


RESEARCH ARTICLE

What explains firms' net zero adoption, strategy and response?

Zola Berger-Schmitz | Douglas George | Cameron Hindal | Richard Perkins  | Maria Travaille

Department of Geography and Environment,
London School of Economics and Political
Science (LSE), London, UK

Correspondence

Richard Perkins, Department of Geography
and Environment, London School of
Economics and Political Science (LSE),
Houghton Street, London WC2A 2AE, UK.
Email: r.m.perkins@lse.ac.uk

Abstract

The past few years have witnessed a proliferation of corporate net zero emission targets. Despite their growing prominence, little is known about firms' motives for, strategies towards and response pathways of net zero. This paper seeks to narrow the current gap in understanding through an analysis of 30 interview responses. We find evidence that net zero targets have been propelled by a combination of institutional and competitive pressures. Yet firms' response to these pressures, in terms of the substantivity of their commitments and strategic positioning in relation to net zero, has varied significantly. Whilst identifying a role for firm-specific factors, we also draw attention to the importance of sectors in understanding variations in corporate responses. A further contribution of the paper is to map out different temporal trajectories of strategic positioning and offer insights into the factors that lead firms to remain static or change their position towards net zero over time. We conclude by discussing the implications of these findings for both future scholarship and the contribution of net zero commitments to public climate goals.

KEYWORDS

climate mitigation, greenwashing, net zero, sector, strategy, time

1 | INTRODUCTION

A striking feature of the carbon mitigation landscape in recent years has been the proliferation of net zero-aligned targets (Allen et al., 2022; Walenta, 2020). A rapidly expanding number of countries, states, regions and municipalities have adopted such commitments. However, as well as these state actors, corporations have increasingly publicly embraced net zero. As of 2022, over one-third of the world's publicly listed companies had adopted some kind of net zero target (Net Zero Tracker, 2022).

Despite their growing prominence, little academic research has been undertaken into the nature or adoption of corporate net zero targets. A significant body of work has investigated a variety of corporate actions on climate change. This literature has identified various drivers, barriers and moderators shaping climate action, as well as different ways corporations strategically position themselves in relation to climate-related issues (e.g., Bui & Fowler, 2019; Damert & Baumgartner, 2018; Jeswani et al., 2008; Vieira et al., 2022). Several studies have also investigated earlier voluntary carbon targets, including their potential contribution to countries' national mitigation commitments (Gouldson & Sullivan, 2013; Wang & Sueyoshi, 2018), and the influence of target characteristics on emissions reductions (Dahlmann et al., 2019; Ioannou et al., 2016). Studies have also investigated the motives for target setting (Pinkse & Busch, 2013), geographical and sectoral patterns of adoption (Wang & Sueyoshi, 2018)

Abbreviations: COP, Conference of the Parties; EU, European Union; GHG, greenhouse gas; ICT, information and communications technology; IPCC, Intergovernmental Panel on Climate Change; SBTi, Science Based Targets Initiative.

Authors listed in alphabetical surname order.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. Business Strategy and The Environment published by ERP Environment and John Wiley & Sons Ltd.

and the determinants of firm-level mitigation targets (Yin et al., 2017). However, with a handful of exceptions (e.g., Christiansen et al., 2023; Comello et al., 2021), few studies have specifically investigated the recent wave of net zero targets.

The limited amount of research into corporate net zero targets is important. Whilst net zero commitments show similarities with past voluntary decarbonisation targets studied in the literature, they are also distinctive due to their level of ambition, time frames and specification. Corporate net zero targets often carry a stronger commitment to climate action—one that stretches several decades into the future and is typically accompanied by an action plan. Net zero targets are also increasingly the subject of third-party initiatives, standards and guidance, which means that they are more 'regularised' than more ad hoc voluntary carbon targets. Another difference is that, compared to many of these earlier targets, meeting recent commitments potentially demands more far-reaching organisational change (e.g., in business models and governance of value-chain emissions). Indeed, recent targets suggest a more rapid and radical business transition, one that presents unique challenges to firms in certain sectors (Newell, 2020; Vieira et al., 2022). There is thus a need for additional research to investigate net zero targets as a distinctive climate-focused organisational innovation.

Another reason why the current gap in understanding is important is net zero's status as the increasingly dominant framework used by major corporates for planning, enacting and benchmarking climate mitigation. A corollary is that firms' commitments, and their willingness and ability to implement them, are likely to assume considerable significance in shaping the contribution of private actors to public climate goals. Research can shed light on the robustness of, motives for and strategies towards net zero. In doing so, it can help inform debates about the degree to which recent targets embody a substantive commitment to robust climate action or are simply the latest manifestation of corporate greenwashing (Christiansen et al., 2023; Panwar, 2021; Wright & Nyberg, 2015). It can also provide valuable insights into the reasons for differences in firms' responses—which can help inform interventions to accelerate meaningful climate action.

Against this backdrop, the paper seeks to provide insights into firms' engagement with net zero, focusing on the nascent stages of target adoption. Our main research question is: What shapes corporations' response pathways of, and strategies towards, net zero? Data for the paper are derived from 30 semi-structured interviews (including with 25 companies), complemented by documentary sources.

The paper makes several contributions. First, we shed light on the drivers of net zero, finding that many of the pressures leading firms to adopt targets are broadly similar to ones previously identified in past studies on corporate climate action (Bui & Fowler, 2019; Chithambo et al., 2020; Margolick & Russell, 2001). A second contribution is to map variations in firms' responses to these pressures. We use a novel scoring methodology to evaluate the substantivity of firms' net zero pledges, revealing considerable heterogeneity in the strength of their commitments. We also identify different strategic positions taken by firms towards net zero and map these onto the substantivity of firms'

pledges. Using an inductively derived typology, we document how their positioning may remain static or change over time, with potentially important consequences for the strength of firms' commitments.

A third contribution is to explain these variations in firms' net target substantivity and strategic positioning. Consistent with other studies on corporate climate action (e.g., Jabbour et al., 2020; Kyaw et al., 2022), we find a role for firm-specific determinants. Yet an important insight is that understanding differences in corporate responses to net zero pressures also requires attention to sectoral aspects. Our paper is not the first to show that a firm's sector influences its corporate climate action. Yet, by examining corporate net zero behaviour across different industrial sectors, we provide clarity on how sectors matter. Our paper also offers novel insights into the factors that determine whether a firm's strategic positioning may (or may not) change over time.

