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# Framing the path to net zero

## A corpus-assisted discourse analysis of sustainability disclosures by major corporate emitters, 2011–2020

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Big corporations are a leading contributor to global carbon emissions and their investment decisions have a significant impact on the world's ability to tackle climate change. This study combines corpus and discourse approaches to examine how major corporate emitters have responded to the Paris Agreement, how they legitimize their practices amid mounting public pressure, and how companies operating in high- and middle-income countries differ in their framing of climate change. The results show that carbon majors place increasing focus on climate issues, widely support the goals of the Paris Agreement, and are increasingly making net-zero pledges. However, close inspection of linguistic patterns reveals a troubling disconnect between proclaimed goals, the solutions advocated for, and the radical steps needed to address the escalating climate crisis. Companies from middle-income countries devote comparatively less attention to climate change, which points to the need for better coordinated global efforts to address this problem.

**Keywords:** climate change, carbon reporting, discursive legitimation, carbon neutrality, corporate social responsibility

### 1. Introduction

Climate change is one of the most pressing challenges of our time. Despite global efforts to tackle it, greenhouse gas emissions are still rising and the window of opportunity to limit global warming to 1.5°C, as set out in the Paris Agreement, is rapidly shrinking (IPCC, 2022). Large corporations have contributed significantly to climate change. A recent survey of historical data shows that just 100 companies are responsible for 71% of all industrial greenhouse gas emissions to date

(CDP, 2017). This study employs a corpus-assisted discourse analysis approach (e.g. Baker & McEnery, 2015) to investigate how the climate change discourse of major corporate emitters has evolved over the 2010s. We compare the sustainability reports published before and after the Paris Agreement by 69 “carbon majors” to establish whether and how their language and attitudes towards emissions and climate change have shifted in response to growing public pressure for climate action. In addition, we compare the reports published by companies operating in high- and middle-income countries to identify differences in their discursive framing of the problem. By integrating corpus and discourse methods, our study offers a comprehensive analysis of how heavy polluters communicate about climate change and emphasizes the role of micro-level linguistic features in shaping the persuasive and ideological potential of their discourse. The study makes an original contribution to the growing interdisciplinary literature on carbon reporting, which has not examined how corporations have responded to the Paris Agreement and has so far focused primarily on developed economies. The study also adds to the body of corpus-based research on climate change (e.g. Bednarek et al., 2022; Gillings & Dayrell, 2023; Mahlberg, 2007) by providing novel insights into how corporations discursively frame this critical global challenge.

## 2. Previous work

This section discusses prior research relevant to our study. We start by summarizing existing work on corporate climate change discourse and then outline the theoretical framework that guides our analysis.

### 2.1 Corporate discourse on climate change

As climate change worsens and its effects become more apparent, corporations are under increasing pressure from governments, activists, the media and the general public to reduce their carbon footprint. One of the ways in which corporations have responded to these pressures is by increasing the amount of information they provide about their greenhouse gas emissions and their strategies to reduce them. This information is made available via multiple channels, including annual financial reports, submissions to the Carbon Disclosure Project (CDP) and stand-alone sustainability reports. Our study focuses on the latter.

Carbon reporting practices have been researched extensively in the corporate communication and accounting literature. Most previous studies focus on the amount or content of carbon disclosures (e.g. Hrasky, 2012; Liesen et al., 2015; Pittrakkos & Maroun, 2019). There is, however, an emerging body of work that

takes a discourse analytical approach to deconstruct corporate discourse on climate change and uncover its ideological and persuasive properties. Three important findings emerge from this literature. First, companies are paying increasing attention to climate change in their public discourse in an effort to retain legitimacy amid growing societal pressure. For example, a longitudinal study by Pollach (2018) shows that mentions of climate change-related words in sustainability reports increased substantially over the first decade of the 21st century. Along similar lines, Ihlen (2009) finds that each of the world's 30 largest corporations discussed climate change in their 2007 sustainability reports, albeit to different degrees.

The second major theme emerging from this stream of literature is that while corporations increasingly recognize the severity of climate change, the systemic issues underlying it are left undiscussed and unchallenged. Instead, business and ecological goals are presented as mutually compatible. In a pioneering study, Livesey (2002) finds that in its first sustainability report, the energy company Shell deployed the emerging concept of 'sustainable development' as a rhetorical strategy to promote a new, hybrid discursive order in which economic growth and environmental protection can co-exist. Shell's report blended discourses of business pragmatism and rationalism with discourses of caring and ethics, for example, by defending profit as a necessary means to enable businesses to invest in environmental and social programs. The report also highlighted the social contributions of corporate wealth, such as tax revenues, employment and investment in research and development. In another landmark study, Milne et al. (2006) find that the journey metaphor is a pervasive feature of business talk on sustainability. This metaphor construes the shift towards a sustainable economy as a continuous process of experimentation, learning and improvement, with the focus generally on the journey itself rather than the end destination. The journey metaphor therefore serves primarily an impression management function; it is used by companies to portray themselves as "on the path to" or "moving toward" sustainable development, thereby avoiding blame for inaction (Milne et al., 2006: 822). The authors found no explicit discussion of limits and constraints to economic growth and therefore conclude that the journey metaphor "has the effect of deferring sustainability, in the sense of forestalling radical change that many commentators believe is necessary for its achievement" (Milne et al., 2006: 821).

Finally, previous studies reveal broad consensus among corporations around the idea that market-based solutions are superior to regulation for combating climate change. Ferguson et al. (2016), for example, find that companies advocated a market-based approach centered around voluntary emissions trading programs as the most cost-effective means for reducing their carbon footprint. Regulatory approaches such as a carbon tax were criticized as inefficient, and failed attempts

in the early 2000s by governments and international institutions to agree a common framework for tackling climate change were brought as proof that business control of the agenda is a “win-win” solution for business and society. Companies also sought to partly deflect responsibility onto other stakeholders, including consumers, by presenting climate change as a “chicken-and-egg” problem. Along similar lines, Dahl and Fløttum (2019) report that energy majors promoted carbon pricing along with technological innovation as effective market-based solutions to climate change.

