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Original research article

"We don't want to be the bad guys": Oil industry's sensemaking of the sustainability transition paradox

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ABSTRACT

The operating model of the global oil industry is not compatible with the goals of the Paris Agreement. For the industry, there is a fundamental tension between two competing mandates: the pressure to contribute to the social goal of climate change mitigation, and the need to perform financially and meet obligations to shareholders in activities that directly contribute to climate change. To explore the range of responses to the tension, we interview professionals from large international oil companies who work or have worked in climate related roles. This is novel data from a professional group that has not previously been interviewed in depth about climate change. We develop a framework of six archetypical responses to tension within the oil industry. Examples of strategic responses include accepting the paradox to choose priorities other than climate change mitigation and confronting the paradox to demand changes to the way the oil industry operates. Examples of defensive responses include the transfer of responsibility and projection of tension to other stakeholders. Responses calling for change in the oil industry are the most common among people who have left the industry and the least common for participants from companies headquartered outside of Europe. In a field marked by controversies and value-based debates, a better understanding of the views of people working on the energy transition inside the oil industry provides new insight into the discussion about possible routes to the sustainability transition.

1. Introduction

To avoid disastrous climate change, humanity needs to emit less carbon dioxide (CO_2) into the atmosphere [1]. Meeting globally agreed climate change mitigation goals requires rapid reductions in our reliance on fossil fuels [2] and a large-scale transition to a low-carbon energy system [3]. This means substantial changes to the way the global oil industry operates [4].

The activities of the oil industry have significantly contributed to climate change [5]. Evidence shows that large oil companies have lobbied governments against emission regulation and confounded public discussion around the science of anthropogenic climate change while continuing to profit from polluting activities [6]. Climate activists routinely call for the shutdown of the industry and 'keeping it in the ground' [7]. On the other hand, some commentators take the perspective that oil companies can be a positive force in the transition [8]. In recent years, some oil companies, especially international ones headquartered in Europe, have made public statements about wanting to move away from the most polluting sources of production and taken steps to e.g. invest in clean energy [9].

From the perspective of the oil industry, a clear tension lies at the heart of these discussions. Companies are presented with two competing mandates: on the one hand, the societal pressure to contribute to climate change mitigation, and on the other, financial pressure to perform for shareholders via activities that directly and significantly contribute to climate change.

The future of the oil industry and other incumbents in the energy transition is a relatively new entrant into the academic field of systems transitions analysis. The transition literature concerns the way societal systems might change to become more sustainable [10]; however, crucial questions remain around the potential for incumbents to hinder a transition, or aid one, and the potential dynamics of declining industries [11]. Research about the oil industry, even when explicitly related to sustainability, often focuses on actions oil companies can undertake to improve the sustainability of their operations (see e.g. [12]) rather than their potential role in the wider sustainable energy transition. Recent literature has begun to explore the oil industry from the transition perspective [9,13–16], but much is yet to be understood, especially since

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the high carbon emissions of the oil industry give it a deciding role in the success of climate change mitigation [17].

We present the results of an exploratory case study of the global oil industry in the energy transition. This study brings together transition research and organisational studies to derive insights on how people working in energy transition roles within the oil industry interpret the deep contradiction between sustainability and the business they are in. We ask: 'How do professionals working in the intersection of the oil industry and climate change respond to the paradoxical tension between the oil industry business model and the social goal of climate change mitigation?' This question leads to the following research objectives:

1. To explore the range of attitudes of oil industry professionals with climate change expertise towards the paradoxical tension
2. To develop a framework of archetypical responses to tension drawn from the interviews
3. To explore the reasoning behind different responses as well as differences and similarities between participants

These objectives are addressed with novel data from a professional group that has not previously been interviewed in depth about climate change. The overarching aim is to spell out the archetypical arguments used by the professionals so they can be recognised and evaluated as they appear in personal and public discourse. In a field marked by controversies and value-based debates, we hope that a better understanding of the views of people working on the energy transition inside the oil industry can provide new insight into the discussion about possible routes to the sustainability transition.

The remainder of this paper is structured as follows. Section 2 presents the background on transition research, organisation studies, and the relation of the present study to literature. Section 3 describes the methods. In Section 4, the results of the study are presented using a novel analytical framework. Conclusions are drawn in Section 5.

2. Background

This study builds on the following strands of literature: oil industry attitudes and rhetoric around climate change, system transitions and the role of incumbents, the contradictions between business and sustainability, and the concepts of paradox, tension, and sensemaking in organisation research.

2.1. Oil industry attitudes and rhetoric around climate change

This study contributes to an existing body of literature on the oil industry and climate change. Previous work has examined the attitudes of oil industry experts on climate change [18], the response of oil industry employees to corporate sustainability initiatives [19], and the visions of climate futures in oil industry settings [20]. Here, the focus is more sharply on the implications of climate change for the oil industry.

A related strand of literature has examined how climate-related arguments are presented in the official communications of oil companies. Grasso [21] examines how the destructive actions and communications of international oil companies lead to moral responsibility to act on climate change. Nasiritousi [22] highlights how large oil companies engage with climate issues through activities ranging from advocacy of specific policy solutions to casting doubt on climate science and the feasibility of climate goals. Supran and Oreskes focus on the latter point, specifically how ExxonMobil's public messaging has emphasised uncertainty and advocated for delayed climate change action [23,24]. Similarly, Ihlen [25] analyses the rhetoric of the Norwegian oil industry in aiming to pass off oil production as sustainable, concluding that the industry is 'overselling its green credentials'. McKie [26] analyses the 'neutralization techniques' used by organisations aiming to prevent or slow down climate action by spreading uncertainty and climate denial. Although not related specifically to the oil industry, the categorisation of 'discourses of climate delay' in public discussion around climate change by Lamb et al. [27] is also highly relevant.

All these studies focus on the actions and rhetoric of companies. This paper complements them by exploring personal perspectives enabled by anonymised in-depth interviews. Where clear connections can be drawn between the company and individual-level analyses, these are pointed out in Section 4.

2.2. Sustainability transition and the role of incumbents

A rich literature exists on sustainability transitions [10]. The term refers to large-scale shifts in socio-technical systems [28] contributing to increased alignment with sustainability goals such as the climate change mitigation goals set out in the Paris Agreement and the Sustainable Development Goals [29]. While the broadest definition of 'energy transition' is a change in the energy system [30], contemporary definitions often consider changes in energy technologies and fuels which are 'accompanied by widespread social, economic, and political transformations' [31].

