Energy Research & Social Science 85 (2022) 102388

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

# Better poison is the cure? Critically examining fossil fuel companies, climate change framing, and corporate sustainability reports

Matthew Megura [a], Ryan Gunderson [b,*]

[a] Miami University, Institute for the Environment and Sustainability, USA
[b] Miami University, Department of Sociology and Gerontology, 375 Upham Hall, Oxford, OH 45056, USA

ARTICLE INFO

*Keywords:*
Frame analysis
Oil, coal, gas
Technological optimism
Greenwashing
Climate denialism
Reification

ABSTRACT

The way fossil fuel companies frame climate change in their annual sustainability reports shines light how the fossil fuel industry is addressing pressure from stockholders, investors, and the public to become less environmentally harmful. Through a qualitative frame analysis and critical discourse analysis of fossil fuel company sustainability reports, four major frames emerged: (1) *techno-optimism*, or, the belief that innovative technologies and fuels, without social change, can help solve the issue of climate change; (2) *necessitarianism*, or, the notion that the fossil fuel industry provides a necessary service; (3) *compliance*, or, adherence to established regulations and standards; and (4) *countermeasures*, or, strategies that indirectly counteract harms done. Two frames central to discourses surrounding fossil fuels and climate change are notably absent: (5) potential environmental and societal risks of fossil fuels (*risk minimization*) and (6) potential future scenarios that are significantly different from the growing economy powered by increased energy output (*possibility blindness*). Together, the frames are a subtle form of climate change denialism that acknowledges climate change as a problem without diagnosing the root cause of the problem (*ideological denial*), conceals environmentally harmful actions with the rhetoric of environmental friendliness (*greenwashing*), and justifies the status quo as necessary (*reification*).

## 1. Introduction

The fossil fuel industry has a tenuous history with the public regarding information about climate change (for summary, see [1]: 310f). Major players in the industry, most notably ExxonMobil, actively sought to cover up and deny the reality of climate change despite knowing about the contribution of fossil fuels to global warming long before the public [2]. In addition to secrecy and denial, the fossil fuel industry worked to discredit climate scientists in the eyes of the public [3–5]. With growth in the public's belief in anthropogenic climate change, and the increasing difficulty of denying climate change given the reality of climate change-related impacts, stockholders in the fossil fuel industry, other stakeholders, and members of the public, are increasingly demanding change from fossil fuel companies. These demands range from completely phasing-out fossil fuels to transitioning to greener sources of energy [6]. The industry is reacting to these demands in diverse and sometimes contradictory ways. For example, most fossil fuel companies now acknowledge that climate change is real and should be addressed, yet some are simultaneously members or leaders in organizations that spread disinformation about climate science or seek to block climate action [1,3,7–8].

There is a wealth of literature on strategies the fossil fuel industry employs to actively undermine climate change policy (e.g., [5,9]). However, there is not an extensive body of research, save the exceptions reviewed in Section 2, regarding how the industry frames, beyond outright denial, the causes, moral dimensions of, and solutions to climate change. This is a large gap in the literature considering the industry's recent attempts to become, at least in appearance, more environmentally conscious by, for example, publishing sustainability reports. The way fossil fuel companies frame climate change in their sustainability reports opens a window into how the fossil fuel industry is managing the pressure from stockholders, investors, and the public to become more sustainable.

The goal of this analysis is to identify the most coherent and polished framing strategies used by the fossil fuel industry to reconcile the demand to "go green" with the reality of extracting and distributing the commodity most responsible for carbon emissions [10–11]. Through a qualitative frame analysis of fossil fuel company sustainability reports, four major frames emerged: (1) *techno-optimism*, or, the belief that innovative technologies, without fundamental social changes, can help

* Corresponding author.
*E-mail address:* gunderrm@miamioh.edu (R. Gunderson).

https://doi.org/10.1016/j.erss.2021.102388
Received 21 April 2021; Received in revised form 1 November 2021; Accepted 4 November 2021

solve the issue of climate change, as well as invoking the future potential of renewable and cleaner nonrenewable sources; (2) *necessitarianism*, or, the notion that the fossil fuel industry provides a necessary service that improves the quality of life of many people; (3) *compliance*, or, adherence to established regulations and standards; and (4) *countermeasures*, or, strategies that indirectly counteract harms done, especially through participation in other organizations that do work to benefit the environment and investing in other environmental projects. Furthermore, two frames central to discourses surrounding fossil fuels and climate change are notably absent in the annual sustainability reports: (5) potential environmental and societal risks of purely technological solutions and continued fossil fuel use (*risk minimization*) and (6) potential future scenarios that are significantly different from the growing economy powered by increased energy output (*possibility blindness*). Both omissions help overcome the paradox between the demand to "go green" with the reality of extracting fossil fuels by implicitly disregarding the existence of the contradiction.

Below, we review of the concepts of frames and framing, as well as pertinent existing information regarding how fossil fuel companies framed climate change in the past (Section 2). Section 3 reviews the methods used to analyze fossil fuel industry sustainability reports. We then discuss the major frames that emerged during the analysis (Section 4), followed by a critical analysis of these framing strategies (Section 5). We conclude by examining the implications of the findings for climate change mitigation and the future of the fossil fuel industry in climate action (Section 6).

## 2. Research approach

The concept of "frame" draws attention to the way experience is conditioned by the selection and salience of information [12]. The use of frames is prevalent in society, and perhaps an inherent feature of all perception [13], though we may not always be cognizant of their use and existence. Individuals and organizations can explicitly adopt framing strategies that select aspects of perceived reality that the individual or organization wants to make more salient. By enhancing salience, we mean that the piece of information selected is made more noticeable, meaningful, or memorable. Frames can be used as tools by organizations to control how they represent themselves to the public. Successfully employed frames can define problems, diagnose causes, make moral judgements, and suggest treatments or remedies [12]. Frames can shape the perception of information. By controlling what information is conveyed, and how salient that information is, the audience can be swayed, find other facts or perspectives irrelevant, etc. Furthermore, frames can provide insight into the ideals and priorities of the people or organizations using the frames.

Frames are employed by the fossil fuel industry, a powerful actor in mainstreaming specific framings of climate change [14]. In an analysis of 38 previous studies on industry actors' communications on climate change between 1990 and 2010, three overarching and evolving frames were used by industrial actors: scientific uncertainty, socioeconomic consequences of mandatory emissions reductions, and, most recently, industrial leadership in climate protection [15]. The latter frame, which took hold globally and is still prevalent today, refers to "industrial actors acknowledg[ing] responsibility for the climate. However, they portray technological innovations as the primary assets to combat climate change" ([15]: 505). The industrial leadership frame was pioneered by European oil and gas companies. The initial pushback towards carbon emission regulation was much more aggressive among US corporations than European corporations [16]. US corporations formed industry associations, lobbied politicians, cast doubt on climate science, and emphasized the high economic cost of forced emission reductions. In contrast, industries in Europe expressed a willingness to invest in technologies that would reduce emissions.

Earlier, Le Menestrel et al. [17] also found that oil and gas actors emphasized technological investments (e.g., in green energy) to address a dilemma: that constraining emissions would lead to lower profits. However, these companies simultaneously invested substantially more money in fossil fuels and lent support to anti-climate action lobby groups. Green marketing and strategic framing help address this contradiction, and similar paradoxes. For example, in their Helios Power campaign, BP used background images of wind turbines, environmental buzzwords (*reduce waste*, *conserve energy*, etc.), green color schemes, a conservation advocacy section of the campaign, and a new green logo [18]. BP appears to align itself with green ideals and advocate for the pro-environmental movement. However, closer analysis shows that this behavior primarily serves to maintain company profits while appeasing environmentally friendly stakeholders and climate activists.

