

Fracking the Future:

The Temporal Portability of Frames in Political Contests

ABSTRACT

Despite scientific consensus on the need to rapidly decarbonize economic systems to limit global warming, the exploitation of fossil fuels continues unabated. This begs the question, why do we continue down this path? We argue that one reason is the way in which fossil fuel expansion is temporally framed. In this article, we examine the disputed development of hydraulic fracturing of shale gas ('fracking') in the UK. Through analysis of a series of public inquiries conducted by the UK Government we show how industry, government and NGOs have engaged in a framing contest in debating the future of fracking. The findings show how the framing of fossil fuel development was solidified over time through processes of certainty, simplicity and familiarity. We contribute by: (a) showing how actors mobilize temporality in constructing persuasive and actionable frames; (b) developing a theory of how frames gain temporal portability – a chronology between a dominant past and a recognized future; and (c) providing an alternative theory of short-termism in explaining the path leading us to a dangerous climate changed future.

Keywords: framing, framing contests, time, temporality, fracking, politics, climate change

INTRODUCTION

The development of ‘unconventional fossil fuels’ has become a central issue in the polarized political debate over climate change (Kitchen, 2014). The exploitation of tar sands, deep-water oil drilling and the hydraulic fracturing of shale and coal-seam gas (so-called fracking) illustrates the continued ingenuity in exploiting fossil fuel reserves, despite a clear scientific consensus that such developments threaten the future of a habitable climate (IPCC, 2013). Central to this debate over fossil fuels is temporality. While industry proponents champion new fossil fuel reserves and frame them as a short-term ‘bridge’ to a lower-carbon future (Levant, 2014), critics emphasize their long-term contribution to escalating greenhouse gas emissions (Klein, 2014). This contest is then not about whether we need to address climate change, but being successful in framing how and when.

Fracking epitomizes this debate. This technology has been rapidly adopted around the world matched by a corresponding grass-roots movement of resistance to it (de Rijke, 2013). As with other areas of climate politics, a vigorous political battle is being waged over fracking. On the one hand, industry and government frame ‘natural gas’ as essential to future energy security, jobs and economic growth. On the other hand, NGOs and grass-roots social movements argue that fracking results in environmental degradation and exacerbates climate change (Cotton, Rattle, & Van Alstine, 2014). The current era of climate politics is thus marked by claims and counter-claims of fossil fuel expansion and this contest is increasingly played out in the court of public opinion.

In this article, we explore the ways in which industry, government and NGOs engage in a framing contest in making fracking meaningful to broader constituents and seeking to win the public debate over fracking in the UK. Based on public hearings and reports, we identify the different frames used by these actors in informing the dispute and how these frames were solidified over time through processes of increasing certainty, simplicity, and familiarity.

Frame solidification made the frames portable in providing a chronology between a dominant past and a desired future. By reckoning with time, certain frames became more meaningful to act on.

We contribute to the management and organization studies (MOS) literature on temporality by discussing how actors mobilize temporality in framing contests (Granqvist & Gustafsson, 2016; Reinecke & Ansari, 2015), and to the framing literature by explaining how frames become convincing (Purdy, Ansari, & Gray, 2017; Werner & Cornelissen, 2014). In doing this, we develop the concept of temporal portability, which explains how frames connect chronological formats of pasts and futures. Temporal portability makes frames actionable and provides stepping-stones between depictions of familiar pasts and certain futures. The frames are thus performative and political in bringing about a particular future and reifying a singular past (Nyberg & Wright, 2016). Finally, we contribute to discussions of short-termism (Lavery, 1996) by explaining how the temporal span in decisions (short-term versus long-term) is influenced by the temporal portability of the framing of the issue. This addresses recent calls to further understand how temporality influences our inaction on climate change (Slawinski & Bansal, 2015; Slawinski, Pinkse, Busch, & Banerjee, 2017).

THE POLITICS OF FRAMING

Public contests over fossil fuel extraction and use are increasing across the globe. Against the context of a political agreement to limit global warming this century at a maximum of 2 degrees Celsius (McGlade & Ekins, 2015), proposals for new fossil fuel developments are encountering growing public resistance. The idea of a defined carbon budget to avoid dangerous climate change has resulted in a vibrant public campaign for fossil fuel divestment (Ayling & Gunningham, 2017). This opposition stands in marked contrast to proposals from the energy sector and national governments for the expansion of new fossil fuel projects. These represent

new theatres in the broader battle over fossil fuels, in which energy and resource corporations, governments and social movements seek to mobilize public support for and against their development (Nyberg, Spicer, & Wright, 2013).

Conceptually these conflicts can be viewed as ‘framing contests’ in which different social actors construct rival understandings of contested social phenomena and seek to mobilize support for their preferred ‘frame’ over rival ‘counter-frames’ (Benford & Snow, 2000; Kaplan, 2008). As Benford and Snow (2000, p. 614) argue, ‘[f]rames help to render events or occurrences meaningful and thereby function to organize experience and guide action’. Frames work both as an interpretative diagnosis of the situation and a ‘call to arms’ of what needs to be done (Polletta & Ho, 2006, p. 190). Collectively these frames ‘perform this interpretive function by simplifying and condensing aspects of the “world out there”’, with the intention of mobilizing ‘potential adherents and constituents, to garner bystander support, and to demobilize antagonists’ (Snow & Benford, 1988, p. 198). This support is galvanized through frame alignments, which aim at linking individual’s and group’s interests and values with those of the constructed frame (Polletta & Ho, 2006).

The framing perspective is particularly relevant in examining current conflicts over fossil fuel development in that rival social actors develop specific rhetorical accounts and public understandings of particular issues (Hoffman, 2015). For example, MacKay and Munro (2012) have studied the informational war between energy giant ExxonMobil and environmental NGO Greenpeace in promoting their conflicting visions of climate change and fossil fuel use. The framing contest for public opinion is seen as a campaign of ‘information warfare’ involving ‘ideologically infused ideas through information networks to promote an organization’s interest over those of its adversaries’ (2012, p. 1507). These conflicts represent a fight for public sentiment in which different visions or ‘frames’ of the future are promoted.

While these frames are socially constructed and negotiated (Cornelissen & Werner, 2014), there are limits to the plasticity of framing. In linguistically providing meaning to what is going on and what should be done, the frames cannot be pulled out of thin air. To win over others, the frames of a contested issue have to be meaningful and the reality construction needs significance. Following a processual understanding of framing suggests that frames are temporally situated in what is understood as a present ‘reality’ (Benford & Snow, 2000; Snow, 2008). Framing is thus anchored in time so the observed event can be ‘assembled, collated and packaged’ as *the* reality (Benford & Snow, 2000, p. 623). To be convincing, the frame needs to be supported by a dominant understanding of history and how people collectively project meaning to the future. To further situate framing contests in the context of time, the following section develops framing as a form of temporalizing meaning.