Beyond corporate communication and accounting, two recent studies at the intersection of social and environmental sciences have shone a light on the climate change rhetoric deployed by fossil fuel companies. Megura and Gunderson (2022) use qualitative frame analysis to understand how these companies discursively reconcile the growing imperative to become more sustainable with the reality that their products are a direct cause of climate change. They find that ‘techno-optimism’ was the dominant rhetorical frame used in the latest sustainability reports by eight major oil and coal producers. This frame hinges on and perpetuates the belief that technological breakthroughs will solve climate change without the need for radical change. The second most prominent frame, ‘necessitarianism’, presented carbon emissions as the inevitable cost of high living standards and emphasized the positive contributions made by industry to economic growth and social development (cf. Livesey, 2002). Megura and Gunderson (2022) conclude that, while overwhelming scientific evidence has forced fossil fuel companies to abandon explicit climate change denialism, the industry has shifted to a more subtle form of denialism which revolves around the promotion of unproven technologies as a “silver bullet” and the strategic concealment of the full environmental impacts both of fossil fuels and of the proposed technological solutions. The disconnect between rhetoric and behavior in the fossil fuel industry is empirically supported by Li et al. (2022), who compare the climate change pledges made by two American and two European oil majors against “hard” data about their revenue streams and investment in fossil fuel exploration versus renewables. The authors find no evidence of a significant shift away from fossil fuels, despite the companies’ pledges to the contrary, which suggests accusations of greenwashing often levelled at oil majors are well-founded (Li et al., 2022: 19).

Within linguistics, prior research has examined various aspects of corporate discourse on the environment and sustainability (e.g. Lischinsky, 2015; Jaworska & Nanda, 2018; Zappettini & Unerman, 2016). To date, however, the only study that has looked specifically at corporate discourse on climate change is Jaworska (2018). The author uses corpus methods to investigate how major oil companies frame this issue and how their discourse has evolved between 2000 and 2013. Her

results mirror the patterns observed in the work reviewed above. For example, Jaworska (2018) finds no evidence of questioning or fundamental rethinking of the current economic paradigm. Instead, technological innovation, such as carbon capture and storage, is promoted as the key strategy for tackling climate change. The diachronic analysis corroborates Pollach's (2018) finding that companies' attention to climate change has grown over time, but also reveals a sharp decline in mentions of climate change from 2009. Jaworska's (2018) analysis adds much needed linguistic nuance to existing scholarship. For instance, she observes the use of hedging devices in sentences discussing the link between carbon emissions and climate change, and the use of the modal *will* and other future expressions to frame actions against climate change in terms of goals and expectations.

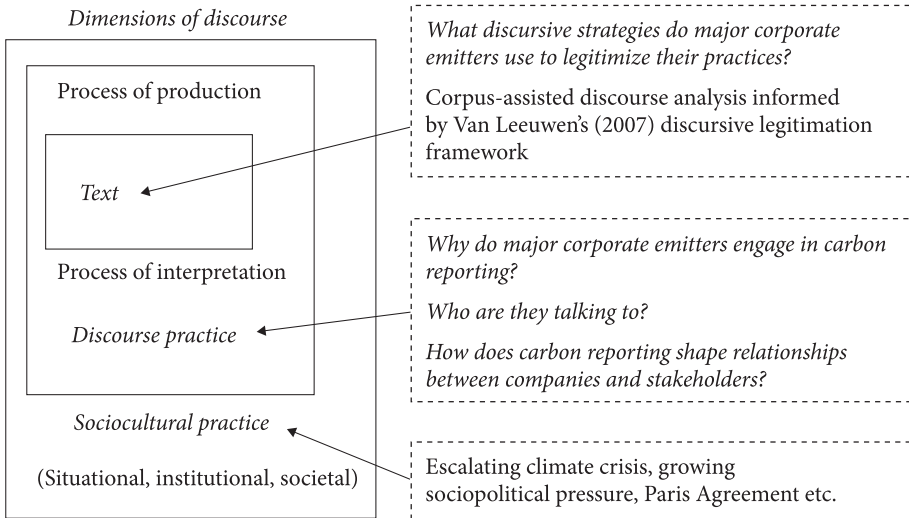
The research reviewed so far either considers texts that were published before the Paris Agreement or analyzes carbon disclosures without drawing an explicit link between corporate discursive practices and this event. While there is work investigating whether corporations are abiding by the Paris Agreement goals (e.g. Dietz et al., 2018; Klaus et al., 2023), the question of how this landmark deal has influenced corporate discourse on carbon emissions and climate change remains unexplored. We argue that studying how heavy emitters' discourse has evolved following the Paris Agreement is critical to understanding whether these companies are aligning their language, strategic vision and values with the ambitious yet imperative goals of the agreement.

Moreover, while there are a few studies comparing companies' carbon reporting practices between developed and developing countries (e.g. Luo et al., 2013), the academic debate has predominantly focused on the former (Cordova et al., 2021) and none of the previous studies has examined differences in the language used by companies operating in different socio-economic contexts. Given that a growing proportion of future carbon emissions are predicted to come from emerging and developing economies (IEA, 2021) and that climate change is a global problem requiring coordinated global action, it is important to evaluate whether top carbon emitters around the world are speaking the same language when it comes to climate change and to what extent they are aligned in their understanding and vision of possible solutions.

## 2.2 Theoretical framework

From a theoretical perspective, our study is guided by Fairclough's (2013) critical discourse analysis framework, which, as shown in Figure 1, models the relationship between language and society at three levels: (i) the linguistic choices made in text (micro level), (ii) the discursive practices of text production and interpretation

(meso level), and (iii) the broader socio-cultural context in which discursive practices are situated (macro level).



**Figure 1.** Three-dimensional critical discourse analysis framework adapted from Fairclough (2013: 133)

At the macro level, there are several important extra-linguistic factors that are likely to condition the discursive practices of major corporate polluters. These include the ever more visible effects of climate change, heightened public awareness of this problem, increasing public pressure on governments to take decisive climate action and on corporations to reduce their carbon footprint, the growing power of international institutions for dealing with climate change (e.g. the UN's IPCC), the emergence of new regulatory frameworks such as the Paris Agreement, and ongoing tensions between developed and developing countries over who should bear the financial burden of climate mitigation policies. These and other elements create an incentive structure that encourages companies to engage in carbon reporting and provide the socio-economic backdrop against which this discursive practice takes place.