The use of green images and rhetoric despite, or to mask, environmental harms and manipulate consumers is sometimes termed "greenwashing" [19]. A common form of greenwashing among fossil fuel companies is the hidden trade-off, where a product is framed as green or environmentally friendly based on a single attribute while other attributes are ignored [20]. Companies also often enhance these greenwashed frames by highlighting and amplifying science and technology, and the expertise of authorities.

Pulling these historical trends together, Brulle [3] examined how the fossil fuel industry initially engaged in explicit denialism, despite knowing about climate science and the role of fossil fuels in climate change. More recently, the industry has shifted toward a more subtle framing that feigns positive change or provides minimal support towards a pro-environment agenda while continuing to harm the environment and prioritize profit outside of the public eye. This strategy includes the use of frames to shape public opinion, industrial leadership, community involvement, and focused campaigns to control the company's public image.

In summary, previous studies on fossil fuel framings of climate change focused on overarching frames or the evolution of frames and industry behaviors over long periods of time, such as Levy [16], Schlichting [17], and Brulle [3]. The goal of this project is to examine the most coherent and polished climate change-related framing strategies officially employed by the fossil fuel industry to date via an analysis of their annual sustainability reports to answer one overarching question:

> *What framing strategies do fossil fuel companies employ to reconcile the demand for addressing the climate crisis with the reality that their product is the most significant immediate cause of climate change?*

This research question provides insight into the industry's views on the interesting ethical dilemma they face, as described by Le Menestrel et al. [17], where the industry is trying to address a problem in which they are the primary contributor. This dilemma has snowballed due to growing pressure from stockholders, investors, and the public to become environmentally friendly.

Answering this overarching question will require an examination of the four dimensions of frames identified in Entman's [12] classic conceptualization: (1) *How do fossil fuel companies define the problem of climate change?;* (2) *How do fossil fuel companies diagnose the problem of climate change?* (i.e., *Who or what is causing the problem of climate change, according to fossil fuel companies?*); (3) *How do fossil fuel companies evaluate the problem of climate change* (i.e., *What moral judgements do they make*)?; (4) *What solutions to climate change do fossil fuel companies propose?* Addressing these questions will illuminate how the industry balances its role in driving climate change with its need to stay profitable, as well as how it works to shape the perceptions and opinions of its stakeholders and critics.

## 3. Methodology and materials

### 3.1. Qualitative frame analysis and critical discourse analysis (CDA)

Typically, frames are identified via content analysis [21]. A distinct frame can be categorized as the definition of a problem or an issue, causal attribution, a moral evaluation, and a treatment [12]. Frames can be analyzed quantitatively and/or qualitatively. Qualitative content analysis identifies and categorizes the central themes or frames of interview transcripts, reports, or other forms of text [22–23]. As the data was collected and analyzed, any recurrent concepts (such as faith in technology or an emphasis on adherence to regulation) were identified and, over time, categorized into specific frames (see Section 3.3). We adopt a qualitative approach here, which emphasizes focusing on, and understanding, frames as they relate to conceptual issues and societal contexts as opposed to solely the prevalence of the frames [24].

In addition to qualitative content analysis, the methodological approach also overlaps with critical discourse analysis (CDA), specifically a form of CDA that examines how language can be used to reproduce existing social conditions and contextualizes discourse with the sometimes-obscured social forces that influence it (for overview, see [25]: 8ff). Like CDA, we think the social context in which language is employed is of critical importance because discourse is shaped or "constituted" by this context. CDA has proven to be a valuable method in studying frames used in environmental and energy discourse [26–29]. Our normative aim is to "demystify" frames employed by fossil fuel companies and analyze them as strategies to reproduce the status quo via minor reforms.

This critical spotlight is based on the premise that to effectively reduce emissions at the pace and scale needed to avoid catastrophic climate change, fossil fuel companies must "end exploration, wind down extraction, [and] invest in low-carbon energy" ([30]: 3). Anything less than explicit plans to phase out nearly all fossil fuel extraction—for example, proposals to merely increase miniscule investments in renewables [31] or co-fund another carbon capture and storage facility—are inadequate for staying within internationally recognized climate targets [30]. For those who argue that this standard is unrealistic, we think our counterfactual is more realistic than meeting climate targets while simultaneously maintaining or expanding fossil fuel extraction – even if the companies extracting fossil fuels allocate a bit more than 0.22% (ExxonMobil) to 2.3% (BP) of total capital expenditures in low-carbon investments [31]. Following others, we make the case that minor reforms in lieu of phase-out are strategies of greenwashing, or even a new form of climate change denial (see Section 5).

### 3.2. Data

The data was collected from the following eight companies: Chevron, ExxonMobil, BP, Royal Dutch Shell (hereafter Shell), ConocoPhillips, Peabody Energy (hereafter Peabody), CONSOL Energy (hereafter CONSOL), and Arch Coal. These eight companies were chosen because they are responsible for 15% of carbon emissions since 1850 [11,32]. There are significant differences between these companies in terms of market focus and climate strategy. Most glaringly, Peabody, CONSOL, and Arch Coal are primarily coal companies, whereas Chevron, ConocoPhillips, ExxonMobil, BP, and Shell derive most of their profits from oil and gas. This difference not only impacts the viability of future markets—for example, some investor-owned coal companies are on their last leg ([30]: 8)—, but also climate strategy. For example, in "planning for a world free from carbon pollution," all three coal companies were ranked as "egregious" by the Union of Concern Scientists [8], whereas the oil and gas companies were ranked as "poor" (BP, Chevron, ConocoPhillips, ExxonMobil) to "fair" (Shell).

Despite these differences, we found that all eight companies employed the same four frames: techno-optimism, necessitarianism, compliance, and countermeasures. (These frames are discussed in detail below.) The only exception is Peabody's sustainability report, which employs two of the frames (techno-optimism and necessitarianism), rather than all four. The consistency in framing across all eight companies is notable.

As pressure from stockholders and investors may have more immediate financial consequences for companies when compared to public pressure, sustainability reports are a perfect data source to examine how fossil fuel companies reconcile the demand to address climate change with the fact that they are fossil fuel companies. Further, as explained above, our goal is to examine the most polished climate change-related frames produced by fossil fuel companies. Sustainability reports are fitting for this research goal as well. To use an analogy, sustainability reports show "the ideal self" of fossil fuel companies' green self-presentation, one that conforms with the expectations of environmentally minded investors and other stakeholders. Fossil fuel companies can use sustainability reports to construct an ideal green self-image because, in contrast to financial statements, there are no established legal or regulatory risks in being excessively optimistic in sustainability reports.[1] Thus, corporate sustainability reports, as a PR exercise, are a window into this ideal green self-image.