FRAMING AS TEMPORALIZING

There is an emerging interest in how the organization of time shapes sense-making processes (see e.g. Granqvist & Gustafsson, 2016; Kaplan & Orlikowski, 2013; Lord, Dinh, & Hoffman, 2015; Reinecke & Ansari, 2015). In this literature, there is a distinction made between *clock-oriented* and *process-oriented* time (Orlikowski & Yates, 2002). In summarizing the two perspectives, Reinecke and Ansari (2015, p. 621) make the distinction that clock time is ‘absolute, unitary, linear and mechanical’, while process time is ‘subjective, open, relative, organic and cyclical’.

Despite depicting time as a subject-object distinction, actors are seen as having the ability to construct, navigate and capitalize on these different time frames (Granqvist & Gustafsson, 2016). For example, Slawinski and Bansal (2012) show how different time frames influence responses to climate change. They found that corporations exhibiting a linear time perspective focused on immediate solutions and the removal of uncertainty, while corporations

with a cyclical time perspective invested in a broader range of activities in preparing for the future. Indeed, these time frames are often contested and conflicting. For instance, Reinecke and Ansari (2015) illustrate how actors can negotiate the competing time frames of linear clock-oriented time and process-oriented time frames. Moreover, the framing of events can be agent focused – with an emphasis on how actors purposefully shape how time is experienced (see e.g. Reinecke & Ansari, 2015), or worldview focused – with an emphasis on a reified time against which a community frames the nature of time (see e.g. Slawinski & Bansal, 2012). In both instances, time is a framing device to understand how the chronological flow of experience is understood by a community or shaped by certain actors.

The literature on temporal work has also moved beyond characterizing the passage of time – clock or process – towards examining how actors make sense of time (Schultz & Hernes, 2013) and employ these frames strategically (Kaplan & Orlikowski, 2013). These studies see actors as temporally embedded, where ‘past and future are seen as interwoven in the present’ (Hernes, Hendrup, & Schäffner, 2015, p.123). This is a process view of time that breaks with the idea of temporal linearity. Actors can reconstruct histories and direct attention to particular versions of the past (Hatch & Schultz, 2017) and multiple imaginings of the future (Kaplan & Orlikowski, 2013). For example, Schultz and Hernes’ (2013) study of the LEGO group shows how aspects of the past are used to articulate a desirable future. These approaches ground time as the foundation of existence and sense-making, with the past, present and future all rolled-in together (Hernes, Simpson, & Söderlund, 2013).

This latter temporal ontology proposes that the time frames commonly employed in MOS are not fundamentally contradictory; clock time and process time are two different and useful frames of reckoning with time, for example, according to clocks or cycles. These are the temporal practices we are thrown into and use to take into account events and experiences in everyday activities, but also to bring about a future. They are temporal frames to make sense

of our existence and illustrate the importance of temporality for framing events. Temporality is the opening for action (framing) by bringing the past and the future to bear on the present. Reckoning with time demonstrates how temporality frames our encounters with the world.

By building on this temporal ontological position, it is possible to account for how the world is meaningfully structured – how aspects of the world come to matter or are reckoned with. Time reckoning presupposes a right and wrong time to do something (Munn, 1992). An event or experience (past) is oriented towards a framing (present) in relation to what should be done (future). There are underlying logics of temporalization (Kockelman & Bernstein, 2012). Certain periods and measurements of time are privileged over others; we generally pay more attention to what happens next week over next decade, and we prefer to act on quantified time over non-quantified (e.g. seconds, minutes, hours over before, late, in a while). This does not suggest a linearity of time or temporal flow; rather, the ‘past’ and the ‘future’ are equally present in how we make sense of our existence. Through time, reckoning activities get a temporal purpose, which can support an explanation of why particular frames become more persuasive to act upon in the short-term (Lavery, 1996; Marginson & McAulay, 2008). The frames include preferable and privileged time reckonings, which makes them more meaningful to act on.

To conclude, a framing perspective helps to explain social contests by showing how frames align (Kaplan, 2008) or synchronize interests (Nyberg et al., 2013). However, the frames tend to be isolated from their temporal construction that make them meaningful to act on, and it has been argued that there has been limited attention to how framing is articulated in relation to time (Snow, 2008). As a result, there is scant research on how different actors frame the same event using temporal constructions of the past and the future to anchor competing frames (Snow, Vliegthart, & Corrigan-Brown, 2007). It is thus unclear how conflicting frames’ construction of pasts and futures are developed and prioritized in the present. In the

same vein, Cornelissen and Werner (2014) call for research exploring how frames are situated in time and addressing this forms the basis for our first question: *How is temporality constructed within framing contests?* In response to situating framing contests in time, we argue that temporality provides insights into how certain frames become privileged through reckoning with time. This leads to our second research question: *How do certain frames become more meaningful to act on?*

METHODS

Research context

This article draws on a study of the political contest over fracking in the UK between 2010 and 2015. Fracking is the process used to extract gas and oil from deep underground rock formations. This involves pumping large volumes of ‘fracturing fluid’ (water, sand and chemicals) at high pressure into boreholes drilled into geological shale formations to create fractures in the rock and enable the gas/oil to be extracted. While the production of shale gas has a long history, the innovation of combining horizontal drilling and hydraulic fracturing is more recent and enjoyed widespread adoption in the US from around 2003 (Howarth & Ingraffea, 2011). Early exploratory fracking in the UK was initiated by Cuadrilla Resources in 2010 at Preese Hall in Lancashire. Seismic activity from these operations led to a temporary halt and the emergence of an anti-fracking social movement utilising protests and occupations (Green, Styles, & Baptie, 2012). In response to these events the UK Government established a series of inquiries over the period 2010-2015 to determine the prospects, policy implications and risks with fracking (see Table 1).

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The first of the four inquiries was initiated on 24 November 2010 by the House of Commons (HoC), with the final report published in May 2011. The inquiry focused on ‘the

prospects of shale gas in the UK, the risks and hazards associated with shale gas, and the potential carbon footprint of large-scale shale gas extraction' (House of Commons, 2011a, p.5). Given the first inquiry's broad ambit, a second inquiry was held in 2012-2013 in an effort to provide more detailed appraisals of the amount of gas available for extraction, and the likely impact of shale for UK and world energy markets (House of Commons, 2013b).

The third inquiry was conducted by the House of Lords (HoL) Economic Affairs Committee during parliamentary session 2013-2014. This inquiry sought to respond to the widening public hostility to fracking and sought 'to stand back from the passion on both sides, and focus on the facts' (House of Lords, 2014a, p. 9), specifically, the potential economic impact of fracking on UK energy policy.