At the meso level, we draw on previous work outside linguistics to understand the managerial motivations behind carbon reporting and the role this emerging discursive practice plays in shaping the relationships between companies (the text producers) and their stakeholders (the text receivers). Three distinct but complementary explanations have dominated this field: legitimacy theory, stakeholder theory and institutional theory. These approaches share the assumption that com-

panies need societal approval to survive and grow but differ in their level of granularity and in what mechanisms they see as driving changes in organizational behavior (Chen & Roberts, 2010). Legitimacy theory takes a broad perspective on the motivations for carbon reporting and sees disclosures as an impression management tool aimed at redressing the legitimacy gap created by growing public awareness of climate change (e.g. Hrasky, 2012; Pittrakkos & Maroun, 2019). Stakeholder theory examines legitimation processes at a more fine-grained level, considering how different stakeholder groups influence carbon reporting practices (e.g. Liesen et al., 2015). Finally, institutional theory sees carbon reporting as a form of adaptive behavior whereby companies conform to dominant institutional practices that can impart legitimacy upon them (e.g. Comyns, 2018).

In this study we adopt legitimacy theory as our primary explanatory framework for carbon reporting. Accordingly, we view this discursive practice as a form of strategic communication aimed at shaping societal impressions and at shielding companies from criticism in the wake of mounting concern over climate change. We also incorporate insights from stakeholder and institutional theory into our interpretation of diachronic and cross-regional patterns. Our analysis takes a broad societal perspective on the motivations and effects of carbon reporting and does not systematically consider the role of specific stakeholder groups. However, it is important to recognize that different stakeholders (e.g. investors vs. the general public) may have conflicting expectations of companies and these tensions may manifest discursively in our data. We also do not examine in detail how the practice of carbon reporting is influenced by the specific institutional environments in which the companies in our sample operate, but we do consider the impact of the Paris Agreement as a major global institutional shift and we are interested in establishing whether carbon reporting practices differ across countries with different levels of economic development.

Finally, at the micro level, we draw on Van Leeuwen's (2007) model of discursive legitimation to interpret the rhetorical and ideological import of linguistic choices in text. This framework is a natural fit for legitimacy theory and enables us to show how the legitimation work that carbon disclosures perform is manifested in micro-level linguistic features. Van Leeuwen (2007) provides a taxonomy of four legitimation strategies: 'authorization', 'moral evaluation', 'rationalization' and 'mythopoesis'. Briefly, authorization concerns legitimation by reference to the personal authority or expertise of social actors or by reference to laws and traditions. Moral evaluation covers legitimating arguments grounded in moral values. Rationalization is legitimation based on utilitarian benefits. Mythopoesis involves narratives sanctioning the behavior of a subject or cautioning against negative outcomes deriving from illegitimate actions. We use Van Leeuwen's categories as



an interpretive lens to help us unpack the rhetorical and ideological function of specific linguistic features identified as significant through corpus analysis.<sup>1</sup>

### 3. Data and methods

For this study we compiled a specialized corpus of sustainability reports published between 2011 and 2020 by the largest greenhouse gas emitters based on the “carbon majors” ranking produced by the Climate Accountability Institute (CAI, 2020). Sustainability reports are annual voluntary disclosures by companies showcasing their social and environmental performance (for a detailed overview of this genre, see Fuoli, 2018). Out of the 100 companies included in the ranking, 69 published sustainability reports during this period and were included in our sample. 56 of them are fossil fuel producers, 10 operate in the mining sector (including coal mining) and three are cement producers. The corpus is described in Table 1. We use gross national income (GNI) per capita as an indicator of economic development and subdivide companies based on data from the World Bank<sup>2</sup> into those operating in high- and middle-income countries. For brevity, we shall refer to the former as ‘HIs’ and to the latter as ‘MIs’. A complete list of the companies included in each of these categories is given in the Supplementary Materials. Most of the reports were downloaded from the Corporate Register online repository.<sup>3</sup> Where unavailable, they were sourced directly from the companies’ website. The texts were automatically converted from pdf into plain text, followed by extensive manual cleaning of the files to correct file conversion errors (e.g. miscoded characters).

**Table 1.** Corpus details

		Number of texts	Size in words
Diachronic sub-corpora	Before Paris	242	6,753,091
	After Paris	287	8,908,440
Regional sub-corpora	HIs	382	10,014,546
	MIs	147	5,646,985
	Full corpus	529	15,661,531

1. It is important to note, however, that we will not be attempting to systematically quantify these strategies because our corpus is too extensive to be manually annotated and there are currently no reliable methods for automating this kind of analysis.

2. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups> [accessed May 2023].

3. <https://www.corporateregister.com/> [accessed May 2023].

The analysis was performed using *Sketch Engine* (Kilgarriff et al., 2014). We use a combination of keyword, collocation and concordance analysis to identify patterns of change emerging as a result of the Paris Agreement, deconstruct corporate discourses around carbon emissions and climate change, and compare the language used by companies based in high- and middle-income countries. Keyword analysis serves as the initial step in our investigation, offering us a panoramic view of the corpus, highlighting the most prominent themes discussed in the reports, and suggesting valuable entry points for further qualitative exploration of our data. Complementing the keyword analysis, collocation and concordance analysis provide a more detailed perspective on specific lexical items, enhancing our understanding of their rhetorical and ideological function.

The keyword analysis involved three distinct comparisons. To identify shifts in carbon majors' climate change discourse following the Paris Agreement, we compared the sustainability reports published after the agreement (i.e. the 'focus' corpus) with those published before (i.e. the 'reference' corpus). To identify differences in the climate change discourses of carbon majors operating in developed and emerging countries, we conducted two separate keyword analyses: one with the reports by HIs as the focus corpus and the reports by MIs as the reference corpus, and the other vice versa. To generate keyword lists, we relied on a combination of statistical significance, dispersion and effect size measures. We only considered keywords that were found in at least 50% of the texts and that had a log-likelihood value of 15.13 or higher ( $p < 0.0001$ ). For the pre- vs. post-Paris Agreement comparison, the 50% dispersion criterion was solely applied to the focus corpus to avoid obscuring or missing significant shifts in the discourse. After careful consideration, function words were excluded from the analysis due to space constraints and their limited contribution to our research questions. The resulting keywords were calculated using *Sketch Engine's* simple maths formula (add- $N = 1000$ ). For reasons of space, we limit further in-depth analysis to the top 100 terms.

As standard practice in corpus-assisted discourse analysis, the keywords were manually grouped into semantic categories to highlight major themes and communicative functions (for an overview of approaches to semantic categorization in CADS, see Mahlberg, 2014). The categories were developed collaboratively following an inductive approach with the goal of achieving a balance between informativeness and parsimony. The two authors independently coded each of the three sets of 100 keywords. To aid the classification process, a set of 100 concordances was randomly selected and carefully examined for each keyword. Afterwards, the authors met to discuss and resolve any inconsistencies in their coding. These discussions were instrumental in the final categorization of each keyword and provided a foundation for further refining the groupings and category labels.