While sustainability transition research has traditionally focused mostly on innovation processes and the rise of new technologies and industries, there is also research on the possible roles of incumbent business actors during periods of transition [10,32–36]. In a case study of the car industry, for example, Berggren et al. [37] find that incumbents can make both positive and negative contributions to the sustainability transition. Markard [38] has argued that the next phase of the energy transition is about generating major changes in existing systems rather than establishing the viability of new technologies, and therefore calls for more research about the possible dynamics of industrial decline as old, polluting industries give way to more sustainable alternatives. One such dynamic is 'regime destabilisation', which leads to the decline of an incumbent industry, and is studied through case studies of e.g. the British coal industry [39] and the Swedish pulp and paper industry [40]. The oil and gas industry is an example of an extremely powerful regime with potential to both aid and hinder the transition, and as such deserves attention in the same context.

There is debate in the literature about whether incumbents can or should be part of the energy transition. Much of the literature about the oil industry in the energy transition (see e.g. [9,14,41]) focuses on ways in which the industry could play a productive part in the transition, implicitly assuming that today's economic structures will continue in the transition and oil companies have a chance to retain their power. On the other hand, Newell et al. [42] argue that the fossil fuel industry should not be an active participant in the transition, as this will further entrench existing inequalities. The relevance of the two positions to the interview responses is discussed in Section 4.

2.3. Contradictions between business and sustainability

The contradiction between the profit-seeking goals of capitalism and the need to preserve the environment has a long history in social science. Two broad approaches to the issue emerge from environmental sociology: ecological modernisation and critical political economy [43]. Ecological modernisation, which underlies prominent ideas about company-driven sustainability transitions, argues that environmental goals can be met within the framework of modern capitalism if institutions become more aware of ecological concerns and begin addressing them [44,45]. Critics argue that mentions of ecological concern are not enough unless followed by tangible environmental improvements, of which there seems to be little evidence in the modern society [46].

An alternative view stating that the capitalist industrial society is fundamentally incompatible with environmental preservation is expressed across many strands of critical political economy literature, such as the 'treadmill' school [47], neoMarxism [48], and scholarship around unequal ecological exchange [49]. Newell [50] writes of this

structural contradiction that a sustainability transition requires a 'fundamental re-structuring of an economy' that goes 'beyond glib statements about "green growth" and "win-win solutions" to the climate crisis'. Such a restructuring would leave little room for today's oil companies to continue their business.

Determining which of the two approaches is correct lies outside the scope of this study. The responses of the interviewees are, however, examined in the context that they tend to take existing economic structures for granted, which is not uncontroversial across political economy literature.

2.4. Paradox and tension in organisation research

To explore the possible parts the oil industry may play in the energy transition, this study makes use of concepts from organisation and management research. Such research has mostly been applied to sustainability topics through the concept of corporate sustainability, which refers to ways in which companies integrate environmental and social concerns into their activities [51] through changes that are more incremental than what would be required for a full sustainability transition.

In the context of organisation studies, a paradox is a combination of simultaneously existing elements, features or situations which make sense in isolation but appear contradictory when juxtaposed [52]. The word tension is often used in literature to denote this contradictory situation as well as the feelings of people confronted with the paradox [53]. Paradoxes and tensions are frequently identified in business and management research [54], and paradox has become a prevalent research framing for studying organisations [53].

The paradox research framing focuses on understanding individual and organisational responses to paradoxes and tensions [55]. The first responses to paradoxes are often defensive, 'clinging to past understandings' to temporarily dampen the tension felt by the respondents for example through denial or projection [52]. Responses to paradox can also be strategic, aiming to engage with the contradictory elements of the situation rather than avoid them [55]. Strategic responses to paradox may lead to new, more creative and long-term approaches to the business situations as organisations and individuals either learn to live with the paradox or reach a resolution between the contradictory elements [56,57].

The concepts of paradox and tension have been found to be useful in corporate sustainability research. The most fundamental tension in corporate sustainability is between the creation of private value for the company and shared value for society [58]. Other relevant tensions are between what individuals want and what the organisation advocates for, and between desire for sustainability and actual unsustainable consumer behaviour [59]. A paradox-oriented frame of mind can help managers navigate the complexity and interconnectedness of sustainability concerns in the context of business [60,61].

The paradox framing has not yet been widely used to study businesses in the sustainability transition, even though it seems well suited to describe the contradicting demands on many incumbents. Iivonen [62], for example, describes a 'strategic sustainability paradox perceived to exist between [...] core business and a social goal' in a study of how Coca-Cola deals with the social problem of obesity to which its products contribute. A similar strategic paradox exists between the oil industry's core business model and the social goal of climate change mitigation.

2.5. Sensemaking in the face of paradox

Sensemaking is the process by which a person comprehends a circumstance explicitly in words that can lead to action on that circumstance [63]. The process is an ongoing cycle of noticing and selecting certain elements of one's experience, interpreting or assigning meaning to these elements, and acting on the basis of the assigned meanings [64]. Sensemaking is widely used as a research framing for studying organisational adaptation and change [65].

In the context of this study, the concept of sensemaking is useful for understanding how people in businesses understand sustainability and transition topics and how these insights may lead to action and change in the organisation. Previous studies have explored how middle managers deal with the contradicting demands of profit-making and social purpose [66], how sustainability sensemaking leads to the embedding of new practices in a company [67], and how higher education leaders make sense of the sustainability transition and their role in it [68].

3. Methods

3.1. Methodological background

This study focuses on the perspective of employees with experience of working in international oil companies (IOCs). While these companies account for only a small part of the remaining global oil reserves [69], in the energy transition they could have a role as trailblazers indicating a possible course for the whole industry. This is because they have often been ahead of other industry actors in engagement with climate issues [70] (despite having also contributed significantly to climate change denial and other harms to society [21,24]).

Data is collected in interviews with people from the oil industry, a group not often accessible for academic research on climate and sustainability. The research is inductive: themes emerging from the collected data are identified with the aim of mapping them onto a theoretical framework around the concepts of sensemaking and tension [71] (pp. 154–155). This approach is considered appropriate for studying a topic that is relatively novel and lacks a substantial theoretical research base. Rigor in qualitative research is ensured by applying the method consistently and being explicit about the limitations of the research [72] – see Section 3.4. The research is also exploratory. As opposed to research that is descriptive, explanatory, or evaluative, it asks open questions about an area of inquiry that is not well understood, and the aim is to clarify the nature of an issue and open up avenues for further research [71] (pp. 186–187).