The fourth and final inquiry was conducted by the government's environmental audit committee in January 2015. In contrast to the three earlier inquiries, this inquiry focused on the environmental implications, specifically, 'the extent to which fracking would be consistent with the UK's climate change obligations...and the environmental risks' (House of Commons, 2015, p. 8).

After each inquiry, the UK Government provided a written response which over time became more explicit in its advocacy for shale gas development. This pro-fracking position became pronounced in January 2014 when Prime Minister David Cameron publicly declared, 'We're going all out for shale. It will mean more jobs and opportunities for people, and economic security for our country' (Watt, 2014).

Data collection and analysis

All four inquiries received extensive written and oral evidence from representatives from industry, government, NGOs, environmental groups and research/technical experts, providing a rich source of qualitative data for analysing the debate. Table 2 details the oral and written

testimonies submitted by each of these groups across the four inquiries and a categorisation of their evidence as supporting, opposing or expressing a neutral position to the development of fracking in the UK. In most cases, witness testimony indicated support or opposition for fracking, such as, ‘From day one when I arrived at DEFRA I stated that I am a very strong supporter of the extraction of shale gas’ (House of Lords, 2014b, p. 230); or ‘I object strongly to the government’s support of the fracking industry’ (HoC, 2015, Dianne Hogarth, WE, p.1). Testimonies that were dominantly technical or seemingly impartial were categorised as neutral.

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It was the political and public contest with opposing positions on fracking that led us to employ the concept of framing, since it ‘captures the processes by which actors influence the interpretation of reality among various audiences’ (Fiss & Hirsch, 2005, p.30) and highlights how issues are represented by political actors in attempts to advance their interests. Framing is seen as a tool to provide meaning and frame analysis aims to explain whether and how these meanings or interpretations become established (Purdy et al., 2017). In our frame analysis, we first analysed the four inquiries and associated texts (e.g. testimonies and submissions) by identifying different frames used to depict fracking. This initial analysis focused on how the issue of fracking was constructed and given coherence through unifying master frames that were central in the debate. The fragmented positions of different actors were linked together into a meaningful package, with a signifier, such as, ‘energy security’, ‘transition fuel’, ‘employment’ and ‘climate change’ deployed in the text. This process resulted in a list of common frames employed under each master frame by the different actors in the four inquiries. The analysis showed how each frame defined the problems addressed or identified with fracking (diagnostic), the solutions or tactics mobilized by the framing (prognostic), and the rationale (motivational), or call to arms, articulated in the framing (see Table 3) (Snow & Benford, 1988).

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This initial grounded frame analysis highlighted a) how the frames included references to both the past and the future, and b) the shift of symbolic references within the frames over time. It was these initial findings that focused our analysis on the temporal dimensions of framing. This abductive analytical process of interplay between the theory (framing) and our data led us to identify additional dimensions (temporality) that required further analysis and theorization (Timmermans & Tavory, 2012). Thus, we mobilized an inductive (data-driven) approach iteratively with a deductive (theory-driven) approach (Langley, 1999). The second and third step of our analysis subsequently attended to our research questions around (Q1) how temporality is constructed within framing contests, and (Q2) how certain frames become more meaningful to act on.

The second step in our empirical analysis addressed how the frames constructed temporality. In particular, the analysis focused on how the past and future were brought into existence in the texts. For example, how the frame articulations included a prioritized past of lessons from the USA and the imagined future of thousands of jobs. This established how fossil fuel development was promoted through temporal constructions, with certain frames becoming more portable by convincingly linking the present with a past and a future (see Table 4).

Finally, we focused on how the common frames in the inquiries were transformed over the four years. For example, the fracking opportunity shifted from an assessment that it ‘could be considerable’ (House of Commons, 2011a, p. 3), to a declaration of a certain ‘economic opportunity offered to the United Kingdom’ (House of Lords, 2014a, p. 5), and parliamentary concerns over climate implications moved from ‘[the need] to be cautious in its approach to natural gas as a transition fuel to a low carbon economy’ (House of Commons, 2011a, p. 3), to a view that fracking would make ‘a positive contribution to achievement of the UK’s

commitment on climate change’ (House of Lords, 2014a, p. 47). This analysis established how the frames were solidified through processes of certainty, familiarity and simplicity.

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FINDINGS

The sections below first establish the key frames developed within the UK contest over fracking. This is followed by the temporal constructions of the frames, i.e. how pasts and futures were enrolled into framings. The final findings section illustrates the processes through which the frames were solidified throughout the debate. The findings explain how the solidifications of frames provided them with temporal portability in portraying a chronological path supporting fracking.

Framing fracking

For proponents of fracking, two frames dominated from an early stage in the inquiries: energy costs and energy security. In terms of the former, a dominant rhetoric for proponents of fracking was that a new source of domestic supply would reduce demand for costly imported gas and result in lower energy prices. For example, Scotia Gas Networks, UK’s second largest gas distribution company, argued that if ‘the availability of the gas resources increase through the production of shale gas, wholesale prices could be reduced’ (House of Commons, 2011b, Ev w12). The solution to the frame, the prognostic, was fracking. However, this frame was also contested, with the Green Party arguing that the ‘cost of the processes involved in fracking, disposal of waste and of infrastructure, including new roads and treatment centres, will add to energy prices’ (House of Commons, 2011b, Ev w38).

By contrast, the ‘energy security’ frame identified energy dependence as the problem. This protectionist frame mobilized fracking through positive implications for the UK such as

reducing reliance on imported gas and the potential for the UK to become a key player in global energy markets. As the CEO of oil and gas company INEOS proclaimed: ‘We have the infrastructure that can allow us to continue to be an importer or—in a wonderful scenario—become an exporter again’ (House of Commons, 2013a, p. 41).

Over the course of the four inquiries a broader economic master frame became evident, framing fracking in terms of job creation and industrial development. For instance, the CEO of Cuadrilla argued that fracking offered a rosy future for employment suggesting the industry could support ‘thousands to tens of thousands of jobs’ (House of Commons, 2013a, p. 19). Within this economic framing, the industry presented itself as a key contributor to future economic well-being.

Beyond economics, the other dominant frame constructed by the industry around fracking was ‘climate change’. Rather than disputing climate change, industry and government proponents presented fracking as a solution by stressing the lower carbon emissions resulting from the combustion of shale gas (methane) in comparison to coal. The industry argued shale gas would pave the way to a low carbon future: ‘Increased use of gas... potentially lead to lower greenhouse gas emissions’ (House of Commons, 2011b, Ev w12). Indeed, fracking proponents often sought to combine these positive framings, neatly summarized in a submission by energy company Cuadrilla:

Cuadrilla believes that shale gas can offer a ‘triple win’ for governments, including the UK government, contributing to the three key policy objectives of (1) enhancing energy security, (2) lowering the cost and price volatility of energy to consumers and (3) reducing greenhouse gas emissions (House of Commons, 2011a, Ev 78).