It should be noted that some of these keywords may have different meanings and uses in different contexts. Our categories aim to capture the main ‘local textual function’ of each keyword in our corpus (Mahlberg, 2005). As such, the categories should be seen as a heuristic tool to help identify discursive patterns in our data, rather than a definitive, rigid classification of the meaning of these words.

## 4. Results

In this section, we present the results of our study. We begin by exploring how carbon majors have responded to the Paris Agreement, comparing reports published before and after its adoption. Next, we examine the differences between the reports issued by HIs and MIs.

### 4.1 Carbon majors’ discursive response to the Paris Agreement

Table 2 shows the top 100 key lemmas in the sub-corpus of sustainability reports published after the Paris Agreement, categorized into thematic groups. These results reveal a growing emphasis on climate change and related issues. The category of ‘environment and climate change’ is the largest, encompassing 14 terms. It includes explicit mentions of climate change (*climate, change, climate-related*), words pointing to the need for a shift to a more sustainable economy (*transition, sustainable*) and references to established institutions central to global initiatives to tackle climate change, namely the *UN* and its *Sustainable Development Goals* and the *Paris Agreement*. Words related to greenhouse gas emissions are also a prominent feature of the discourse, suggesting that carbon majors are cognizant of the need to reduce their carbon footprint. The keyword *scope* indicates increased adoption of the standards set by the Greenhouse Gas Protocol for estimating the full carbon impacts of their activities and products, including upstream (scope 2 and 3) and downstream (scope 3) emissions in addition to direct emissions (scope 1). The keyword *zero* points to discussion and possibly endorsement of the Paris Agreement’s goal of carbon neutrality (i.e. ‘net-zero emissions’). The keyword *methane* indicates that carbon majors are responding to growing concern about methane as a powerful greenhouse gas. Lastly, the reports published after the agreement place a greater emphasis on renewable energy sources (*renewable, hydrogen, solar*).

Overall, then, the results of the keyword analysis appear to show that carbon majors are increasingly acknowledging climate change as a substantial concern and expending greater discursive effort to showcase their commitment to addressing it. A key aspect of this effort involves supporting the Paris Agreement, as

**Table 2.** Top 100 key lemmas in the reports published after the Paris Agreement compared with the reports published before (by semantic category)

Category	Keywords
Business and finance	chain, portfolio, financial, upstream, asset
Document	introduction, page, table
Energy	renewable, hydrogen, solar, power
Environment and climate change	climate, <i>ESG</i> , <i>scenario</i> , change, sustainability, climate-related, transition, <i>SDG</i> , sustainable, Paris, leak, UN, water, repair
Greenhouse gas emissions	emission, carbon, GHG, intensity, methane, scope, low-carbon, reduction, reduce, <i>zero</i> , CO <sub>2e</sub> , footprint
Measurement and evaluation	low, evaluation, metric, data
Organization and management	governance, board, entity, management, group, directors, committee, executive, leadership, remuneration, team, approve
Reporting and standards	GRI, disclosure, standards, integrated, align, compliance, statement, boundary, update, annual, report, framework
Risk management	risk, <i>scenario</i>
Social responsibility and workplace safety	<i>ESG</i> , <i>SDG</i> , inclusion, support, value, diversity, <i>zero</i> , policy, worker, integrity, responsible, indigenous
Strategic planning	goal, strategy, target, approach, transformation, opportunity, resilience, purpose, focus, future, strategic, integrate
Technology and innovation	digital, innovation, technology, solution, electric
Other	topic, matter, component, material, resources, line, event

*Note.* ESG = Environmental, Social and Governance. SDG = Sustainable Development Goal. UN = United Nations. GHG = greenhouse gas. CO<sub>2e</sub> = carbon dioxide equivalent. GRI = Global Reporting Initiative. Lemmas are ordered by effect size. Words in italics fit more than one category.

revealed by a follow-up qualitative analysis of a random sample of 100 concordance lines containing the keyword *Paris* followed by *agreement*. 70% of instances in the sample included either an explicit endorsement of the deal, as shown in Example (1),<sup>4</sup> or presented the company's plans or actions as coherent with it, as seen in (2).

- (1) We fully support the **Paris Agreement**, and its goal of keeping the rise in global temperatures to below two degrees Celsius. (Shell, 2017)

4. In all the examples presented, we utilize bold text to emphasize the focal keyword and underline to emphasize the corresponding phrase in which the keyword is a constituent.

- (2) The Company aims for industry-leading greenhouse gas performance across its businesses by 2030, and recently announced new emission reduction plans for 2025, which are projected to be consistent with the goals of the **Paris Agreement**. (ExxonMobil, 2019)

The widespread endorsement of the Paris Agreement can be seen as a type of authorization strategy, whereby carbon majors seek legitimation by aligning themselves with legitimate institutions and practices. A similar rhetorical function can be attributed to other keywords denoting important climate-related institutions, namely the *UN*, *SDGs* and the business-led *ESG* and *GRI* frameworks.

At first glance, these results seem to indicate a substantial discursive shift following the Paris Agreement. However, closer inspection of selected keywords reveals a more complex picture, characterized by tensions and contradictions. First, while concordance analysis of the keyword *Paris* shows broad support for the agreement, it also reveals considerable variation in the companies' degree of commitment to and motivations for endorsing it. As observed in previous work (e.g. Li et al., 2022), we find a clear divide between European and U.S. companies. The former tend to set clearer and more ambitious targets and to project a stronger commitment to the agreement. In (3), for example, Shell uses evaluative language (*urgent*, *challenge*) to highlight the severity of climate change and pledges to become carbon neutral by 2050.

- (3) Tackling climate change is an urgent challenge. We will contribute to a net-zero world, where society stops adding to the total amount of greenhouse gases (GHG) in the atmosphere. That is why we have set a target to become a net-zero emissions energy business by 2050, in step with society. This supports the most ambitious goal to tackle climate change laid out in the **Paris Agreement**: to limit the rise in average global warming to 1.5 degrees Celsius. (Shell, 2020)

American companies, on the other hand, take a more lukewarm stance on the Paris Agreement and tend to present solutions to climate change as within reach, thereby implicitly downplaying the severity of the problem. In (4), for example, ExxonMobil claims their practices are already in line with climate targets and evaluates the fossil fuel natural gas as a *powerful* tool to reduce emissions.