A web search and a search of company websites uncovered sustainability reports for most of the companies listed above. A second, more directed search uncovered sustainability reports for every company except Arch Coal. The most recent sustainability report for each company available at the time (July 2020) was used as data. The reports analyzed are as follows: (1) Chevron's "Climate Change Resilience: A Framework for Decision Making" [34], (2) ExxonMobil's "2018 Sustainability Report Highlights" [35], (3) BP's "Energy with Purpose: BP Sustainability Report 2019" [36], (4) Shell's "Sustainability Report 2019: Delivering Energy Responsibly" [37], (5) ConocoPhillips' "2018 Sustainability Report" [38], (6) Peabody's "Delivering Results, Generating Value: Environmental, Social, and Governance Report 2019" [39], and (7) CONSOL's "Forward Progress: 2019 Corporate Sustainability Report" [40].

We could not locate a sustainability report for Arch Coal, as mentioned above. Instead of using data from their annual report, data for Arch Coal was collected from the company's website. The website has an "Our Approach" page with nine links to other sections (pages) that all deal with various sustainability and environmental issues [41]. Each of these nine other sections, as well as the original page, were examined for relevant data.

### 3.3. Analysis

The data were analyzed by the first author in accordance with the qualitative content analysis of frames as described above in Section 3.1. The second author was consulted throughout the analysis to help conceptualize emergent codes. Relatively open coding was used when analyzing the data, which ensured that any prominent frames would emerge during analysis. Although open coding was used, the analysis was guided by the research questions and purpose (see Section 2), which was to identify what framing strategies fossil fuel companies use to reconcile the demand for action to address the climate crisis with the fact that their products are the most immediate cause of this crisis. Identifying these frames required attention to how fossil fuel companies define the problem of climate change; how fossil fuel companies diagnose the problem of climate change; how fossil fuel companies evaluate the problem of climate change; and what solutions fossil fuel companies propose to solve climate change. Further, past literature informed the "naming" of codes in cases of clear overlaps (e.g., "techno-optimism"). Finally, the analysis purposefully recorded what potentially relevant climate change information (e.g., risks of continuing fossil fuel extraction) was not discussed in sustainability reports. Drawing

[1] We would like to thank an anonymous reviewer for raising this point.

attention to what is "unsaid," "backgrounded," or "omitted," despite being potentially relevant, is consistent with CDA (e.g., [27]) and frame analysis in general [12].

## 4. Results

All the reports analyzed discussed the fossil fuel industry's relationship to environmental health and climate change. The extent and breadth of this discussion varied between reports. As discussed above, the analysis was guided by Entman's [12] classic conceptualization of framing as the definition, diagnosis, evaluation, and prescription of a given issue or problem. One notable finding is that the sustainability reports *did not diagnose or evaluate the problem of climate change*. Instead, frames are almost entirely prescriptive. The problem itself, and its causes, are taken for granted. The absence of diagnosis is especially notable because diagnosing climate change requires an analysis of the primary immediate driver of climate change: fossil fuels. The only frame that can be interpreted as an evaluation of climate change is "necessitarianism," which frames fossil fuels as a prerequisite for a decent standard of living (see Sections 4.2, 4.5).

Four prescriptive frames emerged from the data: (1) *techno-optimism*, (2) *necessitarianism,* (3) *compliance*, and (4) *countermeasures*. Each frame is described with examples below, followed by a section on key omissions from the reports (Section 4.5). Table 1 below provides a summary of the prescriptive frames identified.

### 4.1. Techno-optimism

Techno-optimism is the first and most prevalent climate change solution frame used by fossil fuel companies. It is the belief that technological breakthroughs and adoption will solve environmental problems without the need of social changes (for discussion, see [42]). In the context of climate change, techno-optimism entails the belief that innovative technologies like carbon capture and storage can help solve the issue of climate change, as well as the invocation of the future potential of renewable and cleaner nonrenewable sources – technological changes that can address climate change without simultaneously requiring social changes or disruptive political decisions. This frame was utilized, to some extent, by each of the companies. When using the techno-optimism frames, the companies often spoke of driving and "meeting evolving technology" ([36]: 7). For some companies, such as CONSOL and ConocoPhillips, this meant incorporating technological development into their sustainability goals. For others, such as ExxonMobil, Shell and Chevron, focus was placed specifically on carbon capture and storage (CCS) technology to reduce emissions (cf. [33]).

The techno-optimism frame can be divided into several categories: (1) general faith in technological advancement, (2) an emphasis on CCS, (3) cleaner and more efficient fossil fuels, and (4) the future potential of renewable energy. Each dimension will be discussed in turn.

The first subdivision of the techno-optimism frame – a general faith in technological advancement – was ubiquitous. A line from Peabody's ([39]: 17) report captures the essence of a faith in technological innovation to solve the problem of climate change: "Peabody believes that technology has been the proven answer, and we have the opportunity to continue to use technology to drive down emissions." Innovation and the promise of future discoveries are typical of this general faith. For example, "We are conducting scientific research to develop the next generation of energy technologies and products. Our work includes advanced biofuels, carbon capture and storage, natural gas technologies and new energy efficiency processes" ([35]: 12). ConocoPhillips ([38]: 66) too provides a helpful illustration: "Technology will play a major role in addressing GHG emissions, whether through reducing fugitive emissions or lowering the energy intensity of our operations or value chain. In Canada we are sponsoring an XPRIZE to support development of innovative ways to reuse carbon associated with steam generation in the oil sands."

**Table 1**
Summary of frames.

| Frame | Themes | Examples |
|---|---|---|
| **Techno-optimism** | Faith in technological development | "Peabody believes that technology has been the proven answer, and we have the opportunity to continue to use technology to drive down emissions." |
| | Emphasis on CCS | "CCS is part of a portfolio of emerging GHG-mitigation technologies that can help manage emissions in the future… Chevron's participation in the development of policy frameworks for CCS spans more than a decade." |
| | Higher efficiency fossil fuels | "Shell V-Power petrol and diesel and Shell Helix engine oil increase engine efficiency by burning more cleanly and reducing friction and wear." |
| | Renewable energy | "For instance, we [BP] have major interests in solar development, electric vehicle charging and sustainable biofuels." |
| **Necessitarianism** | Provision of a vital and necessary service that improves quality of life | "Our [ConocoPhillips'] core business of delivering energy to the world contributes directly to: Goal 7 [UN Sustainable Development Goals]: Ensure access to affordable, reliable, sustainable and modern energy for all." |
| **Compliance** | Emphasis of adherence to regulation and established standards | "Our [CONSOL Energy's] sustainability goal is to maintain a 99.9% compliance record, and in 2018, we achieved this record for the 6th consecutive year." |
| **Countermeasures** | Participation in organizations and partnerships that benefit the environment | "We [ExxonMobil] collaborate with approximately 80 universities around the world to explore new energy technologies." |
| | Monetary investment in environment-related R&D | "In addition, the company [Peabody Energy] made a $3 million investment in Arq technology in 2019 to advance a novel approach to coal-to-oil products that creates a very low sulfur transportation fuel." |

The use of the techno-optimism frame often serves as an argument for the sustainable use of fossil fuels. A prime example of this is Peabody's [39] "Surprisingly Sustainable Case for Coal." Peabody argues that coal is a sustainable energy source. The company explains this assertion with three central points, called pillars. The first pillar asserts that there will be market demand for coal for many decades to come. The above quote serves as an explanation of the company's second pillar, which highlights the ability of advanced technology to drive down emissions. The third pillar explains that working to lower admissions will result in financial success for the company ([39]: 16). This frame directs attention to technologies that can do good for the environment, without completely diverting from the established fossil fuel industry.

