Government) and I wish to set out the Government's view that there is a national need to explore and develop our shale gas and oil resources in a safe, and sustainable and timely way, and the steps it is taking to support this. In laying this statement before Parliament, it formally replaces the Shale Gas and Oil Policy Statement issued by DECC and DCLG on 13 August 2015. This statement to Parliament should be taken into account in planning decisions and plan-making" (DCLG/DECC 2015, no pagination)

Para. 2:

"Exploring and developing our shale gas and oil resources could potentially bring substantial benefits and help meet our objectives for secure energy supplies, economic growth and lower carbon emissions" (DCLG/DECC 2015, no pagination).

Para. 3:

"Having access to clean, safe and secure supplies of natural gas for years to come is a key requirement if the UK is to successfully transition in the longer term to a low-carbon economy. The Government remains fully committed to the development and deployment of renewable technologies for heat and electricity generation and to driving up energy efficiency, but we need gas - the cleanest of all fossil fuels – to support our climate change target by providing flexibility while we do that and help us to reduce the use of high-carbon coal" (DCLG/DECC 2015, no pagination).

Para. 6:

"There are also potential economic benefits in building a new industry for the country and for communities.

- Nationally, we will benefit from development of a new industrial sector, building on the experience and skills developed here in 50 years of on- and offshore oil and gas development.

- Developing shale resources would deliver investment in key domestic energy infrastructure, boosting the UK's capital stock and leading to increased productivity and growth.
- Reducing imports would improve the balance of trade.
- Consultants EY estimated in 2014[5] that a thriving shale industry could mean cumulative investment of £33 billion and support 64,500 jobs in the gas, oil, construction, engineering and chemical sectors at peak. Locally that might mean new facilities and jobs for local companies" (DCLG/DECC 2015, no pagination).

Para. 8:

"Shale gas can create a bridge while we develop renewable energy, improve energy efficiency and build new nuclear generating capacity. Studies have shown that the carbon footprint of electricity from UK shale gas would be likely to be significantly less than unabated coal and also lower than imported Liquefied Natural Gas[9]" (DCLG/DECC 2015, no pagination).

Footnote 9 refers to the Mackay and Stone report (Mackay and Stone 2013).

## A1.2 PLANNING POLICY

### A1.2.1 'DM2'

"Development for minerals or waste management operations will be supported where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that all material, social, economic or environmental impacts that would cause demonstrable harm can be eliminated or reduced to acceptable levels. In assessing proposals account will be taken of the proposal's setting, baseline environmental conditions and neighbouring land uses, together with the extent to which its impacts can be controlled in accordance with current best practice and recognised standards.

In accordance with Policy CS5 and CS9 of the Core Strategy developments will be supported for minerals or waste developments where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that the proposals will, where appropriate, make a positive contribution to the:

- Local and wider economy
- Historic environment
- Biodiversity, geodiversity and landscape character
- Residential amenity of those living nearby
- Reduction of carbon emissions
- Reduction in the length and number of journeys made

This will be achieved through for example:

- The quality of design, layout, form, scale and appearance of buildings
- The control of emissions from the proposal including dust, noise, light and water.
- Restoration within agreed time limits, to a beneficial after use and the management of landscaping and tree planting.

- The control of the numbers, frequency, timing and routing of transport related to the development” (The Joint Advisory Committee for Strategic Planning: Lancashire County Council; Blackpool Council; Blackburn with Darwen Council 2013b, 10)

### A1.2.2 ‘THE NPPF’

Para. 93:

“Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development” (DCLG 2012, 21–22).

Para. 120:

“To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner” (DCLG 2012, 28).

Para. 121:

“Planning policies and decisions should also ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- adequate site investigation information, prepared by a competent person, is presented” (DCLG 2012, 28–29).

Para. 122:

“In doing so, local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities” (DCLG 2012, 29).

Para. 147:

“Minerals planning authorities should also:

- when planning for on-shore oil and gas development, including unconventional hydrocarbons, clearly distinguish between the three phases of development (exploration,

appraisal and production) and address constraints on production and processing within areas that are licensed for oil and gas exploration or production;

- encourage underground gas and carbon storage and associated infrastructure if local geological circumstances indicate its feasibility;
- indicate any areas where coal extraction and the disposal of colliery spoil may be acceptable;
- encourage capture and use of methane from coal mines in active and abandoned coalfield areas; and
- provide for coal producers to extract separately, and if necessary stockpile, fireclay so that it remains available for use” (DCLG 2012, 36).