- (4) We're encouraged that the Paris Agreement creates an effective framework for all countries to address rising emissions. In fact, our company's forecasts of greenhouse gas emissions are consistent with the aggregation of the **Paris Agreement** pledges. The world already has powerful tools for meeting growing global energy demand while reducing emissions. One is natural gas. (ExxonMobil, 2016)

In several instances, U.S. companies deploy the rationalization legitimization strategy by presenting alignment with the Paris Agreement as a sensible strategic move aimed at mitigating future regulatory or reputational risks. For instance, in (5), ConocoPhillips objects to Donald Trump's decision to withdraw from the agreement, arguing that this would limit the country's ability to shape climate policy and protect its interests. Revealingly, the company also argues that this decision could backfire and embolden fossil fuel divestment movements.

- (5) It gives the U.S. the opportunity to participate in future climate policy discussions to safeguard its economic and environmental best interests as the Paris Agreement is being implemented globally. It provides an opportunity for the U.S. to encourage other nations to incorporate technology development as a means of lowering emissions from fossil fuels [...]. Withdrawing from the agreement could energize political action by domestic opponents of U.S. energy development. (ConocoPhillips, 2019)

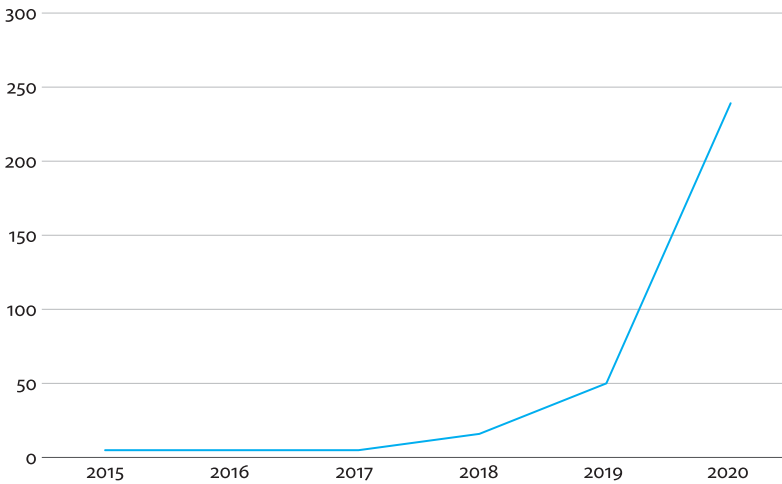
Another site of discursive tension in the corpus is the concept of carbon neutrality. One of the key goals of the Paris Agreement (art. 4) is to achieve a balance between carbon emissions produced by human activities and emissions absorbed via carbon sinks (e.g. forests) by mid-century. Recent years have witnessed a flurry of carbon neutrality pledges by countries around the world, with net-zero targets covering close to 90% of global emissions.<sup>5</sup> At first glance, carbon majors appear to have embraced this trend, as evidenced by their frequent use of terms associated with carbon emissions; notably the keyword *zero*, which appears in 34.59% of cases as part of the phrase *net zero*. Inspection of the frequency of *net zero* in the corpus reveals that its usage has experienced a substantial increase since 2018, as shown in Figure 2. This upsurge can be viewed as a legitimating response to external events that have contributed to amplifying public awareness of the urgency of climate change, most notably the 2019 UN Climate Action Summit which emphasized the need to achieve net-zero emissions by 2050 in order to limit global warming to a safe level of 1.5°C,<sup>6</sup> and the rise of worldwide climate change activism inspired by Greta Thunberg.

However, closer analysis of the term *net zero* reveals that consensus among carbon majors on achieving carbon neutrality is far from universal. 42% of carbon majors do not mention *net zero* at all in their reports and 10 companies account for over 80% of all instances. Similar to the patterns discussed above, only half

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5. Source: <https://climateactiontracker.org/global/cat-net-zero-target-evaluations/> [accessed May 2023].

6. Source: <https://www.un.org/en/climatechange/2019-climate-action-summit> [accessed May 2023].



Note: Both variants (with and without dash) are included in the count.

**Figure 2.** Frequency of the phrase *net zero* over time (normalized per million tokens)

of U.S. carbon majors mention *net zero* in their reports versus 80% of European companies. Where the phrase is used, it is often embedded in vague and non-committal discursive frames. Inspection of the top collocates of *net zero*, presented in Table 3, shows that this phrase strongly co-occurs with desiderative evaluative expressions (items in small caps), most of which denote a rather weak level of commitment (cf. *ambition* vs. *plan* or *intention*), and metaphorical language pertaining to the JOURNEY frame (items in italics). These collocates suggest that the shift to a carbon neutral model is predominantly framed in aspirational terms and construed as a continuous, open-ended process. This is the same kind of framing that was commonly used in corporate discourse on “sustainability” around two decades ago (e.g. Milne et al., 2006). But while reaching sustainability is not an inherently bounded process and can therefore plausibly – if unsatisfactorily – be construed as a never-ending “journey”, the net-zero target has an in-built “deadline”. Thus, there appears to be a contradiction between the expectations of finality generated by companies’ net-zero pledges and the looser discursive framing they use to talk about it. This is compounded by the fact that two of the main measures proposed to achieve carbon neutrality, as evidenced in a random sample of 100 concordance lines of *net zero*, are carbon offsetting and carbon capture and storage, as shown in (6). Both methods have severe limitations and are not currently regarded as a credible solution to climate change (Martin-Roberts et al., 2021; Watt, 2021).

**Table 3.** Top 20 collocates of phrase *net zero* ( $-3/+3$  context window, lemmatized and case insensitive)

Lemma	Co-occurrences	Candidates	logDice
AMBITION	74	1,222	10.23
<i>get</i>	91	1,712	10.21
<i>pathway</i>	29	639	9.37
ASPIRATION	22	610	9.00
September	30	1,276	8.89
achieve	148	12,493	8.51
Shell	70	5,538	8.50
ASPIRE	9	187	8.22
emission	363	44,021	8.05
become	34	4,332	7.76
<i>reach</i>	31	4,033	7.72
<i>journey</i>	11	977	7.66
ASPIRATIONAL	5	91	7.52
<i>move</i>	15	2,282	7.32
ADVOCATE	8	859	7.30
world	51	10,397	7.22
absolute	7	743	7.21
AIM	50	10,256	7.21
<i>towards</i>	20	3,803	7.15
BP	20	4,262	7.02

Note. Both hyphenated and non-hyphenated versions of the phrase *net zero* were included.