The rest of the paper is organised as follows: Section 2 introduces net zero and presents our theorisation and its links to previous literature; Section 3 outlines research methods; Section 4 provides results; whilst discussion and conclusions follow in Sections 5 and 6, respectively.

2 | CONTEXT AND THEORY

2.1 | A brief history of net zero

From relative obscurity, the concept of net zero has quickly emerged to become a central goal of global climate mitigation policy (Fankhauser et al., 2022). The origins of net zero have their roots in earlier ideas about cumulative emissions, carbon budgets and carbon neutrality. Yet it was the Paris Agreement in 2015—with its emphasis on long-term climate action within the context of an ambitious temperature goal—which paved the way for the institutionalisation of net zero as a key policy objective (Allen et al., 2022; Van Coppenolle et al., 2022). The concept was given further impetus by the Intergovernmental Panel on Climate Change's (IPCC, 2018) special report, which asserted the necessity of reaching net zero around 2050 to limit warming to 1.5°C and around 2070 for 2.0°C.

Reaching net zero will require 'deep and rapid reductions' in emissions of anthropogenic carbon dioxide (CO₂), as well as substantial reductions in other greenhouse gases (GHGs) (IPCC, 2023, p. 22). Yet recognising that it will be difficult to reduce all GHG emissions to zero (e.g., in the case of 'hard-to-abate', carbon-intensive industries), net zero will also require removal of any residual emissions. Net zero thus refers to a scenario where emissions produced are equivalent to emissions permanently removed from the atmosphere.

The focus of this paper is on corporate net zero targets. Such targets can be understood as comprising a specific commitment or pledge to achieve the goal of net zero by a specified date, along with a published plan on how interim and long-term targets will be achieved (Net Zero Tracker, 2022). In the rest of this section, we theorise firms' motives for, and responses to, net zero.

2.2 | Theorising pressures

Our starting point for theorising net zero targets is to suggest that they are propelled by institutional and competitive pressures. Theoretical inspiration comes from DiMaggio and Powell (1983) who hypothesise two mechanisms of isomorphic change wherein organisations become more similar over time. Competitive pressures are rooted in organisations' self-interested search for efficiency. Applied to the present context, a firm might adopt a net zero target 'guided by an economic rationality and by motives of efficiency, effectiveness and profitability' (Oliver, 1997, p. 698).

Institutional pressures stem from the wider institutional environment, also labelled as organisational fields, comprising 'a composite of constituents within the firm's external social, political, and economic environments' (Hoffman, 2001b, p. 135). We conceptualise net zero as a nascent field increasingly structuring the actions of corporations within the task environment of climate mitigation. Within this frame of new institutionalism, DiMaggio and Powell (1983) identify three sources of institutional pressure: coercive (deriving from legal or social sanctions from powerful actors), mimetic (wherein, within the context of uncertainty, firms imitate organisational templates by successful or influential peers) and normative pressures (which prescribe conformity to certain organisational templates that are professionalised and institutionalised as the rational, proper or even moral course of action). In response, organisations are hypothesised to adjust to their institutional environment, resulting in the adoption of similar structures, policies and practices (Meyer & Rowan, 1977). Underpinning conformity is the need to acquire or maintain legitimacy and resources, which are central to organisational success and survival.

With some exceptions (e.g., Chithambo et al., 2020; Dhanda et al., 2021), past work examining the antecedents of climate action has largely discussed institutional and competitive pressures within a conceptual frame of external and internal 'drivers' (Jeswani et al., 2008; Littlewood et al., 2018). Amongst external drivers are customers (Cadez et al., 2019), government regulations (Abreu et al., 2021; Littlewood et al., 2018; Yin et al., 2017), shareholders (Jabbour et al., 2020) and competitors (Abreu et al., 2021). Internal drivers include employees (Kyaw et al., 2022; Littlewood et al., 2018), cost savings (Aben et al., 2010; Hoffman, 2005; Jabbour et al., 2020) and environmental strategy¹ (Cadez et al., 2019).

One question addressed here is whether these drivers are the same ones leading firms to adopt net zero targets. At one level, there are reasons to be affirmative, considering that climate strategies, policies and practices examined in past work also predominantly focused on climate mitigation (Abreu et al., 2021). However, there are potential differences in that, rather than realised actions (which have been a mainstay of previous research), net zero targets comprise forward-looking, quantified commitments.

The limited work that has been undertaken on voluntary carbon commitments—or so-called 'low-carbon norms' (Pinkse & Busch, 2013)—suggests that firms adopt such targets for several

reasons. One is organisational: Target setting may be adopted to help animate and propel internal processes to substantively reduce emissions (Dahlmann et al., 2019). Another is to cultivate a particular image, for example, to positively signal their superior climate commitment (Dahlmann et al., 2019; Pinkse & Busch, 2013). Climate targets may also be adopted to achieve specific strategic goals such as managing future regulatory risks and pursuing economic opportunities including energy-related cost savings (Hoffman, 2005; Margolick & Russell, 2001). Yet the recent wave of net zero targets goes further than most previously studied voluntary targets (Gouldson & Sullivan, 2013; Margolick & Russell, 2001; Rietbergen et al., 2015), committing firms to more rapid, impactful and multi-dimensional climate action (Newell, 2020). They are also being adopted in a post-Paris context where firms are facing ever greater pressures—from governments, civil society and other market actors—to contribute to global climate goals (Keefe, 2022).

2.3 | Net zero response pathways

The discussion so far has centred on motives for net zero targets. Of central interest here is the strength of these commitments. Previous related work on corporate climate action has often examined the robustness of firms' ambitions through the lens of substantive and symbolic action (Coen et al., 2022; Dupuis & Schweizer, 2019; Hyatt & Berente, 2017). The former is characterised by high levels of managerial commitment to understanding and enacting the substantive operational changes needed to realise genuine emission reductions (Dahlmann et al., 2019). Conversely, symbolic action involves low levels of commitment and potentially purposeful efforts to decouple stated policy from actual operations. A significant literature on such behaviour exists within the context of carbon mitigation, including in relation to voluntary targets, reporting and corporate political activity (Cho et al., 2018; Kim & Lyon, 2011). In one of the few studies of its kind, Christiansen et al. (2023) show how net zero discourses have been used by a Swedish fast-food company to justify a non-transformative, business-as-usual approach.