An extension of this function of the techno-optimism frame is the utilization of its second subdivision, an emphasis on CCS. Excluding Arch Coal, all company publications discussed the merits of CCS technology. Some sustainability reports emphasized how long the given company had supported CCS. For example, "Chevron's participation in the development of policy frameworks for CCS spans more than a decade" ([34]: 36). Others emphasized the amount of carbon already

captured. ExxonMobil ([35]: 13), for example, boasts that, "Since 1970, ExxonMobil has cumulatively captured more $CO_2$ than any other company, accounting for more than 40 percent of cumulative $CO_2$ captured. We maintain a working interest in more than one-fifth of the world's total carbon capture capacity." Other reports highlighted the future potential of CCS. Shell ([37]: 45) states that, "We invest in projects to capture and store carbon dioxide ($CO_2$) and we are exploring new ways of using $CO_2$ once it has been captured." Like a general faith in technological innovation to solve climate change, an emphasis on the positive future role of CCS to combat climate change was common. ExxonMobil, Shell, and Chevron have sections in their reports dedicated to CCS. Overall, a focus on CCS is a central component of techno-optimism in the sustainability reports.

Some sustainability reports point to the development of cleaner and more efficient nonrenewable energy sources and renewable energy sources as a supplement for existing fossil fuels. The "cleaner" fossil fuel energy and renewable energy subdivisions of the techno-optimism frame were less prevalent than more general faith in technological advancement and CCS subdivisions, only being used by CONSOL, BP, Shell, and Chevron. BP ([36]: 27), for example, is "exploring the potential of blue hydrogen – hydrogen from natural gas – from which the carbon is captured and stored. We also believe green hydrogen produced from the electrolysis of water using renewable energy will play an increasingly important role, particularly in parts of the world with high renewable energy potential." Examples of the fourth subdivision of the techno-optimism frame, a future transition to renewable energy sources, include BP's ([36]: 3) statement that "we have major interests in solar development, electric vehicle charging and sustainable biofuels" and Chevron's ([34]: 37) claim to continue "its commitment to understanding and evaluating the economic viability of renewable energy sources, including solar, wind, geothermal and biofuels."

Overall, the techno-optimism frame was the most prominent climate change frame utilized in the sustainability reports. The emphasis on technological advancement and CCS in particular present the fossil fuel companies as the solution to climate change. As one reviewer pointed out, techno-optimism is certainly not restricted to fossil fuel companies, and may even be endemic to nearly all private industries. The gravity and implications of a prevalent techno-optimism among fossil fuel companies in particular will be critically analyzed in the discussion (Section 5).

### 4.2. Necessitarianism

The second major frame that emerged from the data is this: the fossil fuel industry provides a necessary and vital service that improves the quality of life for many people. This frame was termed "necessitarianism" to invoke the implied message: carbon emissions are the necessary cost of living in modern society. As with the techno-optimism frame, this frame was employed by all the sustainability reports, thus making it the second most prevalent frame. However, in comparison to the techno-optimism frame, the necessitarian frame was often used with less detail and in passing. The frame emphasizes the inherent importance of providing energy to people who need it.

The following passage from ExxonMobil ([35]: 3) exemplifies the necessitarian frame: "Our industry plays a critical role providing the energy that supports economic growth and improves the quality of life for billions of people around the world." Like ExxonMobil, BP ([36]: 10) associates increases in energy use with economic growth and economic growth with wellbeing: "By providing the energy to heat and light homes and for transport and industry, BP supports economic growth and the improvements in quality of life this brings." Similarly, Peabody ([39]: 17) ties more energy use, specifically more coal use, to improvements in wellbeing: "Life expectancy, educational attainment and income all correlate with per capita electricity use and more of the world's electricity is fueled by coal than any other source." ConocoPhillips ([38]: 41) even links their energy to the UN's Sustainable Development Goals: "Our core business of delivering energy to the world contributes directly to: Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all."

The necessitarian frame is related to climate change because necessitarianism in reports dedicated to summarizing sustainability strategies justifies the existence of and need for the fossil fuel industry, despite the harms. In other words, the necessitarian frame employed in sustainability reports implies that, even if the industry does harm the environment, it does so to provide a necessary and vital service to society that improves the general welfare.

### 4.3. Compliance

"Compliance" is the third major frame that emerged from the data. It refers to the following frame prevalent in the sustainability reports: fossil fuel companies are (already) addressing climate change and environmental concerns more broadly by adhering to established or recent regulations and standards. The companies that predominantly used this frame in their reports were CONSOL, Shell, Arch Coal, Chevron, and ConocoPhillips. When using this frame, these companies highlight their achievements in fulfilling emission policies, safety requirements, criteria for habitat restorations, and more. Of particular interest for this study is adherence to environmental policies regarding emissions.

The simultaneous reassurance and ambiguity of the compliance frame is captured by Shell ([37]: 30): "We set ourselves stringent environmental standards, which meet regulatory requirements and often exceed them." Similarly, CONSOL ([40]: 19) promises that, "Our sustainability goal is to maintain a 99.9% compliance record, and in 2018, we achieved this record for the 6th consecutive year." Arch Coal and ConocoPhillips point to the compliance of subsidiaries and suppliers to signal sustainable practice:

> "Our subsidiaries had a perfect compliance rate while operating around-the-clock and year-round."
>
> -Arch Coal ([41]: "Our Approach to Air")

> "Suppliers must comply with applicable environmental laws and regulations and conduct business with respect and care for both the local and global environment, including utilizing energy and natural resources efficiently and managing waste, emissions and discharges responsibly."
>
> -ConocoPhillips ([38]: 32)

Some companies bolded or enlarged the text employing the compliance frame, thereby enhancing its salience. For example, Arch Coal increased the font size and isolated the above passage above on their website.

This compliance frame suggests that, judged from the perspective of existing regulations, these companies are environmentally acceptable. In Section 5, we critically examine the implied message in the compliance frame: fossil fuel companies are ostensibly less culpable of their actions if they are compliant with standards.

### 4.4. Countermeasures

A fourth frame used by fossil fuel companies to allege climate change action was termed "countermeasures," or strategies that counteract or offset the negative impacts of fossil fuels. Two countermeasures were common: (1) the participation of fossil fuel companies in other organizations and partnerships or communities that do work to benefit the environment and (2) monetary investments in environment-related R&D.

CONSOL, ExxonMobil, BP, Shell, Chevron, ConocoPhillips, and, to an extent, Arch Coal all invoke the environmental partnership countermeasure frame. For example, ConocoPhillips ([38]: 67) states: "We are one of 25 companies participating in The Environmental Partnership, a

coalition of natural gas and oil companies focused on accelerating environmental performance improvements from operations across the United States." Similarly, Shell ([37]: 67) describes how their partnerships can benefit the environment, along with local communities: "We work with partners to reduce our environmental impact, improve areas around our operations and ensure local communities benefit from our presence. Together, we share our scientific and conservation knowledge with industry and environmental groups and engage on sustainability challenges."

Some companies emphasized the inherent positive potential of information exchange across actors. For example, "CONSOL was also represented on the Committee on Earth Resources ('CER') of the National Academies of Science, Engineering, and Medicine. The CER provides a unique forum for discussion and exchange of information among scientists, engineers, and policy makers about issues relevant to the supply, delivery, and associated impacts of mineral and energy resources" ([40]: 7). Other instances of the environmental partnership countermeasure frame are more specific about policy goals. For example, "We're working with other businesses, governments and civil society, to support the expansion of carbon pricing through our participation in the Carbon Pricing Leadership Coalition and the US-based Climate Leadership Council" ([36]: 19).