- (6) Our target is to achieve net-zero emissions from all our operations, as well as from the energy we need to power them. That means that any GHG emissions from making our products that cannot be avoided will be captured or offset using technology and nature. (ExxonMobil, 2020)

Related to this, the analysis shows limited evidence of a deep rethinking of the business model. In fact, qualitative concordance analysis of the keyword *emission* indicates broad consensus among carbon majors on the idea that fossil fuels will continue to be a major source of energy for the foreseeable future. ExxonMobil goes as far as outrightly rejecting the need to reduce fossil fuel production, reframing the problem of carbon emissions as one of demand rather than supply (cf. Ferguson et al., 2016).

- (7) Does ExxonMobil have to reduce its production to align with the Paris Agreement? The Paris Agreement does not contemplate or require individual com-



panies to decrease production to align with the goal of maintaining global temperature rise to below 2°C. The structure of the agreement recognizes that energy-related **emissions** are driven by society's demand for energy – not its supply. (ExxonMobil, 2020)

While the keyword analysis, as mentioned above, shows growing interest in renewable energy sources, these are still generally seen as but one component of the energy mix, as illustrated in (8).

- (8) In addition to providing cleaner energy, natural gas plays a central role in enabling the wider use of **renewables** by providing flexible backup energy when sun, wind or other renewable sources are not active or can't meet peak demand. (Apache 2020)

The keyword analysis also reveals that companies are increasingly using emission *intensity* as a measure of their carbon footprint and reduction targets. Emission intensity is a normalized metric that quantifies emissions relative to economic output and, as such, makes it possible for companies to obtain and showcase improvements even when total emissions rise as their output grows. Close inspection of a random sample of 100 concordance lines of the lemma *reduce* followed by *emissions* finds that technological innovation and engineering solutions were promoted as the most promising means for tackling climate change. Taken together, these results suggest that the tendency observed in early work for carbon majors to avoid questioning or rethinking the fundamentals of their carbon intensive business model is still prevalent, even after the Paris Agreement.

#### 4.2 Differences between climate change discourses of carbon majors operating in high- and middle-income countries

Table 4 shows the key lemmas in the HIs sub-corpus. These results suggest that HIs place comparatively greater emphasis on the issues of carbon emissions and climate change in their sustainability reports. The lemma *emission*, for instance, is used almost twice as often by HIs compared with MIs (2,778.9 vs. 1,515.4 per million tokens) and the phrase *climate change* shows a similar, albeit less pronounced, difference (690 vs. 548.2 per million tokens). The results also indicate that HIs talk about measuring (*intensity*), reducing (*reduce*) and removing (*capture*) carbon emissions comparatively more often.

The 'energy' category features *coal* as one of the key lemmas. Given that coal energy is known to have the highest carbon footprint of all energy types (IPCC, 2014), this finding seems at first glance to clash with HIs' emphasis on emissions reduction and climate change. The percentage of companies involved in coal mining is virtually identical across the two groups (21.5% for HIs versus 22.2% for

**Table 4.** Top 100 key lemmas in the reports published by HIs compared with reports by MIs (by semantic category)

Category	Keywords
Energy	energy, electricity, coal
Environment and climate change	water, <i>manage</i> , spill, climate, land, <i>produce</i> , recycle
Forecasting	future, potential, could, expect, expectation
Goals and strategic approach	continue, way, approach, focus, deliver, provide, address, commit, goal
Greenhouse gas emissions	emission, CO <sub>2</sub> , reduce, GHG, carbon, intensity, flare, methane, capture
Industrial and business operations	operate, industry, operation, business, contractor, mining, asset, plant, <i>produce</i>
Measurement and evaluation	datum, performance, review, tonne, identify, impact, metric
Organization and management	team, leadership, partner, government
Places	site, American, world, global, location, United
Reporting and standards	require, statement
Social responsibility and workplace safety	community, help, work, <i>manage</i> , local, incident, workforce, engage, engagement, safety, support, diversity, concern, learn, conduct, human, appropriate, injury, right, response
Stance	opportunity, need, understand, believe, challenge
Other	more, can, use, example, many, have, include, material, all, do, range, page, further, time, additional, role

*Note.* GHG = greenhouse gas. Lemmas are ordered by effect size. Words in italics fit more than one category.

MIs), so the relative prominence of this word is unlikely to be due to the composition of the corpus. Qualitative inspection of concordance lines shows that coal producers consistently deploy a combination of rationalization and moral evaluation to justify coal as a necessary resource and to portray themselves as morally praiseworthy for facilitating economic and social development, as seen in (9).

- (9) To achieve even greater economic and social progress worldwide, access to energy must grow beyond providing household electricity, expanding connections for agriculture, water treatment facilities, and industry. We believe that **coal** will continue to play a crucial role in bridging this gap. (Consol, 2018)

The finding that coal is discussed comparatively more often in the reports by HIs is coherent with a legitimacy explanation; coal producers in developed countries are under comparatively greater pressure to justify their investment in this highly polluting fossil fuel. However, instead of responding to such pressure by discussing plans to re-route investment away from coal onto greener alternatives, coal producers adopt a defensive legitimation strategy geared towards positively reshaping perceptions of this energy source. Additional evidence of this comes from inspection of the 10 strongest immediate left collocates of *coal*, which feature the adjectives *clean* and *advanced*. As shown in (10), technological innovation rather than divestment is promoted as the answer to reduce carbon emissions from coal.

- (10) Peabody views technology as vital to advancing global climate change solutions, and the company supports advanced coal technologies to drive continuous improvement toward the ultimate goal of near-zero emissions from coal.  
(Peabody, 2020)

Optimistic statements about the potential of technological innovations such as these carry an implicit claim to technical expertise and can thus be seen as a form of authorization aimed at building trust in carbon majors' ability to offer solutions to climate change without the need for radical reform.

Another outstanding pattern emerging from the keyword list is the relative prominence of "stance" words in the reports by HIs. This category encompasses evaluative expressions employed by companies to articulate their views and beliefs, making it an ideal site for examining how carbon majors in developed countries perceive and position themselves in relation to climate change. The evaluative noun *challenge*, for instance, is consistently used to highlight the tension between energy security and the need to reduce carbon emissions, as shown in (11).