Evaluating the substantivity of firms' net zero targets—or what we term 'response pathways' given their temporal horizons—is far from straightforward. The overarching conceptual definition of net zero (see Section 2.1) gives firms little practical clarity on formulating credible net zero targets (Fankhauser et al., 2022). Recently, there have been concentrated efforts to create more robust universal criteria for corporate net zero targets. Particularly significant has been the launch of various guidance, including the Science Based Targets Initiative's (SBTi) Net Zero Standard, which has become the de facto resource many companies use for net zero target setting. Such guidance builds on a body of work that has used various criteria to define and explore the ambitions and substance of firms' mitigation commitments. These criteria include time frames, the nature (relative or absolute) and scope of the target, and the balance between emissions reduction and carbon removal (Comello et al., 2021; Dahlmann et al., 2019; Dupuis & Schweizer, 2019; Gouldson & Sullivan, 2013;

¹Note that studies differ as to whether strategy is conceptualised as a driver or moderator.

Sump & Yi, 2021). In this paper, we draw on these insights to map the response pathways of different firms, identifying stronger and weaker pathways.²

2.4 | Understanding corporate responses

Another key issue explored are the factors that explain corporations' net zero response pathways. This paper suggests that the robustness of such pathways is likely to be rooted in the ways that firms strategically position themselves in response to competitive and institutional pressures. Past studies that have examined firms' strategic positioning in relation to climate change have documented various strategies (Kolk & Pinkse, 2005)—often represented using deductively or inductively derived typologies (e.g., Bui & Fowler, 2019; Damert & Baumgartner, 2018; Lee, 2012). Furthermore, the idea that firms might respond differently to pressures for decarbonisation is consistent with a literature offering a critique of new institutionalism's limited ability to account for organisational heterogeneity. Founded on the pioneering contributions of Oliver (1991, 1997), this work acknowledges that actors may not only conform to institutional pressures but also resist them. Recent work on corporate responsibility has also pointed to opportunity-seeking responses and how firms can proactively exploit institutional pressures for competitive advantage (Pedersen & Gwozdz, 2014).

Strategic positioning is likely to indicate intent (Dupuis & Schweizer, 2019). This implies that whether a firm strategically conforms, resists or opportunity seeks will directly inform how it configures its net zero response pathway. Thus, resistance is likely to be associated with less robust net zero pathways, as firms seek to placate stakeholder demands for decarbonisation through responses that are more symbolic (Westphal & Zajac, 1994). Conversely, proactive responses are likely to be associated with more robust targets, with managers believing in the 'business case' for net zero more inclined to adopt a credible response pathway (Gouldson & Sullivan, 2014).

Past work has largely sought to explain variations in corporate climate strategies, policies and practices with reference to the characteristics of individual firms (Chithambo et al., 2020). Amongst the firm-specific factors identified in the literature are resources (Backman et al., 2017; Jabbour et al., 2020) and managerial perceptions (Gasbarro & Pinkse, 2016; Okereke & Küng, 2013). Whilst accepting their importance, we suggest that an exclusive focus on idiosyncratic firm-level factors under specifies the influence of sector dynamics on corporate net zero. Sectors might matter because of intra-sectoral emulation. New institutionalism predicts that, within the context of uncertainty, firms may imitate the actions of others (DiMaggio & Powell, 1983). These include firms in the same industry that comprise an important social reference group (Bryant et al., 2020; Orsato et al., 2015; Singh et al., 2021). A further possibility is that corporate responses could be co-ordinated at the sectoral level through

collective action. Firms in the same sector have an incentive to cooperate through the creation of a self-regulatory institution that can help coordinate responses to external pressures (Barnett & King, 2008; Orsato et al., 2015).

It is also possible that corporate strategies will vary over time. The importance of time has started to emerge in work on corporate climate action (Bui & Fowler, 2019; Slawinski & Bansal, 2012). Its potential significance here arises because net zero can be interpreted as an emergent organisational field undergoing rapid institutionalisation. According to past literature, such settings 'tend to involve a disparate, and relatively unorganized, sets of actors' (Maguire et al., 2004, p. 668). Yet emerging organisational fields are also sites of change. Firm's responses may change as understandings, norms and practices evolve at the field level, for example, as institutional entrepreneurs introduce new governance arrangements (Pattberg, 2017). Moreover, firms may alter their responses as they react dynamically to their strategic peers (Bondy et al., 2012; Yang et al., 2018).

3 | RESEARCH METHODS

A qualitative research approach was used to capture information surrounding the nature, intent and influences underlying corporate net zero targets (Bryman, 2016; Lee, 2021). The main data for the empirical analysis were collected through semi-structured interviews. This was supplemented by evidence obtained from various documentary sources.

The population for selecting our sample of firms derived from Business Ambition for 1.5°C—a leading global campaign run by the SBTi (2021) and partnered by the UN Global Compact and We Mean Business Coalition. Public signatories to the campaign commit themselves to net zero and a temperate target aligned with 1.5°C warming. An initial longlist of companies was created in February 2020 ($N = 206$). This list was subsequently narrowed to only include publicly listed companies based in Europe or North America ($N = 77$). Although this implies a degree of geographical bias, these regions account for the largest share of net zero adopters. It also ought to be noted that our aim was not to achieve a statistically representative global sample of firms but to explore the pathways and determinants of corporate net zero commitments across a range of major sectors.