### A1.2.3 ‘PPGM’

Para. 12:

“What is the relationship between planning and other regulatory regimes?

The planning and other regulatory regimes are separate but complementary. The planning system controls the development and use of land in the public interest and, as stated in paragraphs 120 (...) and 122 of the National Planning Policy Framework (...), this includes ensuring that new development is appropriate for its location – taking account of the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution.

In doing so the focus of the planning system should be on whether the development itself is an acceptable use of the land, and the impacts of those uses, rather than any control processes, health and safety issues or emissions themselves where these are subject to approval under regimes. Mineral planning authorities should assume that these non-planning regimes will operate effectively” (DCLG 2014, no pagination, para. 27–012).

Para. 112:

“What hydrocarbon issues can mineral planning authorities leave to other regulatory regimes?

Some issues may be covered by other regulatory regimes but may be relevant to mineral planning authorities in specific circumstances. For example, the Environment Agency has responsibility for ensuring that risk to groundwater is appropriately identified and mitigated. Where an Environmental Statement is required, mineral planning authorities can and do play a role in preventing pollution of the water environment from hydrocarbon extraction, principally through controlling the methods of site construction and operation, robustness of storage facilities, and in tackling surface water drainage issues.

There exist a number of issues which are covered by other regulatory regimes and mineral planning authorities should assume that these regimes will operate effectively. Whilst these issues may be put before mineral planning authorities, they should not need to carry out their own assessment as they can rely on the assessment of other regulatory bodies. However, before granting planning permission they will need to be satisfied that these issues can or will be adequately addressed by taking the advice from the relevant regulatory body:

- Mitigation of seismic risks –the Department of Energy and Climate Change is responsible for controls, usually through the licence consent regime, to mitigate seismic risks. Seismic assessment of the geology of the area to establish the geological conditions, risk of seismic

activity and mitigation measures to put in place is required by the Department of Energy and Climate Change for all hydraulic fracturing processes;

- Well design and construction – the Health and Safety Executive are responsible for enforcement of legislation concerning well design and construction. Before design and construction operators must assess and take account of the geological strata, and fluids within them, as well as any hazards that the strata may contain;
- Well integrity during operation – under health and safety legislation the integrity of the well is subject to examination by independent qualified experts throughout its operation, from design through construction and until final plugging at the end of operation;
- Operation of surface equipment on the well pad – whilst planning conditions may be imposed to prevent run-off of any liquid from the pad, and to control any impact on local amenity (such as noise), the actual operation of the site's equipment should not be of concern to mineral planning authorities as these are controlled by the Environment Agency and the Health and Safety Executive;
- Mining waste – the Environment Agency is responsible for ensuring that extractive wastes do not harm human health and the environment. An environmental permit is required for phases of hydrocarbon extraction and this will require the operator to produce and implement a waste management plan;
- Chemical content of hydraulic fracturing fluid – this is covered by the environmental permit as operators are obliged to inform the Environment Agency of all chemicals that they may use as part of any hydraulic fracturing process;
- Flaring or venting of any gas produced as part of the exploratory phase will be subject to Department of Energy and Climate Change controls and will be regulated by the Environment Agency. Mineral planning authorities will, however, need to consider how issues of noise and visual impact will be addressed;
- Final off-site disposal of water – Water that comes back to the surface following hydraulic fracturing may contain naturally occurring radioactive materials. Whilst storage on-site and the traffic impact of any movement of water is of clear interest to local authorities, it is the responsibility of the Environment Agency to ensure that the final treatment/disposal at suitable water treatment facilities is acceptable
- Well decommissioning/abandonment – following exploration, the well is likely to be suspended and abandoned for a period of time. Health and Safety Legislation requires its design and construction that, so far as reasonably practicable, there is no unplanned escape of fluids from it. The mineral planning authority is responsible for ensuring the wells are abandoned and the site is restored" (DCLG 2014, no pagination, para 27–112).

Para. 120:

"Should mineral planning authorities take account of the environmental effects of the production phase of hydrocarbon extraction at the exploration phase?"

Individual applications for the exploratory phase should be considered on their own merits. They should not take account of hypothetical future activities for which consent has not yet been sought, since the further appraisal and production phases will be the subject of separate planning applications and assessments.