Opponents of fracking also utilized some of the same frames in their arguments against shale gas. Climate change in particular was emphasized with the expansion of fracking seen as

distracting investment from renewable energy while at the same time contributing further greenhouse gas emissions at a time when radical decarbonisation was needed. For example, the Tyndall Centre argued that ‘if the UK Government is serious about avoiding dangerous climate change, the only safe place for shale gas remains in the ground’ (House of Commons, 2011a, Ev 86).

Beyond climate concerns, opponents to fracking also emphasized local environmental harm. As a memorandum from NGO WWF outlined:

There is evidence that there are a number of serious environmental and health risks associated with shale gas production the most serious of which is the potential for contamination of groundwater sources...Other notable environmental concerns include air pollution, spillage of hazardous substances, treatment and disposal of waste water, water consumption, well blowouts, noise and traffic (House of Commons, 2011a, Ev 100).

This framing was pronounced in the evidence of local environmental groups and became a dominant motif of anti-fracking submissions. This was particularly evident in the final inquiry, where the HoC Environmental Audit Committee focused specifically on the environmental risks of fracking and emphasised concerns over groundwater contamination, seismic impacts and rural industrialization. The significance of these risks were disputed by the industry, with proponents arguing that the ‘techniques have been used elsewhere for many years, both onshore and offshore, with strong safety and environmental record in the UK’ (House of Commons, 2011a, Ev 27).

Thus, both proponents and opponents of fracking used a number of master frames in seeking to make their case for and against fracking. These frames included the economic impact (energy costs, energy security, job creation, industry development), climate change (low carbon economy, carbon emissions, renewable energy), and local environmental harm (groundwater

contamination, seismic risk, rural industrialisation). However, in making sense of fracking through these frames, all parties temporally constructed their frames by retrieving pasts and anticipating futures.

Temporally constructing frames

In the political contest, proponents and opponents of fracking drew on central histories and imagined futures to strengthen different frames. As we set out in Table 4, these references to pasts and futures underpinned most of the frames utilized in the various inquiries. In employing the economic master frames, proponents drew heavily on past understandings of Britain's energy use and projected future fears and risks. For example, advocates of fracking emphasized a past in which British manufacturers had been exposed to high energy costs and, as North Sea oil and gas reserves declined, a growing dependence on imported gas from politically unstable regions such as the Middle East and Russia. This history of perceived energy crisis was contrasted with the recent past of the US, where a fracking boom was claimed to have dramatically reduced energy prices and driven an energy transformation. As the House of Lords Report summarized:

‘The shale gas revolution in the United States has illustrated the economic opportunity offered to the United Kingdom by its own shale gas resources - if they can be developed successfully.’ (House of Lords, 2014a, p. 5)

This comparative past provided the basis for setting out an imagined future of lower gas prices, energy independence and industrial rejuvenation. Moreover, the UK was seen as a future energy powerhouse. As the CEO of IGas Energy declared: ‘That gives rise to the opportunity to create a new onshore version of Aberdeen somewhere in the UK, probably in the north-west, which is a centre of excellence’ (House of Lords, 2014b, p. 87).

In terms of climate change, proponents argued the comparative past of the US fracking experience also offered lessons for the future of UK carbon emissions. As the CEO of Liberty Resources proclaimed, ‘fracking has also significantly reduced US CO₂ emissions. In fact, last year United States CO₂ emissions per capita were lower than they had been in any year since I was born’ (House of Lords, 2014b, p. 538). Based on this history, the same executive went on to argue a future in which ‘the use of natural gas extracted from shale reservoirs has significant scope to reduce the UK’s overall carbon emissions’ (House of Lords, 2014b, p. 519).

Fracking opponents also temporally constructed their frames through links to histories and futures. For instance, critics drew heavily on the comparative past of the US gas boom and vehement criticism that had emerged there in relation to groundwater contamination, water usage and seismic risk. For example, the UK Greens submission to the HoC Environmental Audit inquiry argued that:

There is increasing evidence from the US linking fracking-related activities to water contamination. The highly toxic chemicals associated with fracking operations makes leaks and spills even more troubling, and there is growing concern about high levels of naturally occurring radiation in wastewater (House of Commons, 2015, WE UK Greens).

While fracking advocates disputed the relevance of the US example in this context given what they claimed was a far more rigorous UK regulatory context, local environmental groups and farmers projected an alternative future of far-reaching environmental destruction if fracking went ahead.

However, the climate change frame proved less amenable to convincing temporal organization. By definition, climate change involves physical phenomena which lack a precedent of human experience. While fracking advocates could point to the past of the US in reducing carbon emissions through the shift from coal to gas, there was no dominant past to

anchor other aspects of the climate change frame around extreme weather events, droughts, floods and storms. Rather, much of the framing around climate change relied upon future projections of carbon budgets and modelling of possible renewable energy investment. This limited temporal formation made it easier for fracking advocates to dismiss and marginalize climate change framings.

Frame solidification throughout the contest

The respondents to the four inquiries and the UK Government temporally located their framing of fracking through references to dominant pasts and future projections. In this final empirical section, we show how these framings were solidified over the course of the four inquiries through processes of certainty, simplicity and familiarity. These processes of frame solidification made certain frames more temporally portable than others.

The first process of frame solidification involved the development of perceived *certainty* about the future of shale gas and its impact on the UK economy. For instance, while the first inquiry provided space for fracking proponents to proclaim the potential of shale gas as a future energy source, this initial framing lacked specificity. However, as the framing contest progressed through subsequent inquiries there was a shift from the presentation of the future as ‘uncertain’ to increasingly ‘certain’. Part of this involved quantification in which through assertion, the framing of economic impact could be based upon estimated volumes of gas that could be extracted, numbers of jobs that would be created, and amounts of money that would be generated in revenue. For example, in the second HoC inquiry, industry testimony was braver in claiming fracking’s potential to ensure energy security. In offering quantitative measures of gas reserves, the CEO of Cuadrilla offered a numbered estimate of the available gas and its energy security implications: ‘we have determined that there is of the order of 200 trillion cubic feet of resources—gas in place’, ‘...with the potential to supply up to a quarter’

of UK energy (House of Commons, 2013a, p. 18). The framing came with the motivational rationale of limiting gas imports: ‘Well, you will be aware that the UK is importing most of its gas and in 10, 20, 30 years’ time it will be importing all of its gas or virtually all of its gas. So there are benefits in security of supply’ (House of Commons, 2013a, p. 19). The future was now quantified in cubic feet and expanded in years.