- (11) Meeting the **challenge** of taking action on climate change while providing adequate, affordable supplies of reliable energy will require financial investments, skilled people, technical innovation and responsible stewardship from policy makers, energy producers and consumers. ConocoPhillips is committed to doing our part.  
(ConocoPhillips, 2019)

By construing energy security and environmental protection as inherently conflicting needs, carbon majors divert the focus away from their critical role in causing climate change, positively reframe their role as benevolent providers, and subtly shift responsibility onto other stakeholders. This form of legitimizing discourse combines rationalization, presenting the inherent challenges of ensuring energy security while addressing climate change as an indisputable logical reality, and moral evaluation, placing emphasis on the genuine commitment of corporations to making meaningful contributions. This discourse heavily relies on a narrative of inevitability around future growth in energy demand (Breeze, 2012), which is repeatedly articulated around the keywords included in the ‘forecasting’ category. For instance, in (12), Antero uses the modal *will* to present a monoglossic, unquestioned “futurological” prediction (Fuoli, 2012: 73) about energy growth. This prediction gains additional legitimacy through the citation of the United Nations as a trusted and authoritative source, a type of authorization strategy.

- (12) The challenge of meeting the world’s increasing demand for energy while also ushering in a lower carbon **future** is complex. The United Nations has projected that global population will increase from 7.7 billion in 2019 to nearly 10 billion in 2050, and energy demand will grow with it. (Antero, 2020)

**Table 5.** Top 100 key lemmas in the reports published by MIs compared with reports by HIs (by semantic category)

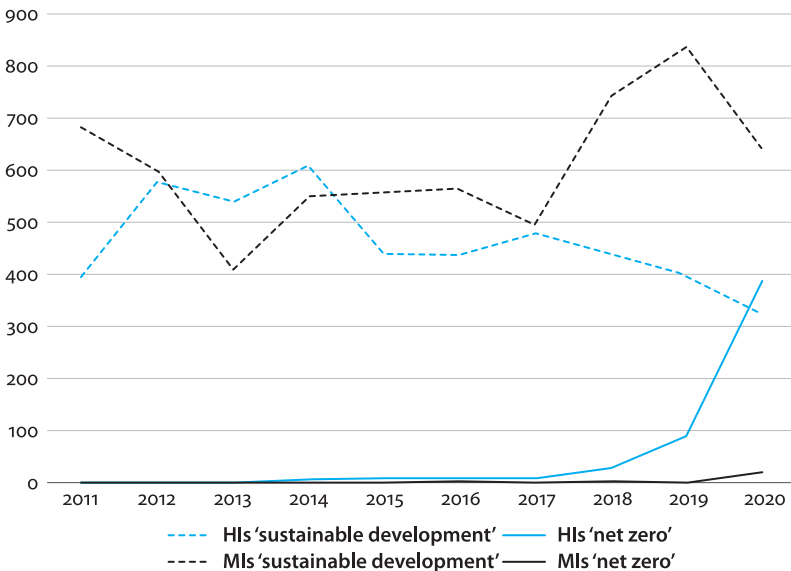
Category	Keywords
Energy	N/A
Environment and climate change	protection, <i>development</i> , environmental, green, sustainable
Forecasting	N/A
Goals and strategic approach	order, project, <i>integrated</i> , strengthen, strategic, promote, growth
Greenhouse gas emissions	N/A
Industrial and business operations	subsidiary, production, service, sale, <i>industrial</i> , reserve, field, construction, gas, hydrocarbon, billion, station, refining, pipeline, crude, oil, exploration, technological, market, petroleum, technical, refinery
Measurement and evaluation	indicator, <i>unit</i> , thousand, ton, consumption
Organization and management	company, entity, group, directors, vice, system, management, <i>unit</i> , implementation, board, limited, corporate, approve, personnel, general, professional, control, hold, <i>agreement</i> , body, meeting, contract, remuneration, structure, award, center, shareholder, mechanism

**Table 5.** (continued)

Category	Keywords
Places	region, China, national, district, foreign, area, domestic
Reporting and standards	period, <i>integrated</i> , GRI, December, <i>channel</i>
Social responsibility and workplace safety	cooperation, social, labor, <i>development</i> , <i>industrial</i> , occupational, participation, accident, <i>agreement</i> , union, prevention, child, talent, <i>channel</i> , emergency, condition, institution,
Stance	special
Other	carry, main, public, follow, accord, regard, various, result, quality

Note. GRI = Global Reporting Initiative. Lemmas are ordered by effect size. Words in italics fit more than one category.

Turning to the analysis of the key lemmas in the reports produced by MIs (given in Table 5), we find a relatively stronger emphasis on business and organizational aspects. This finding suggests that MIs’ discourse primarily addresses powerful institutional stakeholders such as investors and governments, for whom business performance and profitability have high priority.



**Figure 3.** Frequency of the phrases *sustainable development* and *net zero* over time across company categories (normalized per million tokens)

The results of the keyword analysis also show that MIs have a greater tendency to use generic and somewhat vague expressions such as *environmental protection*, *green*, and *sustainable development* to discuss environmental and climate change-related topics. The term *environmental protection* is predominantly used in relation to ecological issues other than climate change, such as industrial waste management, water consumption and biodiversity, and often appears in general statements concerning a company's corporate social responsibility principles, as shown in (13).

- (13) CNOOC Limited has always given top priority to health, safety, and **environmental protection** (HSE). HSE management is not only an economic responsibility, but also a social responsibility.  
(China National Offshore Oil Corporation, 2012–2013)

The adjective *green* collocates with a wide variety of words related to MIs' activities, including words denoting business processes (*procurement, manufacturing*), sites where work takes place (*building, factory*), and broader concepts such as *energy, economy* and *development*. As such, it functions as a versatile signifier of these companies' attention to environmental issues. The phrase *sustainable development* points to a discursive frame that was prevalent in corporate discourse in the early 2000s (Livesey, 2002). As Figure 3 shows, this frame appears to be on the decline in HIs' discourse, while the carbon neutrality frame is gaining traction. Conversely, the phrase *sustainable development* remains widely used in MIs' reports. These results suggest that the Paris Agreement has had a stronger influence on carbon majors in developed countries, causing a more marked discursive shift towards incorporating carbon neutrality as a symbolic pillar of their climate change discourse.