When determining applications for subsequent phases, the fact that exploratory drilling has taken place on a particular site is likely to be material in determining the suitability of continuing to use that site only insofar as it establishes the presence of hydrocarbon resources"(DCLG 2014, no pagination, para. 27–120).

## A1.3 CASE LAW

### A1.3.1 'FFB vs. WSCC'

In the case Frack Free Balcombe vs. West Sussex County Council, FFB challenged the decision of WSCC to grant Cuadrilla planning permission for hydrocarbon exploration and testing at Balcombe at the High Court. Part of the FFB case was that "the Planning Committee was wrongly advised that it should leave matters such as pollution control, air emissions and well integrity to the EA, HSE and other statutory bodies" (Justice Gilbert 2015, High Court:6). In his judgement, Justice Gilbert ruled against FFB on this matter, stating that: "in my judgement there is ample authority to the effect that the Planning Authority may in the exercise of its discretion consider that matters of regulatory control could be left to the statutory regulatory authorities to consider. There was ample material before it that all matters of concern could be and would be addressed, as set out in the officer's very careful report" (Justice Gilbert 2015, High Court:41).

## APPENDIX 2: THE METHANE EMISSIONS ESTIMATES

### A2.1 THE METHANE ESTIMATE CALCULATION

130,000m<sup>3</sup> of gas will be flared per day per well for up to 90 days. In total, then, each site will flare up to 46,800,000m<sup>3</sup> of gas. 98% of this gas is combusted in the flare, emitting CO<sub>2</sub> in the process which is accounted for in the approximately 70% of total GHG emissions from (successful) flaring. 2%, however, which amounts to 936,000m<sup>3</sup>, escapes un-combusted. We're told that the gas is assumed to be 100% methane in appendix H (Arup 2014a, H4), though this is incorrect and by my calculation would result in an estimate of 16,614 tCO<sub>2</sub>e of fugitives. Instead, based on the Preese Hall data (Arup 2014a, B10), the ES estimate actually assumes this gas to be 96.4% methane. The 936,000m<sup>3</sup> of un-combusted gas therefore equates to 902,304m<sup>3</sup> of CH<sub>4</sub>. Arup use a 0.71 density conversion rate, which they reference to the 2012 DEFRA/DECC 'Greenhouse Gas reporting' conversion factors (Arup 2014a, A7, table 2; DEFRA/DECC 2012b), to convert this into kgs, resulting in 640,635kg or ~640 (metric) tonnes of CH<sub>4</sub>. ~640tCH<sub>4</sub> is finally multiplied by the GWP figure of 25 to result in 16,015.896tCO<sub>2</sub>e. This confirms that in total fugitive emissions are estimated to be 2% of the total gas recovered and flared during the 90 days of initial flow testing, which, owing to the assumption of 98% combustion efficiency, must exclusively be comprised of methane escaping un-combusted through the flare (which as I've just calculated, based on the ES's figures and assumptions, amounts to the 16,016tCO<sub>2</sub>e figure when rounded to 0 decimal places). In short, the methane emissions estimate assumes the consummate prevention of all non-flaring fugitives.

### A2.2 IPCC5 AND THE UPWARD REVISION OF METHANE'S GWP

IPCC5 makes a two-step upwards revision of the GWP of methane from 25 to 28 and then to the 34 figure that Anderson references. The first increase relative to IPCC4 is a result of "changes in perturbation lifetime, a minor change in RE [radioactive efficiency] due to an increase in background concentration, and changes in the estimates of indirect effects", as well as changes in the GWP of CO<sub>2</sub> itself (which as the benchmark effects all other GWPs) (IPCC 2013, 717). The second increase, is a result of including climate-carbon feedbacks for non-CO<sub>2</sub> gases. The IPCC4 GWPs "include climate-carbon feedbacks for the reference gas CO<sub>2</sub> but not for the non-CO<sub>2</sub> gases", and as "[s]uch feedbacks may have significant impacts on metrics [they] should be treated consistently" (IPCC 2013, 715). The IPCC4 figures may therefore "underestimate the relative impacts of non-CO<sub>2</sub> gases" (IPCC 2013, 713). Whilst providing two figures – 28 (without climate-carbon feedbacks) and 34 (with climate-carbon feedbacks)

(IPCC 2013, 714, table 8.7) – the authors are clear on the question of whether climate-carbon feedbacks should be included consistently across gasses (and so the 34 GWP used):

“Though uncertainties in the carbon cycle are substantial, it is likely that including the climate-carbon feedback for non-CO<sub>2</sub> gases as well as for CO<sub>2</sub> provides a better estimate of the metric value than including it only for CO<sub>2</sub>” (IPCC 2013, 714).