A particular advantage of focusing on publicly listed firms is that they have more publicly available information on their environmental-, climate- and sustainability-related initiatives, policies and performances. This includes information relevant to analysing their net zero commitments. Indeed, publicly listed firms have faced growing external pressures in recent years (e.g., from investors), to both accelerate their mitigation efforts and improve the disclosure of climate-related information (McDonnell et al., 2022). The sub-sample of 77 publicly listed corporates was further narrowed to 51, with companies selected based on whether publicly available documents related to net zero (a) were in English and (b) provided sufficient details on their targets. Such information was deemed important to triangulate and

²Since this research was conducted, sectoral partnerships such as the Net Zero Asset Owners Alliance have expanded, and an increasing number of firms have coalesced around third-party standard setters like the SBTi to get their net zero targets officially validated.

validate with interview data. Additionally, we included one large privately held Business Ambition for 1.5°C signatory, as well as two large firms that publicly communicated a net zero target without signing up to the SBTi campaign. The rationale was to ensure the inclusion of a broad range of sectors in our sample. Doing so allowed us to respond to calls for more inter-industry insights (Bui & Fowler, 2019) and to explore net zero within industrial settings where the challenge of decarbonisation might be expected to vary (see Section 2.4).

After approaching the 51 firms, the final sample comprised 25 firms who agreed to participate, either by interview or via email (see Appendix A), with all participants holding relatively senior roles. The sample firms were located in the following countries: Canada ($N = 1$), Denmark ($N = 1$), Finland ($N = 2$), France ($N = 1$), Germany ($N = 2$), Luxembourg ($N = 1$), the Netherlands ($N = 1$), Norway ($N = 1$), Spain ($N = 1$), Sweden ($N = 3$), Switzerland ($N = 3$), the United Kingdom ($N = 5$) and the United States of America ($N = 3$). Studies suggest that the country in which a company operates may influence its climate-related strategy, policy and practice (Backman et al., 2017). Amongst other reasons, this is because of differences in societal demand for climate action, as well as the strength of public climate policy (Green et al., 2022; Meckling, 2015; Skjærseth & Skodvin, 2001). Within the present setting, corporates in certain countries in our sample might face stronger pressures—for example, from NGOs and governments—to adopt more robust net zero targets than their counterparts in others (cf. Wang & Sueyoshi, 2018). Whilst cross-national variations are not the primary focus of our research, we nevertheless sought to capture contextual factors that might influence individual firms' net zero response pathway and strategy. These are discussed in Section 4.

The respondent dataset was supplemented by five interviews with journalists and consultants with relevant expertise. The motivation for doing so was to (a) gain insights into the nature of, and factors influencing, net zero target adoption and implementation and (b) validate responses from the sample corporate participants. Two of these interviews took place before the main wave of data collection and were used to inform the themes addressed in the interviews.

Due to the semi-structured nature of interviews, the exact wording and ordering of the questions differed between each interview. Nevertheless, they focused on the following topics: (a) factors shaping firms' decision to adopt—and, where relevant, revise—net zero targets; (b) costs and benefits from adopting and publicly communicating a target; (c) how firms define their net zero target; (d) how firms intend to realise their ambitions; and (e) external and/or internal influences shaping net zero target setting and implementation. The interview questions and approach were designed to address the main research questions. They also sought to gather comparable data about the firms' net zero targets (e.g., time frame, use of removals, etc.) with a view to evaluating the substantivity of response pathways. We remained open to emerging themes during the interviews and therefore retained an exploratory element. This led us to probe further on dynamic, relational elements. We also wanted to avoid a style of questioning that might lead to biased responses, for example, by framing more ambitious targets in a positive light. Interviews were conducted under conditions of personal and organisational anonymity.

A vast majority of respondents provided candid responses, including on potentially controversial topics, such as their strategic intent. Yet aware that participants might seek to cultivate a favourable impression, interviewees were probed about their responses (e.g., for barriers they faced and to give examples) (King et al., 2019). We also triangulated responses across sectors and cross-checked interview accounts with sustainability documentation, including press releases and sustainability/environmental, social and governance (ESG) reports. The interviews were undertaken in pairs (i.e., with two members of the research team present) and administered remotely (using Zoom and Microsoft Teams). Each semi-structured interview typically lasted 30–45 minutes.

Interviews were transcribed de-naturally, and where quotes are provided, they are shown in their naturalised (verbatim) form. Thematic analysis was used to identify and interpret patterns in the interview data (Clarke & Braun, 2014). The analysis unfolded in several phases. Firstly, preliminary codes were developed based on insights from a first round of interview transcripts, key research questions and conceptual categories derived from the literature. These codes were refined and elaborated iteratively after a second round of interviews. Following discussions, the codes were distilled into key themes comprising three high-level categories: drivers/influences, strategic positioning and pathways, alongside a set of sub-themes (some of which contained further sub-nodes). We subsequently compiled a codebook—which contained descriptors of the respective categories—and coded all interview transcripts. To minimise the impact of inter-coder bias between members of the research team, group coding was undertaken on every transcript over 16 coding sessions, with at least three group members present at each session to ensure coding reliability.

4 | RESULTS

4.1 | Pressures for net zero alignment

We found evidence of both competitive and institutional pressures in the decision to adopt net zero targets. Competitive pressures were identified by over three quarters of respondents as a crucial factor in net zero alignment. Such 'business drivers' were often discussed by respondents through the lens of anticipated market trends or overall profitability. Across many sectors, interviewees suggested that the business case for pledging net zero emissions had become increasingly attractive as the cost of abatement continues to decrease (C1, CG1, CG2, E1, ICT1, ICT2, ICT3, S1 and WW2). This illustrates why some companies 'frame [net zero targets] away from a carbon commitment [and towards] an operational business requirement' that can garner quick financial wins (FB2). Beyond cost-related benefits, companies—and especially more carbon-intensive ones—expressed the sentiment that embarking on a net zero trajectory is imperative for future survival from a business operations and climate risk perspective.

Competitive pressures were often discussed in conjunction with institutional ones. Approximately two-thirds of respondents identified

coercive ('regulatory') pressures arising from the influence of national net zero pledges, carbon taxes and international treaties (notably the Paris Agreement). More strategically, some firms emphasised the leverage that a net zero target would afford them in shaping future carbon policies (R1, R2, OG1, OG2 and T1). Another related set of institutional pressures mentioned by approximately two-thirds of respondents came from stakeholders. Many firms alluded to the increasing topic urgency of climate action arising from growing societal concern—spearheaded by activists such as Greta Thunberg—and increasing pressure from policymakers (C1, E1 and T1). Indeed, a recurrent theme from the interviews was that net zero targets were being adopted by firms as a vehicle to signal their alignment with societal values.