In promoting certainty, fracking advocates (and to a lesser extent opponents) over time also emphasized *simplicity* in their messaging about fracking. This involved the continued repetition of particular themes and arguments that sought to reduce the complexity of issues and arguments and cut through the debate with a clear vision of what the future would look like. For instance, the solidification of pro-fracking frames was evident in how the industry and government in different media employed the same framing devices by, for example, making the frame urgent and real in ‘keeping the lights on’ (Energy and Utilities Alliance, House of Commons, 2013a, p.12; Edward Davey, Secretary of State, press release, 2014); citing the same quantification of ‘200 trillion cubic feet’ (Francis Egan, Cuadrilla CEO, House of Commons, 2013b, Ev18; Chris Hulme MP quoted in Daily Telegraph, 2011); and, redeeming a past in an ‘Aberdeen effect’ of fracking expertise (House of Lords, 2014a, p. 64; DECC press release, 2014). While fracking opponents also sought to use simplification in their framing such as emphasizing the local environmental issues and the need to keep shale gas ‘in the ground’, apart from the final Environmental Audit inquiry, these appeals seemed to lack the traction of the dominant economic framings set out by fracking proponents. Thus, in contrast to the complexity of climate change, the simple message linking the past energy industry with future electricity usage provided a temporal trajectory for the UK.

The third process of frame solidification, *familiarity*, built upon certainty and simplicity by reinforcing a projected future that was known, desirable and non-threatening; essentially a continuation of the present. The economic master frame proved particularly powerful given its

ideological power as a hegemonic justification for action. The process of familiarity began in the first inquiry where the assertion of the past use of fossil fuel energy was continued into a future. As the written submission of the Department of Energy and Climate Change argued:

‘...at the moment, our energy supplies come principally from oil and gas—they supply about three-quarters of our needs. We have to start where we are, and the plain fact is that we will still be using a lot of oil and gas in five or 10 years’ time’

(House of Commons, 2011b, p.70).

In subsequent inquiries the economic framing was reinforced by reference to the familiar issue of energy costs: ‘Are you opposed to the idea of cheaper energy? I think most people in this country would love to have cheaper energy’ (Lord Lawson in House of Lords, 2014b, p. 203).

By contrast, fracking opponents’ appeals to alternative renewable energy were interpreted as altogether unfamiliar and uncertain; ‘You are talking about technologies [renewables] that are a long way off being commercially viable’ (House of Commons, 2013a, p. 35). Indeed, apart from the final Environmental Audit inquiry, rival frames focusing on local environmental harm were dismissed by advocates and government ministers as fanciful myth-making. As the Secretary of State for Environment declared in his evidence to the HoL inquiry:

‘The opponents have been getting a lot of media and television coverage, they wear exciting clothes, they have exciting banners and easy slogans. I am afraid that a lot of their stuff has been misleading.’ (House of Lords, 2014b, p. 240).

In a similar manner, the climate change implications of fracking lacked a clear historical analogy and were seen as too remote a framing to bring to the present and justify limiting the industry’s expansion. As Lord Lawson proclaimed:

‘I understand where you are coming from on the question of global warming and all that, but of course what we do in this country is neither here nor there. It is a

global issue, and it depends on what is happening globally' (House of Lords, 2014b, p. 198).

Over the course of the inquiries, fracking was framed as a clear and present need, while climate change was viewed as an uncertain and distant concern of the future. Fracking was temporalized as urgent, a step towards mitigating possible future climate change, and with a clear temporal chronology. In contrast, critics were unable to provide a convincing frame of the future which overcame the normalized vision of fossil fuel extraction as central to economic well-being. Arguments against fracking based on the issue of climate change required altering temporal hierarchies, where futures beyond government and business cycles are prioritized and where environmental destruction is as readily quantified as profit projections. The industry and government certainty of the economic benefits of fracking thus stood in stark contrast to the evidence required for scientific projections of climate change.

TEMPORAL PORTABILITY

The findings above demonstrate how frames were solidified during the course of the inquiries by making the frames certain, simple and familiar. These aspects of frame solidifications reckoned with time by orienting the framing towards the past and the future in mobilizing action. In this section, we explain how the processes of solidification enclose the frames for temporal portability – a chronology is constructed that reaches both to a past and a future. Temporal portability makes the frame meaningful to act on in the present by aligning the frame with a dominant history and a favourable future.

First, certainty solidifies the frame by providing exact measurements, which increases the portability of the frame into both pasts and futures. By using exact measurements in pounds, years, cubic meters etc., the frame becomes taken for granted, which circumvents challenges and disputes (Gray, Purdy, & Ansari, 2015). The solidified frame can then appropriate other

temporal dimensions by, for example, transporting past fracking jobs in the US to future jobs in the UK, with nominated and quantified certainties more persuasive to act on.

Second, simplicity makes the frame more easily communicated. Catchphrases, such as 'keeping the light on', ensures that the frame becomes meaningful across temporal contexts. The public can relate to generally acceptable diagnostics of the problem requiring straightforward solutions. The frame thus becomes 'sticky' in that it resonates and accumulates value through repeated association. Simplicity creates shortcuts to a diagnosis by reducing the scope of the issue (Reinecke & Ansari, 2016). It solidifies the frame by allowing for repetition and avoids the problem of complex contingencies which make frames less portable.

Third, familiarity makes the frame publicly relatable and solidifies the frame by making it sharable within public discourse. With familiarity, the frame becomes central and recognized within an everyday understanding of an issue (Cornelissen, Holt, & Zundel, 2011). For example, the public familiarity of the master frame of 'economic impact' makes it more widely accepted and was not even questioned by the opponents to fracking. Familiarity for the public is a key feature in orienting a frame within a temporal span in that it enrolls a dominant past and a non-threatening future.

These interrelated three processes provide frame solidification, where the frame becomes stabilized and reified. The solidified frames include a quantified and linear temporality, which makes the frames temporally portable in constructing a path between a familiar past and a certain future. The framing supports a chronology that provides meaning and direction for action. For example, the economic master frame of fracking links a dominant interpretation of the past, where the UK was an energy power-house providing jobs and economic well-being, with a desired and similar future, where the UK can be energy independent and the fracking industry provides jobs and other economic benefits. The frame is

portable in that it provides convincing interpretations of both the past and the future, as well as providing a clear roadmap, a temporal span, between these constructed dimensions.