Along with industrial, NGO, and community partnerships, academic partnerships were also prominent in the environmental partnership frame. Details concerning academic partnerships ranged from vague to more specific. For example, compare the following to extracts:

> "We collaborate with approximately 80 universities around the world to explore new energy technologies."
>
> -ExxonMobil ([35]: 12)

> "CONSOL is partnering with a team led by Ohio University aiming to develop engineered composite decking boards from coal. The utilization of coal in the manufacture of construction composite building materials requires less energy — resulting in lower manufacturing costs and emissions—than manufacturing commercial wood plastic composites."
>
> -CONSOL ([40]: 25)

Sustainability reports emphasized how partnerships would positively influence future generations through new technology, information exchange, and/or policy changes. It is common for a single company to have many such partnerships. For example, Peabody has 30 partnerships with organizations such as IPIECA, Oil and Gas Climate Initiative, World Energy, and the Nature Conservancy. This frame can be considered an extension of the industrial leadership frame as discussed by Schlichting [15]. The fossil fuel companies use their influence and wealth to form partnerships with many types of organizations, including research groups, universities, lobbyists, and think tanks. These partnerships then reintroduce and extend the ideals of the fossil fuel industry. This is especially true with partnerships with schools and universities. With elementary and secondary schools, fossil fuel companies help develop curricula and with universities they help fund research [3], as seen above with CONSOL.

Along with environmental partnerships, investing or spending money to fund external and internal R&D is a second dimension of the countermeasure frame. This monetary investment frame is utilized by CONSOL, ExxonMobil, BP, Shell, Arch Coal, Chevron, and ConocoPhillips, emphasizing funding for universities for research and/or money spent on internal environment-related R&D. Many instances assume that any investment in R&D is good because R&D spending shows "an ongoing commitment to fundamental science and innovation," as ExxonMobil ([35]: 12) put it. This framing is clearly connected to the techno-optimism frame. We decided to separate this dimension from the techno-optimism frame and code it as an instance of the countermeasure frame because R&D investments were often framed as a means to offset or correct environmental harms.

The monetary investment component of the countermeasures frame is one of the more directly measurable frames used within the reports. Like the compliance frame, the monetary investment frame is often used by separating the amount of money spent from the text, which enhances its salience. The impact of this dimension of the countermeasures frame is similar to the partnership component. By indicating the specific amounts of money invested, the sustainability reports emphasize a tangible, positive impact, with money used to directly fund research, improve communities, restore locations, or create improved technology.

### 4.5. Omissions

When identifying frames, omissions are just as important to understand as inclusions [12]. A frame of omission is where a certain relevant topic is not mentioned, or only briefly mentioned in a report. There are several key frames of omission in these reports, omissions which reveal what the fossil fuel companies do not consider to be important, at least important enough to discuss in a report on sustainability issues. Shining light on what is omitted also brings to attention relevant information that stakeholders who read the sustainability reports are *not* encouraged to attend to. For the reports studied, the frames of omission include potential environmental and societal risks (*risk minimization*) and potential future scenarios that are significantly different from the growing economy powered by increased energy output (*possibility blindness*) (cf. [33]).

With risk minimization, the companies did not draw attention to potential downsides to or dangers of fossil fuels for the future, or to the risks of technological fixes. This is especially true for the companies that emphasize CCS (Shell, Chevron, ExxonMobil, BP). They propose CCS as a sound option for reducing greenhouse gasses in the atmosphere. However, the reports do not acknowledge any downsides or potential risks this new technology poses. Risks and downsides include slow development, too small of an impact on mitigating carbon flows, inefficient use of energy, and high investment costs that would redirect funds from other, more sustainable solutions (see [43]).

Regarding possibility blindness, Chevron is the only company that actively explored multiple different future scenarios. But this approach was focused mostly on how various sustainable development scenarios and climate change might impact the company. Most companies acknowledged the need for "cleaner" fuel (see Section 4.1) and a select few companies briefly discussed renewable energy. However, all sustainability reports assumed that the future will be powered in part by fossil fuels with aid of advanced technologies like CCS and higher efficiency fossil fuels.

These omissions are related to the absence of problem definition, diagnosis, and evaluation in their framing of climate change (see Section 4). These three dimensions of framing largely overlap: defining the problem determines what a causal agent is doing and the associated costs and benefits of that action, diagnosing causes identifies the forces creating the problem, and making moral judgements evaluates causal agents and their effects [12]. In terms of problem definition, the sustainability reports acknowledge that climate change exists and that it is a problem. While some companies acknowledge their role in climate change, others attempt to subtly spread the blame. For instance, Shell [37] states that they can only control their own emissions and that it is up to everyone involved to mitigate climate change. Therefore, the definition of the problem according to the fossil fuel industry is that climate change is happening, not that they are a leading cause of it.

This is related to cause diagnosis. A leading cause of climate change is fossil fuel combustion, fossil fuels that are extracted by fossil fuel companies. Whether intentional or not, omitting a long discussion of this information in sustainability reports decreases its salience. In terms of moral judgements, the most prevalent is the consequentialist argument implied in the necessitarian frame: the service provided is necessary for improving quality of life and, thus, the end justifies the means (see Section 4.2). In short, any extended diagnosis, problem definition, or

moral judgment would indict the fossil fuel industry. No extended and explicit diagnoses, problem definitions, or moral judgements are made. As discussed in the following section, the avoidance of indictment may be the one uniting feature of all framing strategies.

## 5. Discussion: Denialism in new clothes

The goal of the discussion is to cast a critical eye at what is concealed or hidden from stakeholders and the public by the four frames and their key omissions. We bring the frame analysis of sustainability reports into discussion with more subtle forms of climate denialism among fossil fuel industry actors ([3], cf. [44]) and the use of greenwashing by the fossil fuel industry [20]. For reasons explained below, the analysis of the sustainability reports confirm that the fossil fuel industry continues to engage in denialism in new forms. On the one hand, the fossil fuel industry continues to engage in the organized climate change denial campaign in various ways (e.g., [1,45]). However, this literal, explicit approach to climate change denial is no longer the fossil fuel industry's polished, public-facing message about climate change. The framing strategies employed in their sustainability reports continue climate denialism, but in new forms (for expanded notions of climate change denial, see [46–47]).

Three overlapping and more subtle forms of climate denial are present in the fossil fuel industry's framing strategies: (1) ideological denial, (2) greenwashing, and (3) reification. Along with defining these concepts below, we argue that the techno-optimism, compliance, and countermeasure frames are all forms of ideological denialism and greenwashing, and that the necessitarian frame is a form of climate denial via reification. Additionally, the frame omissions – risk minimization and possibility blindness – are conceptualized as forms of greenwashing, and possibility blindness in particular is interpreted as a form of reification.

### 5.1. Ideological denial

The "ideological denial" of climate change refers to the recognition of the need to address climate change while "fail[ing] to diagnose the root causes and prescrib[ing] solutions that maintain the current system" that drives climate change ([47]: 117). For example, climate change diagnoses that do not direct attention to a growth-dependent and fossil fuel-dependent economy and/or prescribe untested or ineffective technological "silver bullet" solutions are forms of ideological denialism. Mann [44] points to a transition from a literal climate denialism to subtler forms of deflection like promoting "non-solution solutions" such as geoengineering.