Other salient sources of stakeholder pressure identified by respondents were employees, customers and investors. An interviewee from a heavy-emitting industry mentioned that 'staff and employees had expressed more and more discomfort working for a company that, in the past, had a big carbon footprint and wasn't progressive on it ... it just doesn't sound nice in the boardroom' (R1). Further highlighting how institutional and competitive pressures are intertwined, firms discussed the relevance of reputational benefits arising from meeting stakeholder expectations (CG2, CG5, E1, F1, F2, FB1, FB2, OG1, R1 and R2).

4.2 | Mapping firms' response pathways

There was surprising agreement amongst respondents on the drivers for net zero—even if the strength of individual pressures varied across firms in the sample. Yet a persistent theme from the interviews was the lack of clarity on the precise meaning of net zero alignment. Though the definitional landscape has evolved significantly, it has taken time for companies pledging net zero and third-party standards organisations to coalesce around a single definition that is acceptable to firms in both emission-intensive and less intensive sectors. For instance, at the time this research was conducted, the criteria put forth by SBTi in the 2021 Net Zero Standard had not yet been finalised.

Whilst recognising that there are different ways of credibly reaching net zero, we sought to capture the strength of response pathways by evaluating targets along six dimensions: target time frame, operational coverage, value-chain engagement, use of removals, target feasibility and advocacy initiatives. Our choice of dimensional aspects was informed by (a) criteria deployed by standards organisations—especially SBTi (2019); (b) measures of ambition and substantiveness used in past academic studies on voluntary carbon targets (e.g., Dahlmann et al., 2019; Gouldson & Sullivan, 2013; Wang & Sueyoshi, 2018); and (c) perspectives from interviewees regarding key aspects of net zero. Amongst our evaluative criteria, we did not seek to explicitly capture the difficulty of meeting corporate commitments. Previous work has found that the difficulty of voluntary carbon targets influences the degree to which companies realise their mitigation commitments (Ioannou et al., 2016). However, the focus of this paper

is on target setting and whether commitments are robustly configured, rather than on the challenges of implementation. Moreover, as elaborated further below, we approach difficulty (as proxied by sectoral emissions intensity) as an explanatory lens for understanding differences in the substantivity of firms' response pathway and strategic response.

For each of our six dimensions, a determination was made as to whether a firm's target was robust or shallow, with robustness categorised as 'highly robust' (assigned a score of 1.5) or 'robust' (score of 1), and shallowness categorised as 'shallow' (score of 0.5) or 'very shallow' (score of 0). To do so, categorical descriptors were created for the six respective dimensions based on an assessment of their relative ambition, stringency and/or specificity (see Table 1). The evaluations were based on (a) publicly available information on firms' net zero targets obtained from company reports, press releases and related sources (e.g., websites) and (b) responses from the semi-structured interviews. Our approach is consistent with widely used practitioner evaluations (e.g., by Net Zero Tracker), which also rely on analysis of firms' stated commitments. Although not a direct measure of alignment, top scores were more reflective of compliance with the approach, ambitions and mechanisms of science-based initiatives such as SBTi, rather than over-compliance. Low scores reflected limited effort or non-compliance. It is for this reason that we do not have a neutral category that would only be appropriate if we sought to analyse the equivalent of over-compliance, compliance and non-compliance.

The performance of a firm's target on each dimension was translated into an overall score of between 0 and 9, utilising the same four-fold division outlined previously (see Appendix B). Although this inevitably involved simplifying a complex reality, the purpose was not to provide a fine-grained assessment of firms' targets. Rather, by aggregating different dimensions, we sought to broadly assess the relative strength of firms' targets within and across sectors. Figure 1 shows the distribution of firms based on this aggregate scoring of robustness (see Appendix B for detailed scoring). It is readily apparent that considerable inter-firm variability exists—although it is notable that no firm in the sample was classified as 'very shallow' overall.

4.3 | Explaining response pathways

A key factor that emerged from the analysis as influencing the robustness of net zero targets is emissions intensity. Firms in more carbon-intensive sectors were more likely to have shallower targets than those in less carbon-intensive sectors. Evidence from the interviews suggested that corporations in low- and medium-intensity sectors mostly appeared to have more—proven and low cost—options to accelerate decarbonisation efforts (see Figure 2). This, in turn, meant that less carbon-dependent firms were more easily able to concretise stronger net zero targets. Some heavy-emitters communicated the desire to formalise more ambitious net zero targets but expressed frustration about their inability to enact change at the same pace and scale as low-carbon firms. One resource industry participant commented:

TABLE 1 Net zero target evaluation framework.

Dimension	Characteristics of more robust targets	Characteristics of shallower targets
Time frame	Recognise 2050 as absolute deadline and also aim to achieve more imminent targets (e.g., 2030). Use clear interim targets to track and measure progress.	Temporally ambiguous, as shown by the absence or vagueness of intermediate targets to track and measure progress.
Coverage of Scopes 1 and 2	Leverage existing solutions, such as renewable energy, to mitigate operational emissions. Divest from carbon-intensive assets to reduce carbon exposure. Take an active role in developing future mitigation technologies through investment and/or R&D.	Rely heavily (sometimes entirely) on future technologies and/or removal mechanisms. Take a passive 'wait-and-see' approach to development of future technologies.
Coverage of Scope 3	Include footprint of the entire value chain, including customer usage emissions. At a minimum, include the footprint of the most impactful value-chain components that may be directly influenced.	Ignore value-chain emissions potentially directly influenced by the firm.
Usage of removals	Only seek to use removals after exhausting all other avenues for genuine emission reductions. Recognise importance of choosing high quality removals and applying strict standards to their purchase and management.	Utilise removals more liberally.
Feasibility	Account for inherent uncertainty through solution diversification and contingency planning in case the intended mitigation approach fails.	'Place all the eggs in one basket' by relying entirely on a single lever or technological solution for target delivery.
Advocacy	The organisation is an active participant in relevant forums that (a) raise general awareness of net zero issues, (b) encourage industry peers to raise their level of ambition and action, (c) encourage R&D into nascent but critical technology and (d) engage with government for support.	The organisational approach to net zero is inwardly focused with limited external engagement with government, peers and broader industry.