Sensemaking in the face of paradox is used as the theoretical background for structuring the data and understanding the strands of argumentation expressed by the interviewed oil industry employees. A benefit of this framework is that it avoids antagonising any side of the discussion of climate change and the future of the oil industry, which is by its nature emotive and can easily draw people into different 'camps'.

3.2. Data collection

Data was obtained through semi-structured interviews guided by a predetermined list of themes and key questions. The strength of this approach for inductive theory development is that it allows for themes and patterns to emerge organically based on the specific experience and interpretations of the research participants [71] (pp. 437–438). The flexible structure of the interviews combined with the fully anonymous setting allowed for in-depth discussions of personal views going beyond corporate messaging or other publicly available information.

The interviewees for the study comprised of 12 people working in the intersection of climate change and the oil industry. The relatively small sample size is considered appropriate for gaining an in-depth understanding of the specific participants' attitudes and experiences in detail [73]. Since the research focuses on personal experiences and views, full knowledge saturation [74] is unlikely to be possible. Rather, the aim was for the number of research participants to be sufficient to obtain a range of different perspectives while also identifying some similarities between interviewees.

All interview participants either currently work or have previously worked at large international oil companies. The sample includes eight current and two retired employees of the oil industry as well as two who have left the industry to pursue careers in climate change mitigation. All

participants have significant knowledge of and professional exposure to climate change and sustainability topics. This group was chosen because it is likely to be especially aware of the tensions that are the main subject of this study. All interviews were held on the condition of anonymity, so participants or the companies they work or worked for cannot be named on ethical grounds.

The interviewees were recruited by extending invitations to a wide group meeting the participant criteria, as an example of purposive sampling of a homogenous group [71] (pp. 321–322). Further interviewees were recruited through a 'snowball' approach by which interviewees were asked to identify and recommend further interviewees with knowledge and experience of the research topics [71] (p. 323).

Interviews were carried out in person and via online video conference between July 2021 and January 2022 and lasted between 25 and 56 min (median length 35 min). Interview guides (see Appendix 1) were used to steer the discussions, but the interviews were allowed to proceed organically based on the interviewees' interests and priorities. The interview guide was evaluated periodically between interviews and adapted to reflect any lessons learned. The interviews were recorded and transcribed except in the case of one interviewee who did not give permission for recording. In this case, detailed notes were taken during the interview.

3.3. Data analysis

Thematic analysis of the data was carried out to explore the interviewees' attitudes to key concepts and themes [71] (pp. 651–652). The main method is discourse analysis [75]. Interview transcripts were analysed using the computer-assisted qualitative data analysis software NVivo [76]. The data was coded to find elements that give evidence of different responses to the main underlying tension between the needs to mitigate climate change and maintain the financial health and business continuity of oil and gas companies under their traditional business models. This led to the identification of six *archetypical responses to tension*, presented in Fig. 1. The framework was developed by mapping different groups of responses evident in the interviews to the theoretical descriptions of different paradox responses given by e.g. Lewis [52] and Lewis and Smith [55]. The response archetypes are explained in Section 4.

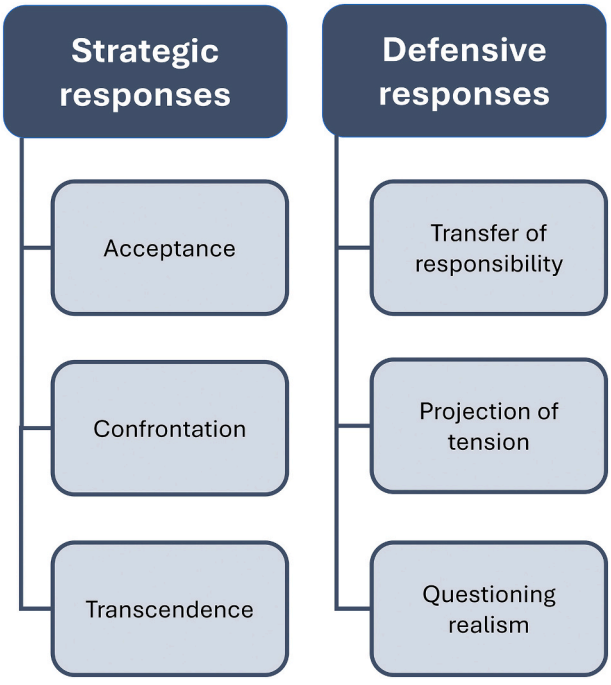

Fig. 1. Archetypical responses to tension emerging from interview data. Descriptions and examples of each response are given at the start of each results sub-section.

Each interview demonstrated elements of several different responses. The aim of this research is not to comment on what views any specific individual or organisation may hold, but to use responses emerging from the interviews as indications of the patterns of thinking and arguments that exist in the organisations.

3.4. Contextualising responses to company culture

Oil company employees are influenced by the context of the companies in which they work or have worked. There is generally a strong link between individuals and organisations through organisational culture, which sets norms that 'can act as a social control system in organisations' [77] as organisational values impact the ways in which members make sense of and respond to situations [78]. It is also known that different companies included in this study have different cultures and approaches to climate change [21]. Hence, it is important to contextualise participants' responses to the corporate cultural environments to which they have been exposed.

To this end, we divide interview participants into three groups: current employees of European oil companies ('European'), current employees of non-European oil companies ('RoW' for Rest of World), and those who have left the industry due to career change or retirement ('Leavers'). All Leavers used to work for European oil companies. For each group, we studied the frequency of responses linked to different archetypes as well as the general quality of responses within the groups. Based on literature, the European group is expected to display views that are more in support of climate change mitigation than RoW [21]. It also seems reasonable to expect that people who have left the oil industry would be more critical of its actions that current employees, although the authors are not aware of any previous studies on the topic.

3.5. Limitations

The small sample size of this study does not allow for statistical analysis about the population of oil industry employees, but establishes empirical novelty through the provision of novel qualitative data from an elite group [72]. The limited availability of academic literature on the topic of the study has led to the interviews being exploratory, with the framework developed and refined over the course of the research project rather than rigorously tested with each interviewee. Below, we discuss three more nuanced limitations of the method.