## A2.3 METHANE EMISSIONS DURING COMPLETIONS

Completions are a key period for methane emissions as they precede the well being connected to the grid, though gas has started to flow from the well. Even if a connection already exists a well will still go through a period of completion to allow the level flowback fluid to reduce and the gas flow to increase. As such, the operator must do something with the gas produced during completion. Historically, in the US, much of this gas is thought to have been vented (let off into the atmosphere as methane). Such practices are now believed to be much rarer due to the tightening of regulation by the EPA to encourage flaring (combusting the gas to emit CO<sub>2</sub> rather than CH<sub>4</sub>) and reduced emissions completions (where a proportion of the gas is captured for use, also known as green completions). These proposals cannot sensibly be considered to be RECs because 100% of the gas will be flared over such a long period<sup>28</sup>.

Understanding a wells potential to emit during a completion requires knowledge of how much gas will flow from the well over what duration. Early high estimates of methane emissions from unconventional gas wells during completions assumed that the completion gas flow rate was the same as the initial production rate or the 30-day production rate (Howarth, Santoro, and Ingraffea 2011 and Jiang et al. 2011b respectively). This assumption has been criticised for being incompatible with the basic physics of shale gas production – average daily completion gas flow rates cannot match or exceed the highest gas flow rate achievable (the initial production rate) when the well still contains fluid, as it does during completion (Cathles et al. 2012). Most subsequent estimates assume the flow rate ramps in some way (i.e. linearly or non-linearly) from zero to the initial production rate over the course of a completion (e.g. O’Sullivan and Paltsev 2012a). Of course, in the US peak gas flow rates are typically reached within between 3-10 days. It is far from clear how the elongated completion stage (60-90 day IFT) of the projects under consideration at this inquiry will affect average daily completion gas flow rates.

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<sup>28</sup> Whether flaring constitutes a reduced or green completion approach (because it reduces emissions compared to venting) appears to be a matter of debate. AEA, for example, define RECs as producing gas that can be delivered into the sales pipeline and as being able to “eliminate or significantly reduce the need for flaring” (AEA 2012a, 126). On the other hand, the Sustainable Gas Institute, for example, imply that capturing and flaring the gas still constitutes a REC (Balcombe et al. 2015, 23, 44). I would suggest that flaring all gas for the entirety of the elongated completion in this case (60-90 days) cannot sensibly be considered in the same category as completions capturing 90% of gas flow over 9 days for sales even if the other 10% is vented. Without even taking into account the CO<sub>2</sub> emissions from the successfully flared 98% of gas, the latter, because of its much shorter duration, would emit around half of the methane of the former in spite of having a fugitive rate five times higher (2%-10%). The key here is the longer period of flaring in the IFT when compared to the US evidence base.

Depending on the ramping assumptions this could result in higher average daily flow rates (and so methane emissions potential) than the US evidence base.

#### A2.4 THE SOURCE OF THE 60-90 DAY IFT DURATION ASSUMPTION?

In a report assessing the lifecycle GHG emissions of Scottish unconventional gas published in August 2014, the authors state that:

“To appraise gas flow rates adequately and establish commerciality, shale gas and CBM [Coal bed methane] wells would require approximately 60 - 90 days of testing” (Bond et al. 2014, 31).

Bond et al. are a little unclear as to whether they are referencing the claim to Foster and Parks (2012) or not<sup>29</sup>. Foster and Parks (AEA 2012a) is a report into the potential climate change impacts of shale gas for the European Commission. The report includes a review of the GHG-relevant regulatory requirements in England, Scotland and Wales, on the one hand, and Northern Ireland on the other. In England, Scotland and Wales, as of 2012, it is suggested that:

If the well needs more than 96 hours of testing to evaluate its potential to produce hydrocarbons, the operator can apply to DECC for an extended well test of up to 60 days (once all other consents and permissions have been granted) which limits the quantities of gas to be produced and saved or flared (AEA 2012a, 81–82).

In Northern Ireland, on the other hand, it is suggested that:

At the exploration stage, it is expected that companies exploring for shale gas will seek permission for an “extended well test”, which allows production for a sufficient length of time, often 90 days, to establish commerciality (AEA 2012a, 84).