Note: The defining characteristics of shallower and more robust targets were based on (a) insights from initiatives such as SBTi, which provide guidance on criteria, recommendations and best practice for temperature-aligned pathways, and (b) the document analysis and interviews (including with independent consultants), which helped the research team grade target substantivity. Distinction within each category (i.e., more robust and shallower) based on partial or full alignment.

Source: Authors.

The heroes who have committed to net zero by next Tuesday afternoon—the technology is very feasible. It's buying more renewables ... they can double their energy costs and they still have a viable business model. (R1)

Carbon intensity also shapes and interacts with another factor influencing response pathways: firms' strategic positioning. Based on analysis of the data, we identified three prevalent strategic positions amongst our sample of firms: conformance, opportunity seeking and avoidance. Conformance was observed amongst firms adopting commonly agreed-upon, accepted and/or broadly similar approaches to reaching net zero emissions. Conversely, opportunity seeking is a strategic position adopted by firms for which the processes (and solutions) needed to achieve net zero alignment are far less established. Opportunity seeking fosters a 'race to the top' driven by the prospect of competitive advantage. We also located a distinct cluster of firms who appeared to adopt avoidance strategies. Whilst some of the firms

in this category appeared to be engaging in deliberate greenwashing, others faced genuine challenges in adopting substantive targets. Details about the criteria used to classify firms into the respective strategic positions are provided in Appendix C.

Figure 3 depicts the distribution of firms according to the three strategic positions outlined above. By segmenting participating firms into groups based on the relative emissions intensity of their output (see Figure 2), we identified five clusters of firms across low-carbon-intensity, medium-carbon-intensity and high-carbon-intensity sectors. As shown in Figure 3, response substantivity was greatest amongst strategic conformers (in the low-emission-intensity category) and opportunity seekers and shallowest amongst firms pursuing strategies of avoidance. Below, we unpack these findings further, paying attention to firm-specific, sectoral and contextual factors influencing response pathways. The analysis is segmented according to emissions intensity, reflecting the material, stepwise change in the size of the carbon reduction task that exists between different firms in different sectors.

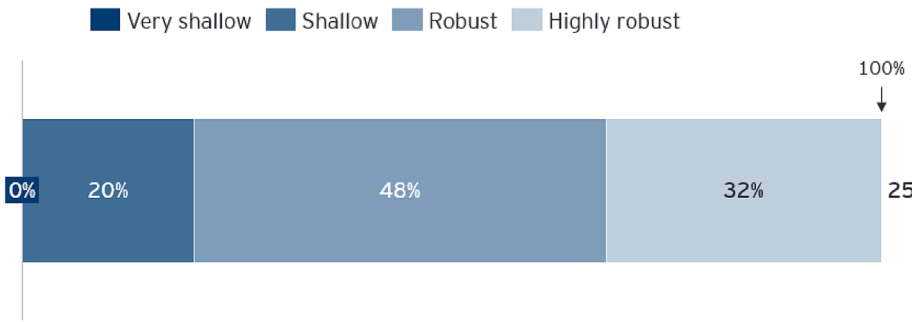


FIGURE 1 Aggregate distribution of participant target classifications, ranging from very shallow to highly robust. See Appendix B for detailed scores, scoring methodology and target classification thresholds. Source: Authors.

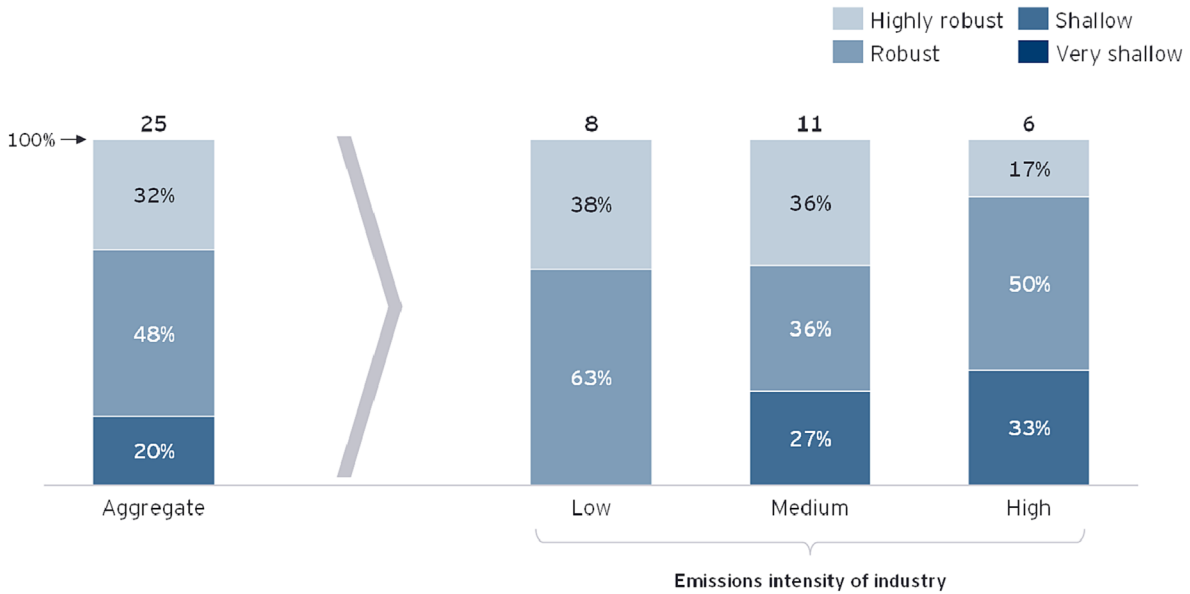


FIGURE 2 Distribution of participant target classifications by emissions intensity of industry. Industry emissions intensity is based on '000 t of emissions per million pounds of GVA as reported by the UK ONS. Low: 0–0.2 (ICT and financial services); medium: 0.2–0.75 (manufacturing, agriculture and forestry); and high (oil and gas, transport mining and quarrying). Source: Authors.