DISCUSSION

The four public inquiries into UK fracking represented a framing contest undertaken between proponents and opponents of fracking. We found three central frames in the public inquiries – economic impact, climate change and local environmental harm. Despite these different framings, it was clear that economic impact quickly won out as a preferred understanding for government as the arbiter of the future of fracking. We explained how the solidification processes – certainty, simplicity and familiarity – increase the temporal portability of the frames by providing a clear chronology between a dominant past and an imagined future (Q1). This makes the frames more meaningful to act on (Q2). Indeed, frame solidification provides actors in a framing contest with an advantage by making the frame more readily applicable to link the present with a ‘known’ future or/and past.

Contributions

We offer three theoretical contributions to further our understanding of the role of temporalization in framing contests. First, our study goes beyond how actors construct and navigate time (Granqvist & Gustafsson, 2016; Reinecke & Ansari, 2015), to show how frames gain temporal portability. We do this by moving beyond an objective-subjective distinction of time and focus instead how time is reckoned with. From this perspective, temporality is the foundation for practices that promote time as subjective or objective, real or ideal, and it is temporality that makes a frame meaningful to act on. In the present, we enrol central narrated pasts and act towards particular futures for mobilization in framing contests.

While previous research has found that certain temporal constructions are more meaningful to act on (Reinecke & Ansari, 2015), we explain how these constructions become actionable and why they are convincing. We thus contribute by analysing *how* actors mobilize temporality (Schultz & Hernes, 2013). The difference is thus not in the format (e.g. linear or cyclical) (Slawinski & Bansal, 2015) or direction (Lord et al., 2015) of time, but rather in how the construction is made sense of, or framed. Our findings suggest that there is a tendency toward levelling down to the lowest common denominator in reckoning with time. Immediate quantifiable gains are privileged over distant uncertainties. In framing contests, the ability to shape the temporality and locality of activities or consequences can afford actors significant advantages. Framing thus becomes the politics of interweaving and disrupting time in making pasts and futures support the present.

Second, we contribute to an understanding of framing contests by explaining how any theory of framing must contain, at least implicitly, a position on time. A frame is only meaningful in its temporal existence; a shared temporal belief makes the frame actionable (Granqvist & Gustafsson, 2016). Temporality provides the somewhat static framing literature with processual dynamics (Cornelissen & Werner, 2014). More specifically, temporalization of frames is required for mobilizing and rationalizing action. In our case, the solidification of frames made them temporally portable. This allows the frames to be linked with favoured or dominant understandings of the past as well as preferred or certain futures. For example, temporal portability was recently illustrated in the key frames employed in both the referendum on UK's withdrawal from the European Union and the last US presidential election: 'Take *back* control'; 'Make America great *again*' (emphasis added). In both instances, a certain, simple and familiar past was employed to project a desirable future.

While a number of possible frames exist in a framing contest, the portable aspects of a frame motivate action and provide convincing temporal guidance. Solidification supports

amplification of frames to be more widely acceptable and used (Gray et al., 2015). Our explanation of solidification processes further develops the vertically levelled micro-processes of framing by explaining how frames become actionable and thus can be amplified and enacted at an institutional level (Gray et al., 2015; Purdy et al., 2017). In our case, the framing of fracking provided justifications and possibilities for fracking. The path towards fracking was cleared in that the performativity of framing gave the future presence (Nyberg & Wright, 2016). In contrast, the communicated complexities of climate change makes it almost ‘unqualifiable’ (Callon, 2009, p. 542), with no existing framing able to embrace climate change in its entirety. Climate change denies a projected existence beyond current dominant master frames, where everything goes on as it has, albeit with small technological corrections and perhaps marginally less unsustainable lifestyles (Levy & Spicer, 2013).

Third, the concept of temporal portability offers a relative explanation of short-termism. Short-termism is generally understood as a decision ‘that is best for the short-term but suboptimal over the long-run’ (Laverty, 1996, p.826). This objective or clock-oriented time perspective offers an individual or organizational rationalist position, where time is measured in a unitary and linear way. In contrast, our position on temporality suggests that whether something is successfully framed as short-term or long-term is informed by the temporal portability of the frame. This offers an alternative explanation of how short-termism is linked to uncertainty avoidance in addressing climate change (Slawinski et al., 2017). The frame solidification of an issue compresses the temporal span (Bansal & Knox-Hayes, 2013). In our case, the fact that the development of renewable energy appeared more uncertain than fracking was not due to a worse prognosis or lack of information (Slawinski et al., 2017), but results from the greater temporal portability of the familiar economic fossil fuel frame over a rival low carbon renewable frame.

Implications for climate change action

Through the solidification processes of certainty, simplicity and familiarity, the debate around fracking levelled down towards the lowest common denominator in offering fracking as a continuation of the current socio-economic system. In framing contests, these processes promote nostalgia in clinging to the continuation of a favoured past in supporting current hegemonic economic interests. For example, it is notable that 93 per cent of government and industry submissions in the inquiries advocated for fracking (see Table 2 above). The dominant interpretation of the past was linked to popular economic interests and national identities in claiming to align the future expansion of fossil fuel with broader national interests (Levy & Spicer, 2013).

The advocates for fracking aligned their position with familiar and simple narratives in constructing certainty over the benefits of fracking. Temporal portability is present-making in providing a future to act upon and thus requires the exclusion of uncertainty (e.g. whether the industry is viable), complexity (e.g. whether fracking is possible within current environmental regulations), and unfamiliar ideologies and ideas that challenge the dominant understanding of society (e.g. de-growth). In arguing for expanding fossil fuels, the government and industry did not deny or seed doubt over climate change, they simply asserted their position on fracking with increasing certainty in constructing a reality supporting their position (Murray, Nyberg, & Rogers, 2016).

The temporal portability of the pro-fracking frame also points to the possibility of how alternative counter-frames can be made more convincing. Addressing constructed tensions between business and society/environment (Slawinski & Bansal, 2015) is then about levelling the playing field by improving framing qualities. This can be done in relation to climate change by, for example, quantifying emission targets at the lowest or most detailed level, reducing the timeframes for climate action, sharing and 'realizing' current experiences or analogies of

climate change, and linking climate change to what is seen as legitimate and immediate concerns. This has practical implications for challenging the dominant framings around fracking, and climate change more broadly, by either contesting the dominant frames or increasing the portability of competing frames. Here we suggest several possible strategies.