Firstly, picking out parts of interview data that suggest specific archetypical responses to tension runs the risk of misrepresenting the views of the interview participants. Sensemaking is an ongoing process in which interpretations of circumstances are revised in a continuous loop of observation, interpretation, and action [64]. Hence, each interviewee is unlikely to have any single response or point of view. Rather, the process of each individual making sense of the paradox leads to an interplay between different possible points of view from which action, and eventually organisational change, may emerge.

A second complication of the methodology is the difficulty in evaluating the responses of the interviewees regarding the likelihood and dynamics of different energy system pathways, as even experts disagree about the merits of different options. It is also unclear how an energy transition that would be in accordance with the goals of the Paris Agreement would play out on the level of individual oil companies, even though discussion has started to take place around e.g. the allocation of the remaining carbon budget between different fossil fuel producers [79–81]. This makes it possible for each individual company to claim to operate within the boundaries of the carbon budgets, as it is conceivable that any emissions from their operations will be offset elsewhere. Hence, even if it may seem e.g. that individual companies should, from the perspective of climate change mitigation, feel responsible for a

significant amount of emissions, there may be no logical inconsistency in asserting that any one company still has a lot of emissions left under the carbon budget.

A third caveat to this analysis is that due to the small sample size and the exploratory nature of the research, some views held by oil company employees may not be adequately represented in the sample. However, the results of the study are still instructive, as they define a framework of possible responses which can be expanded in further study using more quantitative methods. Section 4.3. shows that the results of the interviews roughly match what would be expected based on different companies' public approaches to climate change, which supports the findings of the study.

4. Results

This section elaborates on the response archetypes (Fig. 1) using illustrative quotes from the interviews. Direct quotes from participants are italicised and fuller quotes are given in Appendix 2.

The discussion about responses to tension can only be meaningful where a (perceived) tension exists. The tension at the heart of this study requires the acceptance of two premises by the participants. They can be articulated in the following ways:

Premise 1: Anthropogenic climate change is a significant threat.

Premise 2: The operations of the global oil industry today are in conflict with the goal of mitigating climate change.

All interviewees articulated Premise 1 in some form. The existence of tension was also acknowledged in all interviews by expressing views consistent with Premise 2. However, in many cases interviewees did not elaborate on the latter point, but rather expressed views in accordance of the response archetypes dealing with the tension.

4.1. Strategic responses

Lewis [52] identifies three 'strategic' ways to manage a paradox in a productive way: *acceptance*, *confrontation*, and *transcendence*.

4.1.1. Acceptance - 'different priorities'

Acceptance means acknowledging the paradox and continuing business as usual regardless. In this study, the response was most clearly represented in answers emphasising the possibility of prioritising other issues above climate change. One participant explained the rationale behind this response: '*We don't want to be the bad guys. We want to do what's right. In general, we think that we are helping people.*'

The most frequently mentioned priorities were social and economic development, energy access and improved quality of life enabled by fossil fuels and the revenue they generate in developing countries. Interviewed employees see their companies as contributing to these values, with one interviewee remarking: '*enabling people to better their lives, to care more for their families, ultimately lies at the heart of what we energy companies do.*'. A common view was that people in countries that have already benefited from fossil wealth in their development do not have the right to deny other countries the same opportunity: '*No one has the right to tell someone they can't have energy.*' Implicit in these views is a conflation of energy with fossil energy, and the assumption that global energy demand cannot be met without fossil fuels.

A few interviewees explicitly stated that they consider development issues more important than climate change because of their tangible and immediate nature. For example, one stated: '*It's just tough to be like, yeah, we need to really focus on making sure that every hurricane is slightly less strong or that wildfires in the Western US are somewhat less intense every year at the expense of powering people's lives that would otherwise not have energy.*' Most participants did not directly say this but talked about the importance of other priorities more generally. In a small number of cases, the reason interviewees prioritised issues other than climate change was linked to interviewees not believing climate change to be a very serious threat.

In the context of academic literature, *acceptance* responses are examples of the 'discourses of climate delay' discussed by Lamb et al. [27]. These include calls for well-being and social justice, which are used to emphasise the downsides of climate change mitigation. In the context of oil companies, such discourse can be a rationale for delaying climate action or not engaging with the climate debate.

Notably, several interviewees also provided rebuttals to these arguments, saying that many countries whose development requires continued use of fossil fuels are also ones that are likely to suffer the most from the impacts of climate change.

4.1.2. Confrontation – 'change is needed'

The second of Lewis' [52] ways to manage paradox is *confrontation*. This means the willingness to make changes to the business or organisational situation creating the paradox so that it can be resolved. The response was evident when interviewees spoke of the need for the oil industry to adapt because of the threat of climate change. The viewpoint was particularly prevalent among interviewees who no longer work in oil companies. They used strong language around obligation and potentially abandoning fossil fuels altogether, saying that '*there is no question about the need to change*' and that '*the oil industry will have to decarbonise by 2050 whether they like it or not*'.

Interviewees currently working in the industry shared similar views but expressed them in less strong terms. Although there were exceptions, most current employees placed greater emphasis on ideas such as '*green business*', '*decarbonisation strategy*', and the potential to become '*integrated energy companies*', rather than obligation to ramp down fossil fuels.

4.1.3. Transcendence – 'business and climate objectives align'

The third and final way to manage paradox is *transcendence* [52]. This refers to overcoming the paradox by entering a new paradigm of understanding in which the underlying tension is resolved.

The views most clearly reflecting this response pertained to statements that the paradox will be resolved because climate and business objectives will align for oil companies. It is an extension of the *confrontation* response: it is accepted that a change is required, but this change will render the paradox no longer relevant. The interview excerpts demonstrating this response tend to have a positive or optimistic tone. For example, one participant explained: '*Oil companies and the people working there are excited about the transition, motivated and feeling like they have a new purpose. I think everyone likes a good challenge, and this is a challenge people can identify with.*'

The most common approach to this response was to consider the opportunities that the energy transition would bring to oil companies to build new business e.g. in new types of energy or carbon capture and storage: '*There are some extraordinary opportunities for a well thought out and executed strategy to decarbonize.*' This view emphasises the ability of oil companies to have a strong and active role in the energy transition while continuing to thrive and '*to enter into new business with a new perspective, bringing in knowledge from the current business*'. One participant pointed out that this perspective can in fact help with engaging the organisation with the transition: '*Changing the language and the way that you talk about renewables [...] within the company as more of an opportunity than a problem that you have to overcome really helps.*'

These views exemplify transcending the paradox, because if oil companies can succeed in the low-carbon energy transition, then there is no need to choose between climate change mitigation and business objectives. A possible caveat is that focusing on the positive opportunities leaves open the question of whether something needs to change about the existing oil business to meet climate objectives. Would reductions in the legacy business create greater negative financial impacts that outweigh the positives of the transition? A more fundamental caveat is that framing climate action as a 'win-win' for the oil industry may obfuscate the need for more radical change to reach a truly sustainable system [50,82].