Therefore, taken across the whole of the UK, the phase of activity required to assess the commercial viability of a well (an ‘extended well test’, interestingly, in this report) is either limited by the regulator at, or expected to require, between 60-90days. This may of course be a coincidence, or it may be the source of the 60-90 day IFT duration estimate. In the latter case, the assumption would not be a bespoke estimate based on Cuadrilla’s ‘knowledge and experience’, but a more generic UK regulatory requirement/expectation hailing from 2012.

#### A2.5 THE INAPPROPRIATENESS OF ALLEN ET AL. (2013)

*Table A1: Appropriateness of Allen et al. (2013) as the basis for the ES’s fugitive emissions rate*

Claim referenced to Allen et al. (2013)	Appropriateness of Allen et al. (2013) as basis for claim
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<sup>29</sup> The citation comes two sentences later, and it is unclear whether the whole paragraph, or just the final sentence is referenced to Foster and Parks.

<p>“The embedded mitigation measures proposed are known to achieve an estimated reduction in fugitive emissions of 97%-98% [91]” (Arup 2014a, 117). Footnote 91 references Allen et al. (2013)</p>	<p>The proposed mitigation is not ‘known to achieve an estimated’ reduction in fugitive emissions of 97-98% on the basis of Allen et al. (2013).</p> <p>The 98.6% is the average proportion of total potential methane emissions (all of the gas that passes out of the well during the completion) that were prevented from being emitted into the atmosphere as methane (in other words measured emissions were on average 1.6% of total potential emissions) from the Allen et al. sample of 27 (though 3 were not used due to partial data loss so the used sample is 24)</p> <p>The 97-98% reduction refers to the reduction that the rate of 98.6% represents from the ‘bottom-up’ EPA emissions estimates at the time the paper was published (i.e. EPA estimated around 50% of potential emissions are actually lost, Allen et al. find 1.6%, a reduction of roughly 97-98%).</p> <p>The sample contains a wide variety of gas handling approaches, and emissions sources, none of which look exactly like Cuadrilla’s proposal (100% capture and flare).</p> <p>Some of the sampled operations provide much less mitigation than the Cuadrilla proposal (i.e. the venting of gas, prohibited in the UK except in case of emergencies).</p> <p>Some of the sampled operations provide much greater mitigation than the Cuadrilla proposals (i.e. RECs, the capture of gas for sale – which will not occur during the IFT).</p>
<p>“The most significant emission source at this stage is flaring, accounting for over 84% of initial flow testing emissions. Based on a fugitive methane emission rate of 2%[92] (by volume) GHG emissions from this source are estimated to amount to approximately 15% of all GHG emissions associated with the project” (Arup 2014a, 121). Footnote 92 references Allen et al. (2013)</p>	<p>Allen et al. (2013) does not support a scenario of fugitives arising exclusively from uncombusted methane escaping through the flare.</p> <p>Of the 27 cases in their sample there is not a single example of a completion in which methane emissions were limited to exclusively those associated with the flare (all had at least a small amount of non-flaring fugitives).</p> <p>1.6% is the average fugitive emission rate found across 24 operations, but the study does not support a 1.6% rate for operations that flare all gas (which by definition would be 2% - as they use the EPA flare efficiency assumption - plus any extra fugitives).</p> <p>Cuadrilla’s estimate is actually a 0% non-flare fugitive rate and a 98% combustion efficiency rate. Allen et al. (2013) does not support a 0% non-flare fugitive rate. In fact, their findings – to the extent</p>

	that they are relevant at all - are quite contrary to that expectation.
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## A2.6 THE METHANE EMISSIONS ESTIMATE ASSUMPTIONS SUMMARISED