First, as we have seen, frames are solidified by constructing certainties and excluding uncertainties which might challenge justifications. This suggests that counter-framings need to hold dominant frames to account when jobs do not materialize, greenhouse gas emissions are not controlled, or when environmental harm becomes obvious (Gond, Barin Cruz, Raufflet, & Charron, 2016). Indeed, in promoting the expansion of fossil fuel development, the increasingly narrow frames employed in contests inevitably construct a temporal span that will surprise its predictions (Nyberg & Wright, 2016). This is well-illustrated by comparing the UK fracking debate with a similar debate that occurred in Québec (Gond et al., 2016). Despite a clear overlap in how fracking was framed in both locations, recognition of leaks in the majority of the shale gas wells in Québec seeped into the framing contest and challenged the narrow economic framing of fracking. It is these misfires and overflows of unpredicted events and excluded actors that can help to break our path-dependence on fossil fuels (Nyberg & Wright, 2016).

Second, challenging dominant frames can be combined with increasing the portability of competing frames. For instance, in opposing fossil fuel developments, environmental activists often emphasise local environmental harm because climate change is too distant and complex. However, the increasing physical manifestations of climate change (record-breaking heat waves, storms, fires, droughts and coral bleaching) now provide an increasing array of images and experiences around which new framings of our climate changed future can be communicated (Hoffman, 2015). For competing framings to provide a projected future which resonates requires quantification (e.g. environmental NGO 350.org), competing metrics (e.g.

the number of jobs in renewable energy), and illustrations of current effects producing local and societal framings (rather than amorphous global projections) around climate change. The key is to project the current possibilities of existence to a future of lower emissions targets, new forms of energy supply, and different values (e.g. environmental rather than economic).

CONCLUSION

We are currently living in an era of ‘creative self-destruction’ in which corporations search out ever more imaginative ways to exploit the Earth’s natural resources (Wright & Nyberg, 2015). Despite the scientific consensus that the continued use of fossil fuels will tip the world into an era of catastrophic climate change (IPCC, 2013), the world’s major economies appear committed to double down on the bet through the development of deep-water and Arctic oil drilling, tar sands extraction, mountain-top coal mining, and coal and shale gas fracking (Kitchen, 2014; Klein, 2014). And so, one of the most important questions we can ask ourselves is, why do we continue down this self-destructive path?

As we have demonstrated in this article, one of the key reasons for our continued adherence to fossil fuels is the way in which these energy sources provide a clear direction or chronology within the political debate. Framing of these new developments around understandings of ‘growth’, ‘jobs’, ‘standards of living’ and ‘energy security’ play to existing hegemonic understandings of what it means to be human in the developed world. For corporations and governments promoting fossil fuel expansion, this economic framing provides a powerful link with taken-for-granted understandings of contemporary life. Most importantly, it is a framing that brings an imagined twenty-first century future which is desirable and familiar to the immediate present; it is thus instantly temporally portable.

By contrast, ‘climate change’ as a framing around new fossil fuel developments is altogether unfamiliar. Scientific projections of future climate change in which large tracts of

the Earth are rendered uninhabitable, the collapse of global food production, the acidification of the oceans, substantial sea-level rise and storms and droughts of growing intensity – a literal hell on Earth – are unimaginable (Hansen, 2009). They project not only generalized global changes but are also extremely difficult to locate in the present. Climate change thus challenges our everyday assumptions of easily accessible energy, instant global communications and travel, and a comfortable, affluent lifestyle. ‘Climate change’ as a framing is indeed foreign to our very sense of being.

Table 1 UK parliamentary inquiries into shale gas fracking

Inquiry 1: House of Commons Energy and Climate Change Committee Inquiry into Shale Gas. (HoC 2011)

- Commenced November 2010
- 36 witnesses; 151 pages of written and oral testimony
- Inquiry report published May 2011
- Government response published July 2011

Inquiry 2: House of Commons Energy and Climate Change Committee Inquiry into the Impact of Shale Gas on Energy Markets. (HoC 2013)

- Commenced September 2012
- 52 witnesses; 193 pages of written and oral testimony
- Inquiry report published April 2013
- Government response published July 2013

Inquiry 3: House of Lords Economic Affairs Committee Inquiry into the Economic Impact on UK Energy Policy of Shale Gas and Oil. (HoL 2014)

- Commenced September 2013
- 83 witnesses; 540 pages of written and oral testimony
- Inquiry report published May 2014
- Government response published June 2014

Inquiry 4: House of Commons Environmental Audit Committee Inquiry into the Environmental Risks of Fracking. (HoC 2015)

- Commenced December 2014
- 76 witnesses; 361 pages of written and oral testimony
- Inquiry report published January 2015
- Government response published March 2015

Table 2: Summary of witnesses in UK parliamentary inquiries into fracking

	Oral and written evidence		
	For	Against	Neutral
<i>House of Commons (2011)</i>			
Corporations & industry	11	2	0
Government and politicians	6	0	1
NGOs and local environmental groups	0	4	1
Research and technical groups	7	2	3
<i>House of Commons (2013)</i>			
Corporations & industry	27	0	2
Government and politicians	5	0	0
NGOs and local environmental groups	0	5	0
Research and technical groups	7	3	2
<i>House of Lords (2014)</i>			
Corporations & industry	24	1	0
Government and politicians	16	0	0
NGOs and local environmental groups	0	8	0
Research and technical groups	22	5	8
<i>House of Commons (2015)</i>			
Corporations & industry	8	0	0
Government and politicians	4	1	1
NGOs and local environmental groups	0	42	1
Research and technical groups	4	7	11
TOTAL	141	80	30

Table 3: Frame analysis of UK parliamentary inquiries into fracking

Framing	Indicative example (proponents)	Indicative example (opponents)
<i>Economic impact</i>		
energy prices	‘...if the abundance of shale gas worldwide turns out to be as some people expect, that the gas price generally might become significantly lower.’ (House of Commons, 2011a, Ev 51).	‘... the most likely outcome will be a continued high dependency on imports and continued reliance on high gas prices’ (WWF-UK, House of Lords, 2014b, p. 207).
energy security	‘It would reduce imports and help maintain security of supply. This would be especially valuable given the continuing fall in output from the North Sea and Europe’s reliance on Russia, its biggest gas supplier, highlighted by the crisis in Ukraine.’ (House of Lords, 2014a, p. 5).	‘...a scenario which focused on demand reduction and renewables rather than shale would lead to a lower level of gas imports’ (Friends of the Earth, House of Commons, 2015).
employment	‘...there is a benefit in terms of jobs and skills too, which should not be underestimated.’ (John Hayes MP, House of Commons, 2013b, Ev59)	‘...compared to a dash for gas generation strategy, policies enabling a continued deployment of offshore wind farms in the UK to 2030 would...create 70,000 more jobs’ (Greenpeace, House of Commons, 2015).
industrial development	‘...the potential opportunity in the North West of England for local communities to replicate the “Aberdeen effect” and develop a local onshore gas and oil exploration and production expertise which could lead the development of these industries elsewhere in the UK and across Europe’ (Cuadrilla, House of Lords, 2014b, p. 65).	
<i>Climate change</i>		
low carbon economy	‘This [shale gas extraction] will of course be in a way that is completely compatible with our legally binding climate change targets’ (Defra, House of Commons, 2015, p. 3).	‘...allowing unchecked shale gas exploration could leave the UK economy over-dependent on fossil fuel extraction and over-exposed to the economic impacts on the fossil fuel industry of global action to tackle climate change’ (FotE, Greenpeace, WWF, House of Lords, 2014b, p. 183).