A less active role for oil companies in the energy transition was also included in some instances of a *transcendence* response. These imply the resolution of the paradox not as much through the entry of oil companies into new business but the continuance of the companies' traditional fossil fuel activity as part of the energy transition. One example given by interviewees included altering existing operations so that oil is produced in a more climate-friendly way and using this as a competitive advantage and moral justification for continued business success in the energy transition. Another considered accepting a more moderate growth outlook that nonetheless allows for continued business success: '*I hate when people compare us to this, but I think the business is safe in the same way as the tobacco industry. They're not actively trying to grow their business per se, but they are quietly supplying a product that a certain percentage of the world demands and are profiting consistently year over year.*'

Both viewpoints are examples of transcending the paradox, as they integrate requirements from the energy transition into the business model of oil companies, albeit in very different ways. They do not meet demands for strong climate action, as this would require significant reductions in the use of oil, not just the emissions from producing it [83]. Oil companies do not produce combustion emissions, but directly enable them. One interviewee commented, '*producing carbon is inherent to the business model, so these companies can't decarbonise.*'

4.2. Defensive responses

The three archetypical responses to tension described above are ways of managing paradox. The remaining archetypes represent defensive responses, ways of suppressing the threat that paradox poses to old ways of thinking [52]. In the context of the oil industry, many of these can be linked to the practices that oil companies have used at the institutional level to diminish the importance of climate action, such a denial, delay, and greenwashing [84]. The details of the defensive responses are summarised in Fig. 2.

4.2.1. Transfer of responsibility – 'it's someone else's job'

The first defensive response to be discussed is the transfer of responsibility [62]. In this strategy, respondents acknowledge there is a tension, but argue that it is diminished by the lack of responsibility of the oil industry to deal with the issue of climate change. Emphasis is placed on others who need to change their behaviour for the tension to be resolved.

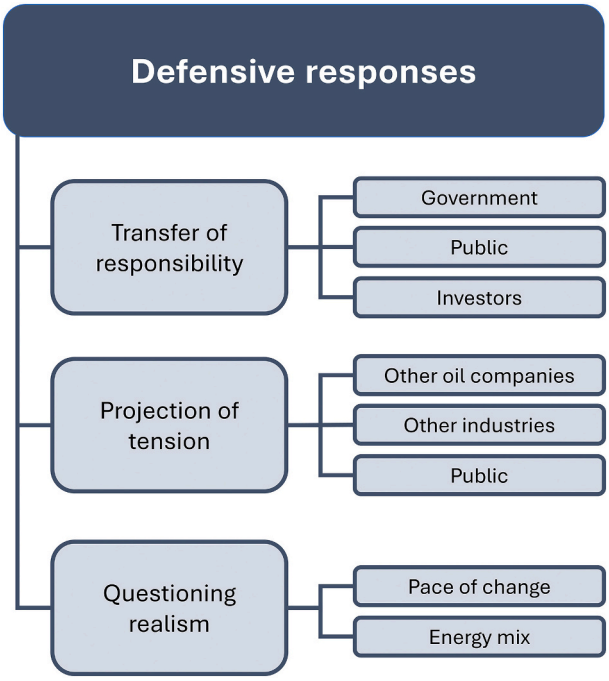

Fig. 2. Defensive responses to tension emerging from interview data.

The most common variant of this response was to argue that it is the responsibility of the government to change laws and markets so that the goals of climate change mitigation and business success of oil companies are more aligned: '*Either governments need to introduce regulations to make low-carbon cheaper, or consumers need to demand low-carbon products.*'

The second kind called on behaviour change by the public: so long as people are buying the products of oil companies, the responsibility for climate change lies with the buyers rather than the producers. For example: '*Energy companies get the torchlight pointed on them. But how willing is Joe Bloggs down the street to give up petrol cars, or have a heat pump?*' This is an example of the 'discourse of individualised responsibility' often used in oil company adverts and other public communications, which tends to downplay the power differential between oil companies' and individuals' abilities to effect large-scale change [23].

The third version of this response focuses on the need for investors and shareholders to not only demand a transition but also '*move their money where their mouth is*' to create financial incentives for oil companies to change.

Classifying this set of responses as defensive does not mean that they are unfounded. Climate change mitigation clearly requires actions from many different stakeholders. The moral responsibility of businesses is a contentious issue [85]. Some argue that historical actions of oil producers, such as active lobbying and deliberate efforts to confound evidence of climate change, gives them moral responsibility for active climate change mitigation today [6,84]. What seems clear is that climate change is a systemic problem and will therefore require solutions that include all parts of the system rather than only some separate actors such as individual members of the public [86–89].

4.2.2. Projection of tension - 'others have it worse'

Projection is a defensive response in which the tension perceived to exist in an organisation is projected onto other entities or people. Rather than resolve the tension, a projecting response focuses on how similar tensions are felt by other actors and explaining ways in which these situations are worse than one's own. In this study, projecting responses are divided into three sub-categories: projections onto other oil companies, other industries, and members of the public.

Projecting tension onto other companies reveals itself through responses about how other companies and industries are in a more paradoxical situation than one's own. The logic is that as long as the other company has not resolved their tension, the situation of one's own organisation is not too serious in comparison.

A common example of projecting tension onto other companies was for representatives of IOCs to explain how national oil companies (NOCs) are likely to be worse hit by the energy transition. According to one participant, NOCs '*only exist to exploit the fossil fuel assets of their countries, which is why they are a bit stuck*'. Interestingly, a similar argument was made in other interviews in the other direction: pointing out that IOCs are likely to be worse off than NOCs at least in the sense that NOCs will continue to receive regulatory support from their governments. There is no clear consensus about which type of company is likely to be in a more difficult situation.

A variant of this response focuses on pointing out ways in which the current operating model of a specific oil company, while possibly in contradiction with climate change mitigation goals, is 'the least bad option'. The arguments demonstrating aspects on this response in the interviews were mostly about geopolitical considerations for security of supply if certain regions held a monopoly on oil production. Another line of argument is about how different suppliers, for example in Russia and the Middle East, are likely to produce oil less '*responsibly*' and with higher associated emissions than Western IOCs.