## 5. Discussion and conclusion

This study set out to examine how the climate change discourse of major corporate emitters has evolved following the Paris Agreement and to identify differences in the way companies operating in advanced and emerging economies discursively frame this problem. In line with legitimacy theory, the results show that carbon majors are responding to growing societal awareness of climate change by devoting more attention to this problem and by foregrounding their intentions to help tackle it. However, close inspection of linguistic patterns reveals striking continuity in the way these companies discursively frame climate change and in the kinds of solutions they envisage. As already observed in work published some twenty years ago (Livesey, 2002), the fundamental systemic issues at the

heart of the climate crisis remain largely unchallenged and there is limited evidence of plans to shift the economic paradigm onto a truly sustainable model. Instead, carbon majors deploy various kinds of legitimating discourses to justify their practices, many of which have become staples of their climate change rhetoric. Similar to previous studies (Ferguson et al., 2016; Jaworska, 2018), companies in our corpus presented future growth in energy demand as inevitable and pitted a discourse of energy security against environmental concerns as a way of subtly shifting responsibility onto other stakeholders. They leveraged a utilitarian frame (Megura & Gunderson, 2022) to positively reframe themselves as “global benefactors” (Breeze, 2012) for providing the resources that enable economic and social development. They promoted techno-optimism (Megura & Gunderson, 2022) by presenting carbon offsetting and technological innovation as viable solutions for climate change. These discourses act to preserve the status quo rather than to help challenge, reimagine and transform the economic fundamentals of our societies.

Continuity was also clearly noticeable in the co-text of the emerging carbon neutrality frame, which lies at the heart of the Paris Agreement and is rapidly making its way into corporate discourse. The frequent use of desiderative lexis and journey metaphors around *net zero* suggests carbon majors are applying the same kind of aspirational framing to the goal of carbon neutrality as they did to sustainability around two decades ago (e.g. Milne et al., 2006). Therefore, it appears that, while the end goal may have shifted from sustainability to carbon neutrality, corporate discourse on climate change remains primarily a form of “aspirational talk” (Christensen et al., 2013). Considering the legitimating discourses discussed above and the scant evidence of a shift towards a sustainable business model found in previous work (Li et al., 2022), we conclude that the phrase *net zero* is used by carbon majors primarily as a symbolic device to project a “green” corporate ethos and safeguard their legitimacy while largely practicing business as usual. As such, *net zero* currently seems little more than just another environmental “buzzword” used by companies to protect their reputation and economic interests.

Our analysis has uncovered considerable differences in how carbon majors from high- and middle-income countries are discursively responding to climate change as well as substantial variation within these two groups. Carbon majors operating in high-income countries talked more about climate change-related issues in their reports than their middle-income counterparts. This finding can be interpreted through the lens of legitimacy theory as the outcome of comparatively higher levels of public awareness of climate change generally observed in developed countries (Ali et al., 2017), which in turn puts more pressure on companies to reduce their carbon footprint. The greater emphasis on emissions measure-

ment observed in reports by companies from high-income countries can be interpreted through the lens of institutional theory as a form of isomorphic behavior (DiMaggio & Powell, 1983) motivated by the need to comply with comparatively more stringent disclosure and regulatory requirements (Bhatia & Makkar, 2019). Conversely, companies operating in middle-income countries placed greater focus on business and organizational as opposed to environmental issues. In addition to discrepancies on the level of societal awareness of climate change, this finding can be explained from the perspective of stakeholder theory as the result of differences in the relative power exercised by the various stakeholder groups upon which carbon majors depend. Several of the companies in the middle-income group, such as Gazprom and PetroChina, are state-owned entities operating in non-democratic regimes. As such, they are under greater scrutiny from governments, who rely on them as a source of revenue, than from the media and general public. Like developed and emerging countries, the distinction between U.S. and European companies can be attributed to varying degrees of public and regulatory pressure. Historically, European countries have been more assertive in establishing emission reduction goals, while the U.S. has been characterized by greater levels of climate skepticism and a less stringent regulatory framework, particularly during the Trump administration (Kenner & Heede, 2021; Vormedal et al., 2020). As a result, carbon-intensive industries in the U.S. have had more leeway to adopt a cautious stance towards carbon reduction.

Overall, the results of our study show that while there have been positive developments in the discourse of top corporate polluters over the past decade, such as the increased focus on climate change and the proclaimed endorsement of the Paris Agreement, there is still a troubling disconnect between the discursive frames used, the solutions proposed and the severity and urgency of the climate crisis. We suggest that this disconnect can at least in part be attributed to a fundamental tension between the need for companies to maximize profits for the benefit of shareholders and the need to radically rethink their model and investment strategies to satisfy society's demand for change. The legitimating discourses deployed by carbon majors in their sustainability reports appear to be designed to reconcile these two conflicting requirements. Forecasts of ever-growing demand and a continued role for fossil fuels aim to reassure shareholders that crucial sources of revenue are safe. Aspirational statements about the journey towards net zero and the boundless possibilities of technological innovation are geared towards appeasing growing public concern about climate change. An alternative explanation is offered in a provocative paper by Christensen et al. (2013). The authors defend aspirational talk as necessary and an important driver of positive change, even when organizations do not fully live up to the expectations created by their words. However, looking back at over twenty years of



research on corporate discourse on climate change, we find the same kind of aspirational talking points being repeated endlessly, while global carbon emissions keep rising. Aspirational talk is cheap unless followed by action.









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## Supplementary materials

**Table 1.** Composition of the sample

Company	Country	Income category
BHP, Whitehaven Coal, Woodside, Santos	Australia	High
OMV Group	Austria	income
Canadian Natural Resources, Suncor, Teck Resources, EnCana, Husky	Canada	
Total, LafargeHolcim	France	
RWE, Wintershall, HeidelbergCement, Ruhrkohle AG (RAG)	Germany	
ENI	Italy	
Inpex, Taiheiyo	Japan	
Kuwait Petroleum Corp.	Kuwait	
Equinor	Norway	
Petroleum Development Oman (PDO)	Oman	
Qatar Petroleum	Qatar	
Saudi Aramco	Saudi Arabia	
Repsol	Spain	
Glencore	Switzerland	
Royal Dutch Shell	The Netherlands	
Abu Dhabi	UAE	
BP, Anglo American, Rio Tinto	UK	
ExxonMobil, Chevron, Peabody Energy, ConocoPhillips, Arch Coal Company, EQT, EOG Resources, Anadarko, Chesapeake Energy, Devon Energy, Antero, Apache, Southwestern, Marathon, Noble Energy, CONSOL Energy, Pioneer, Hess, Murphy Oil, Vistra	USA	
YPF	Argentina	Middle
Petrobras, Vale	Brazil	income
PetroChina, CNOOC (China National Offshore Oil Co.), Sinopec	China	
Ecopetrol	Colombia	
Coal India, Oil & Gas Corp India (ONGC)	India	
Petronas	Malaysia	
Pemex	Mexico	
Gazprom, Rosneft, Lukoil, Novatek	Russia	
Exxaro, Sasol	South Africa	
PTTEP	Thailand	

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