carbon emissions	‘The use of natural gas extracted from shale reservoirs has significant scope to reduce the UK’s overall carbon emissions’ (CEO of Liberty Resources, House of Lords, 2014b, p. 519).	‘So my concerns around the expansion of shale gas are similar to concerns around the expansion of any new fossil fuel resources - that we would be adding to the total burden that we place on the atmosphere and on the climate system’ (Dr Broderick, House of Commons, 2015, p. 3).
renewable energy	‘Natural gas should play a supporting role in the development of a low-carbon power sector, by providing essential backup for intermittent supply from renewables’ (Grantham Reserach Institute, House of Lords, 2014b, p.49).	‘I think the most likely impact will be that energy efficiency and low-carbon generation will be displaced’ (WWF-UK, House of Lords, 2014b, p. 206).

Local environmental harm

groundwater contamination	‘Where there have been problems...they have been to do with the poor sealing of the well nearer the surface...It is our responsibility to ensure that those regulations are properly applied’(Environment Agency, House of Lords, 2014b, p. 122).	‘It is clear that there are significant risks of pollution of water sources and of methane getting into water supplies’ (Martin Quick, House of Commons, 2011b, Ev w7).
water resources	‘I think there is a development also in America to recycle the water, to keep it in a closed loop’ (British Geological Survey, House of Commons, 2013b, Ev7).	‘Vast quantities of water will be used in fracking, typically 22 million litres per well’ (Frack Free Balcombe Residents, House of Commons, 2015).
seismic risk	‘We have an earthquake somewhere in Britain, I read, every day. It is a very modest one and probably has the same drama in someone’s house as a bus going past.’ (Owen Paterson MP, House of Lords, 2014b, p. 231).	‘...drilling is unpredictable, and the faults in the geology in Lancashire make it completely unsuitable for this sort of activity.’ (Residents' Action on Fylde Fracking, House of Lords, 2014b, pp., p. 317).
rural industrialisation	‘The actual visual impairment arising from these wells is pretty minimal.’ (Sir David King, House of Lords, 2014b, p. 360).	‘shale gas production is clearly likely to be highly disruptive to local communities and have a negative impact on local roads, buildings adjacent to access roads, noise levels and air quality.’ (WWF-UK, House of Commons, 2011a, Ev 105).

Table 4: Situating contested frames in time

Framing	Past (indicative example)	Future (indicative example)
<i>Economic impact</i>		
energy prices	‘The evidence from USA is that shale gas has reduced dramatically gas prices thus reducing energy costs’ (Durham Energy Institute, House of Lords, 2014b, p. 126).	‘...abundant new shale gas supplies are bound to have a restraining effect on prices’ (House of Lords, 2014a, p. 5).
energy security	‘Given the decline in Britain’s reserves of gas from the North Sea and increasing dependence on imported gas in the form of LNG from Qatar and pipeline gas from Russia and Norway the debate should really focus on not whether or not the UK will need gas but rather where will that gas be sourced from.’ (Cuadrilla, House of Lords, 2014b, p.65).	‘Fossil fuel back up and continuing dependence on fossil fuels for the medium term are inevitable.’ (Greystar, House of Commons, 2013a, Ev w30).
employment	‘We need only look at how Aberdeen has fared during the past 20 or 30 years as part of the offshore industry’ (CEO, UK Onshore Operators Group House of Lords, 2014b, p. 219).	‘It is estimated that...74,000 jobs could be supported across the industry and its supply chain’ (Centrica, House of Lords, 2014b, p. 54).
industrial development	‘I would point out the history of shale gas has been one of continuous improvement in the economics and how much is produced, and so on.’ Nick Grealy, HoC, 2011, Oral Evidence, Ev31	‘...it has the opportunity to create service centres for other European—and there have already been companies approaching Cuadrilla and Lancashire County Council discussing the possibility about setting up service industries based out of Lancashire for shale.’ (CEO, Cuadrilla, House of Commons, 2013b, Ev19).
<i>Climate change</i>		
low carbon economy		‘[shale gas] could form part of our energy mix as we make the transition to low-carbon sources.’ (INEOS, House of Commons, 2015, Ev w5).

carbon emissions	‘Gas is generally considered a “clean fuel” as a result of having lower carbon emissions than other solid and liquid fuels when combusted.’ (Scotia Gas Networks, House of Commons, 2011b, Ev w11).	‘Climate change as one of the greatest threats to our global economy over the decades ahead’, (Friends of the Earth, House of Lords, 2014b, p. 208).
renewable energy		‘The renewable energy industry can be expanded instead and investing in switching to this, rather than unconventional hydrocarbon extraction, can provide a large part of our future energy needs.’ (House of Commons, 2011b, Ev w38).
<i>Local environmental harm</i>		
groundwater contamination	‘There have been rare instances of shale gas extraction causing methane leakage in the USA.’ (INEOS, House of Commons, 2015, Ev w2).	‘Concerns that have been raised around water and air contamination and seismicity can all be managed by strong regulation and industry best practice.’ (Cuadrilla, House of Lords, 2014b, p. 64).
water resources		‘Fracking itself requires considerable quantities of water and could pose localised risks to water supplies if catchments were over-abstracted or water supplies were stressed already.’ (House of Commons, 2015, p. 22).
seismic risk	‘Of the hundreds of thousands of hydraulic fracturing treatments completed around the world, we are aware of only a handful examples of felt seismicity’ (Dr James Verdon and Professor Michael Kendall, House of Commons, 2015)	‘...drilling is unpredictable, and the faults in the geology in Lancashire make it completely unsuitable for this sort of activity’ (Residents' Action on Fylde Fracking, House of Lords, 2014b, p. 317)
rural industrialisation	‘During drilling, they exceeded noise limits, disturbing our sleep. We had to buy our own sound testing equipment before they admitted infringing the limits.’ (Frack Free Balcombe, House of Lords, 2014b, p. 175).	‘Kent’s economy relies on its agriculture and tourism. We know that fracking would cause large scale industrialisation of our landscape, and a large increase in road traffic.’ (Caroline Raffan, House of Commons, 2015).

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