Other examples include projecting tension on smaller companies, less likely to thrive in the transition than IOCs, as well as other industries

which might be in a worse position than oil regarding climate change. Of industries outside oil and gas, mining was raised as an example that '*has a bigger problem than we do*' because of its polluting nature.

The projection of tension to other companies is closely linked to what Lamb et al. [27] call 'whataboutism': using the fact that other actors contribute to climate change as an excuse to avoid reducing one's own emissions.

Another version which came up less frequently in the interviews is projecting tension onto individuals. This response points out the paradoxical situations of the people who are criticising oil companies for lack of action on climate change. Some forms of this argument include pointing out ways in which the people asking for change (e.g. the public or activists) are being hypocritical, as they are focusing on the oil companies' part of the puzzle rather than dealing with the tensions in their own life or choices. For example, one participant remarked: '*I do laugh at the hypocrisy of the Internet outcry when there's all of this deforestation in the Amazon. Do you think that Europe or a lot of the US wasn't covered in forests when people got here?*'

Despite the presence of these arguments projecting tension in some of the interviews, all interviewees also commended their critics for taking a stand and being part of the discussion on oil. Even if the people 'on the other side of the debate' were described as having tensions of their own, no participant took this to mean that their contributions and views could not be valuable. As one participant said, "*I might not agree with everything Greta Thunberg is saying, but the way she has mobilised children and their parents – wow, what a force.*"

4.2.3. Questioning realism – 'change will be slower and harder than you think'

The final defensive response questions the realism of energy transition pathways regarding either the pace of change or the required energy mix.

Questioning the pace of change relies on the view that while an energy transition is needed to respond to climate change, the speed of the transition will be relatively slow. This gives oil companies time to continue business as usual and adapt when faced with the climate-business paradox. The responses do not resolve the tension but delay the need for resolution until a future time.

Some interview answers pertained to specific decarbonisation goals which were considered unrealistic: '*There are a lot of questions about how fast things have to change to get to net zero by 2050. Some of them are almost insurmountable in terms of what you have to do in a short time, which is still diminishing.*' Such views were expressed even by some participants employed by oil companies that have publicly expressed their commitment to 'net zero' goals.

Most interviewees were less precise about the rate of the transition, stating simply that it is likely to be slower than anticipated by many mitigation scenarios. One participant said, *'I also don't think [oil and gas] is an industry that's on its way to extinction anytime soon. So 50 to 100 years is probably legitimate to be economically viable'*.

It is noteworthy that despite this discourse being present in nearly every interview, most interviewees also stated their belief in the viability of 'net zero by 2050' or similarly strong decarbonisation measures, stating e.g. that although it is a '*huge challenge*', the history of climate and energy shows that '*huge transformations are possible*'. A participant no longer working in the oil industry directly contradicted the responses about transition slowness, stating that raising awareness of the impacts of climate change can lead to fast policy shifts that will speed up the transition.

Some responses questioned the mix of solutions and technologies required to bring about a transition. Arguments brought forth in the interviews emphasised that 'realistic' transition pathways include a continued role for oil and gas, and make use of carbon capture and storage technologies. Others related to specific mitigation measures which some participants declared not to be effective, most notably the idea that policies limiting oil and gas production in one region would not lead to climate change mitigation but simply shift the production elsewhere.

These arguments are generally based on mathematical modelling and an understanding of the intricacies of the energy system. They could be seen as a way of lessening the impact of paradox on the oil industry, promoting pathways in which technologies and solutions provided by the oil industry can play a larger role than in other types of pathways focused on e.g. reductions in overall energy demand [90]. Supran and Oreskes [23] liken this type of response to the 'technological shell game' [91] rhetoric used by the coal industry. Its aim is to invoke 'strategic ambiguity' around technological solutions to climate change and obfuscate the industry's opposition to climate regulation by shifting policy discussion on mitigation measures that are more favourable to the industry's current business model.

The question of what mitigation pathways to promote is certainly complex and can be approached through scientific and technological arguments. It is also necessarily value-laden, as policy questions with scientific and technical underpinnings tend to be [92], and most likely does not have one correct answer. Working towards 'realistic' pathways can help weaken the tension but does not remove the need to grapple with open questions and arguments when attempting to resolve the underlying paradox. Agreeing that a transition is needed and focusing the debate instead on the right pathways could be seen as a useful step in building a way forward on climate and oil. What is important is to maintain awareness of where vested interests may influence which pathways and arguments are accepted as part of the debate.

4.3. Responses in the context of company culture

In this section, the responses of interview participants are presented in the context of three company groups: European for employees of European oil companies (five participants), RoW for employees of other oil companies (three participants), and Leavers for participants who used to work in European oil companies and no longer work in the oil industry (four participants). Each group's interview outputs include responses from both strategic and defensive categories, but the balance between types of responses differs.

In terms of the frequency and strength of responses within each archetype, the RoW and Leavers groups tended to be at opposite ends of the spectrum, with the European group sitting in between the two. For example, RoW tended to make the strongest and most frequent references to the *acceptance* response, while Leavers' answers gave the least indication of this response. On the other hand, the *confrontation* response came up the most with the Leavers and the least with the RoW. This is in line with academic literature on cultures in different oil companies: there is a Trans-Atlantic divide in which European IOCs are more upfront about the issue of climate change and the need to change, while American ones are found to more actively downplay the importance of climate considerations [21,93]. We are not aware of literature on the attitudes of people who have left the oil industry, but our results suggest that this group is more critical of the industry than those still employed by it.

The *transcendence* response was expressed equally strongly by European and RoW groups, but less so by the Leavers. This means that current employees in both geographies were prone to views emphasising the possibility of reconciling the demands of climate and business, whereas those who have left were less likely to see the energy transition as a win-win for the industry.

Nearly all of the defensive responses were the most strongly expressed by the RoW group, especially *projection of tension* and *transfer of responsibility*. This fits the view that companies outside of Europe have less of a culture of engaging productively with climate change. One significant exception to this trend was *questioning realism*, which was included most often by the Leavers. This makes sense in the context of the findings about strategic responses, as shifting focus to discuss what kind of mitigation pathways are preferable or realistic requires some

level of *confrontation* of the initial paradox – a response that was expressed the most strongly by the Leavers too.