The techno-optimism frame is a form of ideological denialism [47]. To review, the techno-optimism frame can be divided into several categories: (1) general faith in technological advancement, (2) an emphasis on CCS, (3) drawing attention to the benefits of cleaner and more efficient fossil fuels, and (4) invoking the future potential renewable energy. This frame reflects two dimensions of the ideological denial of climate change: (1) it implicitly misdiagnoses the problem of climate change as merely a technical problem that can be solved with merely technological solutions, including untested technological solutions, and (2) misdirects attention from the fossil fuel industry as a major actor in driving climate change.

The techno-optimism frame increases salience for technological advancements and newer fuels that will help mitigate climate change, which decreases salience surrounding the fact that their industry is the biggest contributor to climate change. This shift in focus is subtler than denying their impact on climate change, which would be a form of literal denialism. Overall, this frame presents the fossil fuel industry in a positive light by emphasizing technologies that it has co-developed or plans to co-develop. However, the focus on CCS may distract and misdirect stakeholders and the public. As Mann ([44]: 153) recently put it: "CCS is attractive to fossil fuel companies, as it provides them with a license to continue extracting and selling fossil fuels." Again, the salience is placed upon this solution provided by the fossil fuel industry and removes salience from that fact that the fossil fuel industry plays a major role in the climate change problem.

The compliance frame is also an example of ideological denialism. By enhancing salience of adherence to regulation, this frame detracts salience from the root cause of climate change: a growth-dependent economy powered by the product supplied by the fossil fuel industry. This frame implies that companies are doing all they can, within reason, to mitigate their impact on the environment. If they are doing what is required of them, then they need not do more. This frame may serve as a counterargument to those who demand greater change than we have seen. Furthermore, the compliance frame is an effective tool in misdirecting public focus. Placing focus on compliance with regulation shifts focus away from fossil fuel industry contributions to climate change. Focus on compliance, and in some cases exceedance of regulations, implicitly draws attention from wrongdoing by acknowledging the reason behind and need for the regulations (i.e., climate change) while making irrelevant the reason for these regulations (carbon emissions from the use of fossil fuels).

Finally, the countermeasures frame is an expression of the ideological denial, specifically by promoting solutions to climate change that reproduce rather than challenge the status quo. These countermeasures, specifically the partnerships, serve to build and maintain an infrastructure that promulgates the ideals and priorities of the fossil fuel industry. Additionally, education and academic research-based partnerships can increase the dissemination of misleading material regarding climate science and increase support for the fossil fuel industry. These are key long-term denial strategies defined by Brulle [3]. These countermeasures can act as a veil to hide behind. The companies that use this frame can present ways they are improving communities and the environment and distract attention from the ways in which they are harming it.

### 5.2. Greenwashing

Greenwashing can be defined as the concealment of environmentally harmful actions by an industrial actor with the rhetoric of environmental friendliness in order to entice and manipulate consumer perceptions of that industry's product ([20]; for overview of diverse definitions, see [19,48]). The most relevant greenwashing tactic for our purposes is the hidden trade-off: framing a product as green based on a single attribute while other attributes are ignored. At its core, greenwashing redirects public focus attention away from the environmental harm done by corporations and towards their minimal efforts to protect the environment, thereby pacifying disquiet.

In addition to expressing ideological denialism, each iteration of the techno-optimism is a form of greenwashing, specifically the hidden trade-off. In each techno-optimism iteration (general faith in technological advancement, CCS, cleaner and more efficient fossil fuels, and renewable energy), the fossil fuel companies present themselves as the best way forward. Yet they often only looked at one aspect of their proposed solution and none of the potential drawbacks. With better technology, CCS development, and more efficient fuels, the central fuel sources are still fossil fuels. Once again, this is a prime example of the hidden trade-off and expertise emphasis aspects of greenwashing. The fossil fuel companies propose technology developed by their scientific experts as the solution, while ignoring all of the hidden trade-offs that do not support their proposed solutions. Furthermore, this may convince stakeholders that these companies are working to better the environment, when they are actually doing the bare minimum so they can continue extracting fossil fuels.

The compliance frame also represents a form of greenwashing. By emphasizing that they meet some current regulations, these companies imply that they are environmentally friendly as they have not exceeded any regulations that protect the environment. This emphasis on

compliance conceals any harm done in the past, as well as the harm that still occurs even when regulations are met. This is an example of the hidden trade-off aspect of greenwashing. By shifting public focus towards compliance, the corporations shift that focus away from the harm done. The industry is portrayed in a more positive light than it deserves, which may appease the worries of its shareholders.

Both aspects of the countermeasures frame also display elements of greenwashing. This frame works to shift public focus towards positive contributions to society made by the fossil fuel industry in the form of significant partnerships and investment into environment related R&D. The partnerships made by the companies serve to increase the presence of these corporations in local communities and elevate their status and public opinion of them, which further distances the companies from negative perceptions. If the companies can shift focus to how they actively better communities, perhaps stakeholders will inadvertently overlook the harm the industry caused. This situates the fossil fuel industry in a way that it appears to be leading the fight against climate change. However, these partnerships may serve to increase or prolong reliance upon their services. Examples of this include Shell partnering with the Clean Skies for Tomorrow Coalition to provide aviation fuel and CONSOL partnering with Ohio University to prolong reliance on coal usage.

This tangible demonstration of aid and investment in public health captures attention and shifts it away from the fact that the fossil fuel industry is investing much more in fossil fuel-related projects. The fossil fuel companies present themselves in such a way as to convince the public that they are actively working to fight climate change, when many of these partnerships and investments work to circulate information that promulgates the ideals and goals of the fossil fuel industry or undermine climate scientists.

Regarding frame omissions, risk minimization and possibility blindness can also be interpreted as forms of greenwashing. A key component of the hidden trade-off aspect of greenwashing is that risks are minimized. The fossil fuel companies present a solution, while ignoring any potential drawbacks to convince the public of their dedication and successful efforts to restore or protect the environment. Possibility blindness greenwashes in a very similar way to risk minimization. The companies indicate that they are dedicated to fight climate change while omitting the possibility that society could be organized in ways that rapidly reduces emissions and dependence on fossil fuels and transitions to a renewable-based energy system - a significant hidden trade-off.

### 5.3. Reification

Reification often refers to a justification of the current social order on the grounds that this order is natural and/or unchangeable (for reviews, see [49–51]). By constituting society as necessary and fixed, necessitarianism is a form of reification [49]. The goal here is to explain why the necessitarian frame and possibility blindness are expressions of reification and how reification promotes the status quo.

The necessitarian frame is a prime example of reification, where the current social order is justified unchangeable. In this case, the social order supported by the fossil fuel industry is justified as necessary and relatively fixed for the foreseeable future. Emissions are implicitly framed as a necessary consequence of a higher quality of life. The use of necessitarianism juxtaposes the threat of climate change with the idea that, without fossil fuel corporations, multitudes of people would experience a much lower quality of life. Relatedly, blindness to the possibility of a qualitatively different future (possibility blindness) is a dimension of reification [49]. If an alternative future social world that is fundamentally different than the present is not even mentioned, let alone contemplated, there is no reason to expect the basic contours of the present to change.