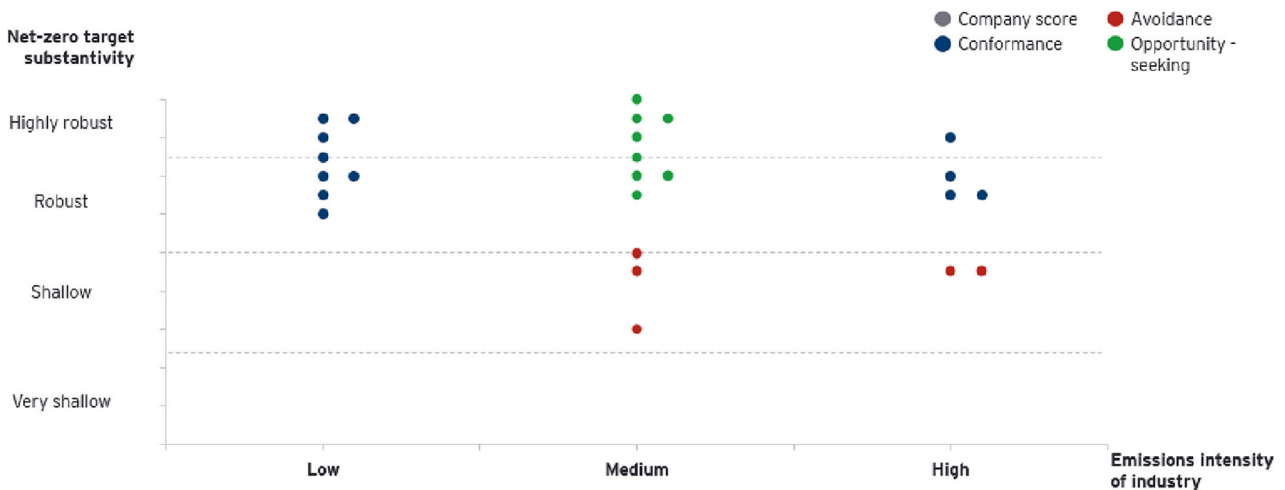


FIGURE 3 Distribution of participant target classifications by emissions intensity of industry and strategic positioning. Industry emissions intensity is determined using the method outlined in Figure 2. Strategic positioning is indicated by circle colour: blue—conformance; green—opportunity seeking; and red—avoidance (see Appendix B for detailed scores, scoring methodology and target classification thresholds). Source: Authors.

4.3.1 | Low-emission sectors

In low-emission sectors, firms in our sample had conformed to normative, coercive and competitive pressures by adopting robust net zero pathways. Respondents discussed their desire to satisfy internal stakeholder demands whilst trying to navigate the normative dynamics shaping broader industry-level conduct (ICT1, ICT2, ICT4, F2 and F3). There was a large base of underlying employee support for accelerating decarbonisation efforts in many firms, which fuelled bottom-up pressure on senior management to formalise a substantive net zero emissions pathway at least as ambitious as peers. As an ICT industry participant commented:

We recently came out on World Environment Day and did some work with our employees and a number of the comments came back. And they said, 'why are we waiting until 2045 to go net zero, we should be more committed ...'. (ICT1)

Corporate reliance on collective action as a tool for mobilising industry-wide net zero alignment was another key factor shaping conformity. Firms in low-carbon sectors like finance and telecommunications often emphasised shared interdependency on important stakeholders such as investors or suppliers, especially in business areas where it is commonplace for companies to frequently exchange services with competitors (CG2, CG5, ICT1, ICT2 and FB2). According to an ICT participant:

What you will find in the telecoms industry is that a lot of people who are your suppliers, they are also your customers ... They set supply chain targets for us and we set them for them, and really, it's driving the industry because we all push each other along. I think most of the telecoms companies all have targets. (ICT1)

In low-emitting sectors with unified net zero standards, companies pointed to the presence of strong trade associations that set uniform guidance on climate targets and issue clear penalties for failing to adopt sectoral protocols. In the telecommunications industry, the GSMA³ adopted an industry-wide climate action roadmap that lays out how companies should achieve 1.5°C alignment. The same is true in the financial industry, where coalitions such as the Net Zero Asset Owner Alliance have set sectoral guidelines and expectations. For firms in sectors characterised by this type of normative pressure, there is greater impetus to bear transition costs equally and to formalise overarching standards earlier on in the net zero curve.

Companies often emphasised how their status as low-emitters gave them little excuse to avoid the net zero bandwagon and far less leeway in responding to decarbonisation pressures. That the task of absolute emission reduction is considerably less difficult—vis-à-vis

carbon-intensive firms—went a long way in explaining limited variations in the response pathway of low-carbon firms (ICT1, ICT2, ICT4, F2 and F3). Many such firms positioned themselves as 'agents of change', considering their efforts vital in enabling and kickstarting emissions reductions within their sector and potentially across the wider economy. As an interviewee from the insurance sector remarked:

The investments we do have quite an important impact on the world. And our operational impact is miniscule. What we did in the past is we formed alliance ... forming a sectoral alliance will be important going forward I think. For example, when we put out our coal policies our competitor was two weeks later coming out with their own—so it really puts pressure on the others. (F2)

4.3.2 | Medium-emission sectors

The greatest response pathway variance was observed amongst firms classified as medium intensity. Associated with more robust targets, we observed a small set of proactive firms that strategically differentiated themselves from others by communicating more comprehensive, transformational action. Firms that positioned themselves as opportunity seekers emphasised building resilience against climate risks, as well as the importance of capturing differentiation and other market advantages. For instance, companies in the manufacturing industry and the food and beverage industry frequently discussed vulnerability to physical risks and referenced the implications of business disruptions stemming from the increasing severity of climate impacts (FB1, FB2, FB3, CG2, CG5 and E1). For medium-emitters less severely constrained by carbon lock-in (referring to carbon-intensive systems and processes locking out low-carbon alternatives), and with the agility to respond, a robust net zero strategy can function as a type of insurance policy against impending climate damages. As one food and beverage industry participant noted:

We have to make our farmers resilient, and I think what gives us confidence to push on with the 1.5°C degree pathway is natural climate solutions. Which for us ... is actually what we call an inset because we are sourcing agricultural raw materials, and luckily the actions we would take for insetting are almost the same actions we would need to help build farmer resilience. (FB1)

Several firms also referenced their desire to adopt an ambitious net zero pathway as a vehicle for expanding market share and outpacing competitors. These companies generally discussed the green advantage they had cultivated or wished to cultivate from front-loading low-carbon goals and decarbonising their operations. One such respondent commented:

³A trade association representing mobile network operators.