Overall, analysis of the response archetypes shows company employees outside Europe being the most likely to express defensive responses to the tension between climate and the oil industry. Those who had left the oil industry tended to be more likely to confront the tension and call on the oil industry to change. Employees of European IOCs generally sat between these viewpoints. There was noticeable variation within each group, likely pertaining to differences between companies within a group, but also in the backgrounds of the individuals in question, which was illustrated by a case of two interviewees from the same company having highly divergent views. In the future, it would be interesting to understand these trends better by carrying out studies with larger sample sizes. It would also be instructive to be able to link participants directly to specific companies, although finding employees willing to be interviewed under these conditions would likely be difficult due to the sensitivity of the subject matter.

5. Discussion and conclusion

In this study, semi-structured interviews of oil industry professionals with climate and sustainability expertise were used to explore responses to the paradoxical tension between the climate change mitigation imperative and the traditional business models of oil companies. The underlying aim of the study was to better understand the motivations and reasoning of people in the intersection of climate change and the oil industry, and to provide tools for a more productive discussion about the possible futures of the industry in the sustainability transition.

The use of sensemaking as the framework for this study is motivated by the desire to understand the perspectives of the interview participants without passing initial judgement. Understanding these interpretations can help see where the people in the industry stand regarding the energy transition, and where the main debates lie. The responses also help illuminate what level of change might be possible from the starting point of where the industry is today and inform analyses of where more radical shifts may be needed.

Two groups of archetypical responses to tension emerge from the research findings: strategic and defensive. Of the strategic responses, *acceptance* is the most clearly at odds with the urgent need to mitigate climate change. While the arguments some participants made in support of this response rely on commendable values, such as the importance of enabling energy access and better living conditions for people around the world, their flaw is that the people who the participants claim the oil business wants to help, mostly in developing countries, will be (and already are) the hardest hit by the catastrophic impacts of climate change.

Confrontation and *transcendence* demonstrate more active engagement with the climate issue, and the presence of these in the responses of current oil industry employees shows that there is at least some willingness to change within the industry, especially among employees of European companies. It may be possible to leverage these views in the endeavour towards a sustainable energy transition, although – as noted above – some critics argue that a transition that takes as is starting point current business realities will simply worsen existing inequalities, so a complete overhaul of the current system would be preferable [42].

Many of the defensive responses can be linked to the avoidance strategies of the oil industry regarding climate change. *Transfer of responsibility* is potentially a thorny one: while arguments are emerging for holding the oil industry responsible for climate change [21], calls on governments to take the lead on climate action are widespread in society. Perhaps common ground could be found by first focusing on the oil industry's responsibility not to hinder climate change mitigation e.g. through lobbying and confounding of scientific evidence.

Questioning realism is part of a broader discussion having mostly moved on from full climate denial to debating specific mitigation solutions. From the perspective of climate action, this is at least a more productive strand of discussion, even though it may still lead to the urgency of change being lost among technicalities. While interviewees talked at length about possible technologies for climate change mitigation, there was much less enthusiasm for discussing potential rampdown of oil and gas, even though that is almost certainly required if CO_2 emissions are to be reduced in line with the goals of the Paris Agreement. As pointed out by some of the interviewees themselves, this aspect of the transition needs to be part of the discussion [94] – and the tension it causes is rarely considered even by the greenest oil industry employees.

In the context of transition literature, many of the responses could be interpreted as examples of avoiding or 'neutralising' the participants' moral responsibility for climate change [26]. Some of them rely on rhetoric which has been used on the corporate level by oil companies to do just that [23]. However, while it seems clear that 'Big Oil' can be held responsible for a large part of anthropogenic climate change [21], is the same true for individuals working in oil companies?

Most interview participants work or have worked in energy transition-related roles and expressed intention to further the transition from their position. Clearly, the oil industry has significantly contributed to climate change and the slowdown of mitigation efforts. But the people interviewed for this study are not blind to the impacts of oil on anthropogenic climate change nor are they indifferent to them. They generally want to see themselves as a force for good and believe in their ability to create change within the companies.

Cognitive dissonance, the psychological state of having contradicting thoughts or beliefs [95], can contribute to differences between the ways in which individuals make sense of paradoxical situations. Gifford writes about people with financial stakes in the fossil fuel industry: 'cognitive dissonance [...] can result from hearing that burning these fuels damages the environment. Cognitive dissonance often is easier to reduce by changing one's mind ('burning these fuels is not causing a problem') than by changing one's behavior (by disposing of one's fossil fuel investments or leaving one's job in that industry)' [96]. Such thinking is not exclusive to the oil industry but visible in countless situations in which people face conflicting demands or desires.

This study begins to fill the research gap around the potential role of incumbents in the energy transition and the perspectives of the people in the oil industry actively working on transition topics. Spelling out the response archetypes reveals the reasoning behind arguments made by oil industry actors in the oil-climate debate. The framework of responses developed in this paper may also be applicable to other incumbent industries in the energy transition, especially ones facing significant pressure to change. In the future, it would be interesting to study the sensemaking attitudes in more depth, for example comparing the responses between different companies or employees of different seniority. It would also be instructive to include the perspective of other actors working on the oil industry transition, such as representatives of government and non-governmental organisations, as well as more global and NOC perspectives.

At its core, the tension between climate change and the oil company business models raises a series of deeper questions: When it comes to climate change, is it wrong to produce oil when its use contributes to human wellbeing? Whose responsibility is it to act on climate change? Are oil companies at fault? And if they are at fault, to what extent is this responsibility shared by current employees? Can the sustainability transition happen in collaboration with the incumbents, or is more radical change necessary? These questions need to be faced head-on if meaningful progress is to be made in climate change mitigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix 1. Interview guide

Question 1: What would large-scale climate mitigation, or even a world aligned with the goals of the Paris Agreement, mean for the oil industry?

- Prompts: the types of strategic choices oil companies should make if faced with a low-carbon transition; preparedness of the sector; ability of different companies to compete; upstream oil demand, supply, price; impacts on IOCs, NOCs, specific companies

Question 2: Questions about the future of the oil industry can give rise to controversial debates. Perhaps some specific arguments spring to mind when I mention this. What do you wish you could explain to people "on the other side of the debate" who do not agree with you on all these issues?

- Example debates if interviewee needs prompting: Do oil companies have a responsibility to act? Is the best thing to do to shut down oil companies as soon as possible? Do we need to stop economic growth? Is oil needed for development? Are there any "villains" in the situation we are in?