Other scholars have explored the role of reification in climate politics, emphasizing the relationship between the reification of the social order that drives climate change and everyday actors' helplessness to change this social order [52–53]. The necessitarian frame further reifies society by consoling readers that, despite their negative consequences, fossil fuels are an indispensable feature of a good life, and there are no alternatives to our current "good life" worthy of discussion. Necessitarianism and possibility blindness are two sides of the same implicit denial of what needs to be done to address climate change: rapidly phase out nearly all fossil fuel extraction and use [54].

## 6. Conclusion

To reconcile the demand to address the climate crisis with the reality that their product is the most significant immediate cause of climate change, the fossil fuel industry employs the following frames in annual sustainability reports: (1) *techno-optimism*, or, the belief that, without fundamental social changes, innovative technologies and fuels can help solve the issue of climate change, as well as invoking the future potential of renewable and cleaner nonrenewable sources; (2) *necessitarianism*, or, the notion that the fossil fuel industry provides a necessary service that improves the quality of life of many people; (3) *compliance*, or, adherence to established regulations and standards; and (4) *countermeasures*, or, strategies that indirectly counteract harms done, especially through participation in other organizations that do work to benefit the environment and investing in other environmental projects. Furthermore, two frames central to discourses surrounding fossil fuels and climate change are notably absent in the annual sustainability reports: (5) potential environmental and societal risks of fossil fuels (*risk minimization*) and (6) potential future scenarios that are significantly different from the growing economy powered by increased energy output (*possibility blindness*).

We argue that these frames are more subtle forms of climate denialism. The fossil fuel industry has transitioned from explicit climate denialism towards new forms of denialism that more subtly denies the reality of climate change and its drivers. The new denialism occurred in three forms: (1) *ideological denialism*, (2) *greenwashing*, and (3) *reification*. The techno-optimism, compliance, and countermeasures frames all expressed the ideological denial of climate change, where climate change is acknowledged as a problem, but the root drivers of climate change are obscured, and the recommended solutions preserve rather than challenge the system driving climate change. The techno-optimism, compliance, and countermeasures frames, as well as the frame omissions, use various forms of greenwashing to manipulate perception and, perhaps, pacify stakeholders. Finally, the necessitarian frame and possibility blindness are forms of reification which promulgates the idea that the social order established by the fossil fuel industry is both necessary and unchangeable.

As literal denialism loses steam, fossil fuel companies will likely continue to employ techno-optimistic, necessitarian, compliance, and countermeasure frames to fill the opening. We think these framings will assist fossil fuel companies in their effort to remain *fossil fuel* companies, which undermines mitigation efforts. As mentioned in Section 3.1, we assume that adequately addressing climate change requires rapidly phasing out nearly all fossil fuel extraction and use, a possible future that is an existential threat to fossil fuel companies [30]. By transforming fossil fuel companies into the solution rather than the problem, techno-optimistic, necessitarian, compliance, and countermeasure frames—prolongations of the industrial leadership frame pioneered by European corporations decades ago [15]—allow fossil fuel companies to protect their existence and profitability in the face of stakeholder criticisms. Indeed, a unifying feature of all the framing strategies in the sustainability reports is that there is no indictment against the perpetrators of climate change. Any extended diagnosis, problem definition, or moral judgment would indict the very industry attempting to conceal its culpability. The frames used serve to shift focus away from the harm done to the environment by the fossil fuel industry and towards the minimal positive actions by the same industry to appease shareholders

and the public.

It is imperative to continue to understand how fossil fuel companies are framing their relationship to climate change, especially when investors and the public are calling for more sustainable corporations. One avenue for future research is to compare the formal, polished framings used by fossil fuel companies with unofficial, less-refined framings. For example, the Climate Leadership Council (CLC), a non-profit organization co-created by fossil fuel companies that advocates centrist solutions to climate change, recently expelled ExxonMobil, a founding member, following the release of a recording of an ExxonMobil lobbyist disclosing that supporting CLC's push for a carbon tax was merely a "great talking point" [55]. Although it would be difficult to systematically gather data to conduct an analysis of unofficial framings, one route is conducting in-depth interviews with, or even ethnographies of, mid- to high-level fossil fuel industry employees. Another route for future research is to more explicitly contrast the polished framings used by fossil fuel companies with their actual behavior (investment patterns, lobbying decisions, etc.).

## 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.

## Acknowledgement

We would like to thank Michele Simmons and Suzanne Zazycki for comments on an early version of this project.