*Table A2: Methane emissions estimate assumptions*

<b>Assumption</b>	<b>Was it explicitly scrutinised?</b>	<b>Issues overlooked</b>	<b>How was closure performed?</b>
Methane density of 0.71	No	The density of methane in the source referenced is 0.72 (DEFRA/DECC 2012; see also BEIS 2016b), the upshot of which is a marginal upward revision of the methane emissions estimate	Scrutiny was withheld through an apparent unwillingness to adopt an orientation of sceptical curiosity to the methods, assumptions, and data sources behind the estimate
100yr GWP of methane of 25	Anderson questioned the use of a GWP of 25, but Cuadrilla did not explicitly defend the figure nor did the Inspector explicitly consider it in her reasoning	34 is the 'latest scientific understanding' of the effectiveness of methane as a GHG over 100 years relative to other GHGs	The use of 25 did not have to be defended due to the lack of serious scrutiny at the inquiry. If it had been considered, however, it is undoubtedly the case that the matter would have been procedurally closed by continued use of 25 at Government level due to 34 not yet being accepted under the UNFCCC
'Worst-case scenario' daily flow rate of 130,000m3 of gas per well	No	The apparent use of the 'worst-case scenario' flow rate (as opposed to an estimated average daily rate) in the estimate appears to be a conservative approach. Whether the apparent worst-case scenario is a reasonable figure, is – on the evidence before the inquiry – difficult to ascertain however. The Bowland has only been fracked once before and those Preese Hall results were not before the inquiry. What was also not scrutinised was how the elongated nature of this 'completion' (the IFT) will affect the 'ramp up' of gas flow, and therefore what a reasonable average daily completion gas flow rate would look like and the extent to which US completion gas flow rates are	Again, scrutiny was withheld and satisfaction with the 'safe reliability' of the estimate was apparently somewhat easily forthcoming. Disclosure of potentially commercially sensitive information (i.e. precise estimates and results of gas flow rates during the IFT and from Preese Hall respectively) may have been an issue too

		comparable. There was therefore no clear or satisfactory basis against which to assess the reasonableness of the 130,000m <sup>3</sup> daily flow rate worst-case scenario beyond the somewhat opaque 'knowledge and experience' of Cuadrilla	
A maximum of 90 days flaring per well	No	Using the upper estimate of the duration of the IFT (60-90 days) as the estimate assumption appears conservative. However, whether and how flaring during the fracking phase was accounted for in the estimate is not at all clear (given the 90 day assumption). It appears at least plausible that a day's flaring during the fracking phase would not automatically yield a day's testing and so potentially be additional not subtractive	Again, this assumption was neither scrutinised nor defended. Of course, 90 days of flaring per well is capped by the EA permit, so (assuming an extension is not sought and granted) the matter could be procedurally closed that way. However, the inquiry did not consider whether the details of the application suggest that the need for an extension might feasibly arise (as in the days of flaring not yielding days of testing scenario set out here)
A flare combustion efficiency of 98%	No	Whilst a widely used assumption in the literature, it is nonetheless questioned by some studies. There are also difficulties in the real-time monitoring of whether it is actually being achieved	Neither scrutinised nor defended at the inquiry. The EA were satisfied with this assumption and arrangements for the monitoring of its achievement – so in all likelihood, if raised, the matter would have been procedurally closed through 'horizontal deference' to the EA's satisfaction
2% fugitive rate (100% capture and flare)	Anderson argued that the methane emissions estimate was "inevitably an underestimate" on the basis of leakage as well as the GWP figure	<p>The basis of this figure – as presented in the ES – is Allen et al. (2013). The claim that the findings of Allen et al. (2013) supports a fugitive rate of 2% in this case is seriously questionable, and appears to demonstrate a basic lack of understanding about that study and its findings.</p> <p>The broader literature is also a problematic basis for this assumption, and in any event is only tenuously applicable. The assumption appears primarily based on Cuadrilla's own stated confidence in their ability to</p>	Anderson's invitation to scrutinise the methane emissions rate that in his expert view was 'inevitably an underestimate' was not seriously taken up at the inquiry. The matter remained obscure through a shallowness of scrutiny and an apparent aversion to problematisation. The inquiry also arguably lacked the capacity to explore such matters more fully

		achieve their 100% capture and flare (consummate prevention of all non-flare fugitives) scenario	
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## APPENDIX 3: THE FLOWBACK FLUID VOLUME ESTIMATES