Question 3: In your opinion, based on your experience, is it possible for society to reach large-scale carbon emission reductions by 2050?

- Prompts: what is preventing it, enabling it?

Question 4: Are you personally worried about climate change?

Appendix 2. Illustrative quotes from the interviews

General

"One misconception is that oil and gas companies love to pollute the environment. That is clearly not true."

"I'm worried about [climate change] more and more because we can start to really feel and see it. And I see it affecting my kids."

1. Acceptance

"We need to [...] accept people will have different opinions and will prioritise things differently."

"It's a hierarchy of concerns, right?"

"No one has the right to tell someone they can't have energy."

"Enabling people to better their lives, to care more for their families, ultimately lies at the heart of what we energy companies do."

"Oil-producing countries need those petro-dollars to invest in a different future."

"Yeah, people need heat and they need energy, but at the same time they also need a planet to live on."

"Yes, people need energy. But people also need to not live in a world that's warmed to the point where it's uninhabitable in large areas of the world."

"I think the effects on me personally are limited. Globally, I think, yes, globally I am very concerned. [...] But it's tough to see how it's really going to impact my life specifically."

"I didn't think climate change was such an imminent threat."

2. Confrontation

"People working at oil companies want change."

"[Oil companies] have to wake up to the licence to operate issue."

"At my company, a lot of their business is still like coal, oil and gas. That part of the business couldn't really exist anymore."

"There is no question about the need to change."

"Oil industry will have to decarbonise by 2050 whether they like it or not."

"[Oil companies] will need to transition their business models away from reliance on fossil fuel production and rapidly bring down production."

"So that we've really switched and transitioned to green business being the growth and oil and gas being very much the legacy."

"We will see oil and gas companies moving to be more integrated energy companies."

"Oil industry needs a clear decarbonisation strategy and capital expenditure to follow that strategy."

3. Transcendence

"There are some extraordinary opportunities for a well thought out and executed strategy to decarbonize."

"There are lots of different opportunities for these [...] companies to branch out. For example, solar, wind, and geothermal."

"It seems more like a great opportunity to enter into new business with a new perspective, bringing in knowledge from the current business."

"Changing the language and the way that you talk about renewables [...] within the company as more of an opportunity than a problem that you have to overcome really helps."

"I hate when people compare us to this, but I think the business is safe in the same way as the tobacco industry. They're not actively trying to grow their business per se, but they are quietly supplying a product that a certain percentage of the world demands and are profiting consistently year over year."

"IOCs are not stopping oil and gas. But they are making sure the balance is better. They are putting more effort into how they do their operations."

"There is no point in producing oil with a lower-carbon operation. Producing carbon is inherent to the business model, so these companies can't decarbonise."

4. Transfer of responsibility

"A company like ours can be uniquely well positioned if regulatory, consumer and investor appetite work hand in hand with oil and gas companies."

"We've been slow to react, not just the oil and gas industry, but everybody."

"Whilst oil and gas producing companies can do a lot to their own emissions, that won't help with Scope 3 emissions."

"Either governments need to introduce regulations to make low-carbon cheaper, or consumers need to demand low-carbon products."

"Especially governments need to take the lead on pricing in externalities."

"Energy companies get the torchlight pointed on them. But how willing is Joe Bloggs down the street to give up petrol cars, or have a heat pump?"

"Unless investors move their money where their mouth is, this can cause companies to rethink."

5. Projection of tension

"The major threat is not for European IOCs, but smaller independent and state-owned companies."

"NOCs have more of a problem than IOCs."

"NOCs always have the benefit that their government will regulate in their favour. If [they] would go 100% solar tomorrow, the government would do its utmost to give [them] a competitive advantage."

"I think the multinational oil and gas companies will be better positioned than the smaller independents that maybe only have acreage out in the Permian in West Texas."

"Mining has a bigger problem than we do. They can't stop like oil and gas, because they are needed for the energy transition. And it is very unsustainable."

"Every company likes to claim they are the greenest, leanest company in the world right now. It's not just oil companies."

"So, how do we get people to start thinking about their own demand and what they do? It is easy to blame a big oil company for the problem instead."

"I do laugh at the hypocrisy of the Internet outcry when there's all of this deforestation in the Amazon. Do you think that Europe or a lot of the US wasn't covered in forests when people got here?"

"I also have immense respect for other voices in the debate, such as Extinction Rebellion. We need all the actors to be heard and present and pushing from different angles."

'Being critical of oil companies is good. We all respond better to stimuli, and it is good to be challenged in our thinking.'

"I might not agree with everything Greta Thunberg is saying, but the way she has mobilised children and their parents – wow, what a force."

"Tackling the supply of oil and gas is not the right approach, as it just causes prices to go higher and more supply to come from Russia and the Middle East."

"But for geopolitics, does the whole world want to rely on Russian gas and Saudi Arabian oil?"

"What kind of companies do you want to be developing the oil and gas resources that will be developed because they are profitable? Do you want that activity to be as responsible as possible, so done by IOCs that have to pay attention to investor pressure, rather than NOCs, who have fewer of those stakeholders to answer to?"

6. Questioning realism

"Any credible scenario still has a small place for oil and gas. Maybe that will change in ten years, but now this seems to be the case."

"Extinction Rebellion want to stop new oil exploration in the North Sea. But it is irrelevant – all it would do is shift who makes money."

"I think that a renewables-only solution won't work, very important though renewables are. It is pretty clear from the modelling that without CCS, and probably without nuclear, we can't get it done."

"In any scenario, CCS is going to play a very important role in getting us to meet the Paris goals."

"Short of something like that happening, some crazy pie in the sky fantasy idea, I don't see us shifting off of fossil fuels fast enough to keep under the degree and a half to two degrees that climate scientists are saying we need to stay under."

"Fossil fuels cannot of course be removed from use overnight."

"No one is saying that we shouldn't be trying to get to net zero. But we can't do it overnight."

"I also don't think [oil and gas] is an industry that's on its way to extinction anytime soon. So 50 to 100 years is probably legitimate to be economically viable."

"I think we can achieve the [mitigation] trajectories."

"I think it's a question about whether we'll make it. It's a big challenge. But it's possible."

"We have already seen in history of climate and energy that huge transformations are possible."

"Policy change can take a long time to happen, but then happen all of a sudden. [...] The physical effects of climate change are being rapidly discovered. The awareness of them is changing significantly, which will drive policy response."

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