## References

[1] R.E. Dunlap, A.M. Aaron, Challenging climate change: the denialist countermovement, in: R.E. Dunlap, R.J. Brulle (Eds.), Climate Change and Society: Sociological Perspectives, Oxford University Press, New York, 2015, pp. 300–333.
[2] N. Banerjee, L. Song, D. Hasemyer, Exxon's own research confirmed fossil fuels' role in global warming decades ago, Inside Climate News 16 (2015).
[3] R.J. Brulle, Denialism: organized opposition to climate change action in the United States, in: D. Konisky (Ed.), Handbook of Environmental Policy, Edward Elgar Publishing, Northampton, MA, 2020, pp. 328–341.
[4] R.E. Dunlap, A.M. McCright, Organized climate change denial, Oxford University Press, The Oxford Handbook of Climate Change and Society, 2011, pp. 144–160.
[5] N. Oreskes, E.M. Conway, Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming, Bloomsbury, New York, 2011.
[6] S. Reed, Oil companies ponder climate change, but profit still rules, *New York Times*, Oct. 7, 2019. Available: https://www.nytimes.com/2019/10/07/business/energy-environment/oil-companies-climate-change-profits.html.
[7] Z. Boren, A.C. Kaufman, L. Carter, Revealed: BP and Shell back anti-climate lobby groups despite pledges. *HuffPost*, Sept. 28, 2020. Available: https://www.huffpost.com/entry/bp-shell-climate_n_5f6e3120c5b64deddeed6762.
[8] Union of Concerned Scientists, The 2018 climate accountability scorecard: Insufficient progress from major fossil fuel companies, 2018.
[9] R.J. Brulle, The climate lobby: a sectoral analysis of lobbying spending on climate change in the USA, 2000 to 2016, Clim. Change 149 (3-4) (2018) 289–303.
[10] P. Griffin, P. *CDP Carbon Majors Report 2017*, 2017. Available: https://b8f65cb373b1b7b15feb- c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/002/327/original/Carbon-Majors-Report-2017.pdf?1499691240.
[11] R. Heede, Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854–2010, Clim. Change 122 (1-2) (2014) 229–241.
[12] R.M. Entman, Framing: toward clarification of a fractured paradigm, J. Commun. 43 (4) (1993) 51–58.
[13] E. Goffman, Frame analysis: An essay on the organization of experience, Harper and Row, New York, 1974.
[14] A. Martínez Arranz, Carbon capture and storage: Frames and blind spots, Energy Policy 82 (2015) 249–259.
[15] I. Schlichting, Strategic framing of climate change by industry actors: A meta-analysis, Environ. Commun. 7 (4) (2013) 493–511.
[16] D.L. Levy, D.L. Business and the evolution of the climate regime, in: D.L. Levy, P.J. Newell (Eds.), *The Business of Global Environmental Governance*, Cambridge, MA: MIT Press, 2005, pp. 73-104.
[17] M. Le Menestrel, S. van de Hoven, H.-C. de Bettignies, Process and consequences in business ethical dilemmas: The oil industry and climate change, J. Bus. Ethics 41 (3) (2002) 251–266.
[18] K.R. Smerecnik, V.R. Renegar, Capitalistic agency: The rhetoric of BP's Helios Power campaign, Environ. Commun. 4 (2) (2010) 152–171.
[19] S.V. de Freitas Netto, M.F.F. Sobral, A.R.B. Ribeiro, G.R. da Luz Soares, Concepts and forms of greenwashing: a systematic review, Environ. Sci. Europe 32 (1) (2020) 1–12.
[20] E. Plec, M. Pettenger, Greenwashing consumption: The didactic framing of ExxonMobil's Energy Solutions, Environ. Commun. 6 (4) (2012) 459–476.
[21] C.C. David, J.M. Atun, E. Fille, C. Monterola, Finding frames: Comparing two methods of frame analysis, Commun. Methods Meas. 5 (4) (2011) 329–351.
[22] U.H. Graneheim, B. Lundman, Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness, Nurse Educ. Today 24 (2) (2004) 105–112.
[23] L. Haapanen, P. Tapio, Economic growth as phenomenon, institution and ideology: a qualitative content analysis of the 21st century growth critique, J. Clean. Prod. 112 (2016) 3492–3503.
[24] C. Meyers, K. Abrams, Feeding the debate: A qualitative framing analysis of organic food news media coverage, J. Appl. Commun. Res. 94 (3–4) (2010) 22–37.
[25] R. Wodak, Aspects of critical discourse analysis, Zeitschrift für angewandte Linguistik 36 (10) (2002) 5–31.
[26] S. Cummings, B. Regeer, L. de Haan, M. Zweekhorst, J. Bunders, Critical discourse analysis of perspectives on knowledge and the knowledge society within the Sustainable Development Goals, Dev. Policy Rev. 36 (6) (2018) 727–742.
[27] K. Molek-Kozakowska, Popularity-driven science journalism and climate change: A critical discourse analysis of the unsaid, Discourse, Context & Media 21 (2018) 73–81.
[28] N. Smeets, The green menace: Unraveling Russia's elite discourse on enabling and constraining factors of renewable energy policies, Energy Res. Social Sci. 40 (2018) (2018) 244–256.
[29] T. Sikka, A critical discourse analysis of geoengineering advocacy, Critical Discourse Studies 9 (2) (2012) 163–175.
[30] D. Kenner, R. Heede, White knights, or horsemen of the apocalypse? Prospects for Big Oil to align emissions with a 1.5° C pathway, Energy Res. Soc. Sci. (2021), 102049.
[31] Carbon Disclosure Project, Beyond the cycle: Which oil and gas companies are ready for the low-carbon transition?, 2018. Available: https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/003/858/original/CDP_Oil_and_Gas_Executive_Summary_2018.pdf?1541783367.
[32] Union of Concerned Scientists, The climate accountability scorecard: ranking major fossil fuel companies on climate deception, disclosure, and action, 2016. Available: https://www.ucsusa.org/sites/default/files/attach/2016/10/climateaccountability-scorecard-full-report.pdf.
[33] R. Gunderson, D. Stuart, B. Petersen, The fossil fuel industry's framing of carbon capture and storage: Faith in innovation, value instrumentalization, and status quo maintenance, J. Cleaner Prod. 252 (2020) 119767, https://doi.org/10.1016/j.jclepro.2019.119767.
[34] Chevron, Climate change resilience a framework for decision making – human energy, 2018. Available: https://www.chevron.com/-/media/shared-media/documents/climate-change-resilience.pdf. Accessed July 2020.
[35] ExxonMobil, 2018 Sustainability Report Highlights, 2018. Available: https://corporate.exxonmobil.com/-/media/Global/Files/sustainability-report/publication/2018-Sustainability-Report.pdf. Accessed July 2020.
[36] British Petroleum (BP), Energy with purpose BP Sustainability Report 2019, 2019. Available: https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/sustainability/group-reports/bp-sustainability-report-2019.pdf. Accessed July 2020.
[37] Royal Dutch Shell (Shell), Sustainability report 2019: Delivering energy responsibly, 2019. Available: https://reports.shell.com/sustainability-report/2019/servicepages/downloads/files/shell_sustainability_report_2019.pdf?_ac_lkid=14b0-f639-efd2-f4de17682987cc3. Accessed July 2020.
[38] ConocoPhillips, 2018 sustainability report. Available: https://static.conocophillips.com/files/callouts/sustainability-report-2018-3.pdf. Accessed July 2020. Accessed July 2020.
[39] Peabody Energy (Peabody), Delivering results, generating value: Environmental, social, and governance report 2019, 2019. Available: https://www.peabodyenergy.com/Peabody/media/MediaLibrary/Sustainability/2019-Peabody-ESG-FINAL.pdf. Accessed July 2020. Accessed July 2020.
[40] CONSOL Energy, Forward progress 2019 corporate sustainability report, 2019. Avaiable: http://www.consolenergy.com/sustainability. Accessed July 2020.
[41] Arch Coal, Our approach. Arch Resources, Inc., 2020. http://www.archrsc.com. Accessed July 2020.
[42] R. York, B. Clark, Critical materialism: science, technology, and environmental sustainability, Sociological Inquiry 80 (3) (2010) 475–499.
[43] J.C. Stephens, N. Markusson, Technological 0ptimism in climate mitigation: The case of carbon capture and storage, in: D.J. Davidson, M. Gross (Eds.), The Oxford Handbook of Energy and Society, Oxford University Press, 2018, pp. 503–517.
[44] M.E. Mann, The New Climate War: The Fight to Take Back the Planet, Public Affairs, New York, 2021.
[45] L. Carter, Z. Boren, Revealed: BP and Shell back anti-climate lobby groups despite pledges. *Unearthed*, 2020. Available: https://unearthed.greenpeace.org/2020/09/28/bp-shell-climate-lobbygroups/.
[46] K.M. Norgaard, Living in denial: Climate change, emotions, and everyday life, MIT Press, 2011.
[47] B. Petersen, D. Stuart, R. Gunderson, Reconceptualizing climate change denial, Human Ecology Review 25 (2) (2019) 117–142.

[48] P. Seele, L. Gatti, Greenwashing revisited: In search of a typology and accusation-based definition incorporating legitimacy strategies, Business Strategy and the Environment 26 (2) (2017) 239–252.
[49] R. Gunderson, Things are the way they are: A typology of reification, Sociological Perspectives 64 (1) (2021) 127–150.
[50] H.F. Pitkin, Rethinking reification, Theory and Society 16 (2) (1987) 263–293.
[51] F. Vandenberghe, Reification: History of the concept, in: N.J. Smelser, P.B. Baltes (Eds.), *International Encyclopedia of the Social and Behavioral Sciences* 19 (2001), Elsevier, pp. 12993-12996.
[52] P.L. Browne, Reification and passivity in the face of climate change, European Journal of Social Theory 21 (4) (2018) 435–452.
[53] A.M. Stoner, A. Melathopoulos (Eds.), Freedom in the Anthropocene, Palgrave Macmillan US, New York, 2015.
[54] R. York, S.E. Bell, Energy transitions or additions? Why a transition from fossil fuels requires more than the growth of renewable energy, Energy Research & Social Science 51 (2019) 40–43.
[55] M. Taft, Exxon kicked out of climate group it helped form. *Gizmodo*, Sep. 9, 2021. Available: https://gizmodo.com/exxon-kicked-out-of-climate-group-it-helped-form-1847451306.