### A3.1 THE CLARIFIED FLOWBACK ESTIMATES AT THE CLOSE OF THE INQUIRY

All flowback during the fracking phase is expected to be reused as fracking fluid for subsequent fracks, and therefore is not expected to require offsite treatment and disposal. The total amount of flowback expected during the fracking phase is 22,730m<sup>3</sup> per site (Quarles 2016b, no pagination, table 1<sup>30</sup>). This is also expressed as a rate (i.e. a proportion of total fluid injected) of 15-25% (Quarles 2016b). Given that total fluid injected per site is approximately 111,950m<sup>3</sup> (Quarles 2016b, no pagination, table 1), 22,730m<sup>3</sup> represents a rate of approximately 20%. The amount of flowback during the IFT is estimated to be 22,050m<sup>3</sup> per site, all of which will have to be treated and disposed of offsite (Quarles 2016b, no pagination, table 1). This is based on the upper end of an estimated rate of 10-40%<sup>31</sup> of the total fluid injected returning during the fracking and IFT phases combined (Cuadrilla 2016d, 1). Any liquid waste returning from the wells in the subsequent EFT phase is considered ‘produced water’ rather than flowback fluid, and does not appear to be included in the 40% flowback return rate figure used (Cuadrilla 2016d, 1). Cuadrilla’s own inquiry documents, however, manage to partially confuse the matter. On the 4<sup>th</sup> of March it was clarified that “[f]lowback fluid will be generated between fracturing stages during hydraulic fracturing operations as well as during the testing phases” (Quarles 2016b, no pagination). Six days later it was suggested instead that:

“The 40% relates to the maximum estimated flowback from the start of the fracturing operation until the end of the Initial Flow Testing. Extended Flow Testing which follows the Initial Flow Testing generates “Produced Water” (Cuadrilla 2016d, 1).

I assume that this means that regardless of whether it is termed ‘flowback fluid’ or ‘produced water’, the liquid waste returning from the well in the EFT is not counted in the 40% upper limit of the estimated flowback return rate.

As well as partially contradicting themselves, these clarifying documents, produced in the face of Watson’s questioning, also contradict or correct a series of figures and claims made across a series of documents produced as part of the planning and environmental permitting applications. The EA had already issued the permit on the basis of these prior documents and the figures and claims therein. The key prior documents were the WMP (Cuadrilla 2014b), the EA decision document (EA 2015) and the ESS (Arup 2014a). For example, both the WMP and the EA decision document refer to the approximately 10-40% flowback rate as applying to “between the hydraulic fracturing stages”, which, contrary to Lieven’s

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<sup>30</sup> Calculated by adding the ‘volume of water reused’ column figures together, given that 100% of flowback during the fracking phase is reused.

<sup>31</sup> It is not clear how, as a matter of basic mathematics, the lower range estimate of the proportion of total injected fluid returning during just the fracking phase (15%) could be larger than the equivalent lower range estimate for that phase and the IFT combined (10%).

protestations, can only sensibly be interpreted as referring to the fracking phase (Cuadrilla 2014b, 25; EA 2015, 22). In the ES the 40% worst-case return rate is suggested to refer to ‘all testing’ (Arup 2014a, 374), which can only sensibly be interpreted as referring to the IFT and EFT. Likewise, Quarles’ rebuttal to Watson suggests that “Cuadrilla defines flowback as the hydraulic fracture fluid returned during initial and extended flow testing” (Quarles 2016a, 7). The absolute volume of flowback during the fracking phase is reported in the ES as 24,891m<sup>3</sup> (Arup 2014a, 508, table 17.44). The absolute volume of flowback during the IFT is variously reported as 22,000m<sup>3</sup> per well (Cuadrilla 2014b, 35; EA 2015, 35), 21,250m<sup>3</sup> per site (Arup 2014a, 511, table 17.52), and 21,500m<sup>3</sup> per site (Arup 2014a, B10).

Finally, Cuadrilla’s inquiry documents are silent on the matter of retained fluids (the proportion of total injected fluid that remains in the ground). The EA decision document and the WMP both state between 16,000 and 24,000m<sup>3</sup> is retained without explicitly stating whether this is a per site or per well figure (Cuadrilla 2014b, 35; EA 2015, 35), though I assume it must be per site. Alternatively, a figure of 37,970m<sup>3</sup> can be calculated from the clarified figures<sup>32</sup>. Intriguingly, the mid-range expectation of 20,000m<sup>3</sup> being retained in the WMP and EA decision document would require a total return rate (i.e. including the EFT) of approximately 82% (the total return rate for Cuadrilla’s clarified figures – i.e. including the EFT’s ‘produce water’ - is approximately 66%). In other words, the retained fluid figures reported in the EA documentation along with the clarified return rate appear to leave a proportion of fluid unaccounted for.

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<sup>32</sup> 40% or 44,780m<sup>3</sup> of the total injected fluids (111,950m<sup>3</sup>) returns during the fracking and IFT phases. The ES states that 29,200m<sup>3</sup> per site then returns in the longer EFT (Arup 2014a, 514, table 17. 63). That leaves a figure of 37,970 unaccounted for which must be retained in the ground.