The challenge is serious but we have the opportunity of really being in the forefront by really sticking out our nose ... and aiming to be the absolute best and we know, because we have done it in other areas [and] due to our size ... we can go into the forefront and our competitors will be forced to meet us. (CG2)

Some companies also emphasised competitive advantages from supporting robust Scope 3 accounting standards in the net zero domain (e.g., R2).

Additionally, we observed that some firms in medium-emission sectors had quickly sought to produce a notional net zero target in response to coercive pressures but failed to match pledges with developed operational commitments. A recurrent theme from interviews was that such firms face genuine barriers that impede more substantive action such as a lack of definitional clarity or know-how (CG2, CG5, E1, FB1, FB2, FB3, R2, WW1 and WW2). Technological readiness was also a central challenge cited by the majority of medium-intensity firms displaying avoidance. One respondent from the water and waste management sector provided the following rationale when discussing a firm-wide decision to avoid setting a concrete net zero pathway:

We think 2050 is too far in the future—the targets beyond 2030, I'm not sure there's been a huge amount of thought on that ... what is the reality around technology coming on board vs. oh well we know things are going to change. (WW2)

4.3.3 | High-emission sectors

Interviews also revealed differences in strategic positioning amongst high-emitting firms. In the oil and gas and aviation sectors, firms' response pathways were re-converging after a period of opportunity seeking that occurred at the start of the net zero movement in 2019 and 2020. Conformance in high-emitting sectors was motivated by emerging sectoral norms and also the reputational consequences of failing to meet investor or government expectations (OG1, OG2, OG3, R1 and R2). For instance, a participant in the resource industry commented on the 'moral obligation' of cultivating an environmental image for investors and regulators or otherwise 'running the risk of not being able to operate' in the future (R2).

Respondents suggested that demand for policy support had accelerated in many heavy-emitting sectors as firms attempt to satisfy coercive pressure, whilst weighing the high upfront costs of investing in new technologies and processes for manufacturing (OG2, OG3, R1 and R2). A resource industry respondent commented on the compromise between pursuing decarbonisation and remaining economically competitive:

It's a really important point because at the moment, the prevailing COP/Paris narrative is that we've got to

get all the companies in the world to commit to do this ... but the investments we require will be 30 to 60 billion. So we need policies to be able to enable us to be competitive against companies that don't bother. (R1)

Since net zero targets were being normalised in many highly carbon-dependent industries, there had been growing (normative) pressure to converge around a common set of net zero standards. Some heavy-emitting firms noted that they could benefit from participating in the creation of sectoral net zero methodologies through shaping the interpretation of net zero alignment in a manner that suited their business interests (e.g., OG3).

Though stakeholder scrutiny from investors and regulators was consistent across high-emission firms, willingness to invest in decarbonisation initiatives differed substantially within and between high-intensity sectors. Important determinants were (a) the carbon intensity of a firm or industry portfolio and (b) that entity's degree of technological readiness to decarbonise. Within the oil and gas sector, for instance, companies with a higher proportion of natural gas in their portfolios were more willing to bear transition costs earlier and to frontload decarbonisation efforts (OGC1 and OGC2).

Firms exhibiting avoidance through shallower net zero pledges were invariably characterised by low investment appetite, manifesting in a reluctance to shoulder substantial costs for at least a decade or until low-carbon technologies have been deployed at scale and have progressed down the experience curve. They also demonstrated profound gaps in their articulation of what concrete strategies and actions they would pursue to reach net zero emissions, as well as general lack of understanding surrounding the meaning of net zero alignment and the level of effort required to neutralise emissions by 2050. An interviewee from an emissions-intensive manufacturing firm described the negative repercussions of coercive pressure:

So where we're drifting towards is, well here's our target but just to let you know, we've got f*ck-all [sic] chance of delivering this target. You want a target? You've got a target. So in a way, we're giving into the pressure to have a target because the consequences of not having a target for us were so immediately painful. (R1)

Typically, firms adopting avoidance reiterated the constraints posed by carbon lock-in and high technology investment barriers to justify their resistance to mitigating climate impacts and, as such, 'rate-limit' society's progress in achieving a green transition to a net zero economy.

4.4 | Dynamic positioning

A company's initial strategic position often provides some indication about its level of net zero ambition. Yet strategic positioning is not always static. We found evidence of significant fluidity as firms

modified their position over time. In particular, the interviews revealed that early adopters of net zero targets tended to exhibit dynamic positioning, either as they actively sought to re-orient themselves in relation to competitors or because their net zero target was normalised by landscape or industry saturation.

We detail below two factors crucial in driving dynamic positioning: (a) peer pressure and competitive advantage and (b) sectoral standardisation.

4.4.1 | Competitive and peer pressure

The rapid spread of corporate net zero targets is institutionalising a field wherein net zero alignment is no longer an exception but is the norm. As a result, almost half the participants communicated that increasing emphasis had been placed on the ambition of net zero pledges and on fostering a 'race to the top' driven by industry-wide competition.

Some firms communicated that they were unable to preserve frontrunner status without frequently raising the bar and re-engineering targets at least annually (FB2, ICT3 and CG2). This was especially evident in industries that lack a cohesive sectoral approach to net zero including technology, transport, manufacturing, and food and beverage. More specifically, firms in sectors lacking standardisation were more likely to alter dimensions of their targets (such as time frame or target scope) in response to competitor net zero announcements. As one manufacturing industry participant noted:

When we set the initial goal, we were the absolute most ambitious and we said 10 years before 2050. They [our competitor] said 2050 and we said 2040, and then [our competitor] came one year later and said we're going to do 2030, and already they had pushed us back before ... so that kind of competition happens. (CG2)

Other firms may set entirely new milestones for low-carbon ambition by 'raising the bar and making a whole new one 12 feet up' (N2). As one industry commentator articulated:

You don't want to be doing exactly the same thing as your competitors are doing, you want to be the one one-upping them. Thus it goes into net zero because companies don't want to be carbon neutral anymore because it has x, y, and z problems ... so I want to be seen as a leader and I want to be net zero ... or I'm being carbon positive and then it's this funny thing that net zero is not enough. (C1)

When describing a company-wide decision to pivot to a more ambitious low-carbon strategy, another technology sector participant noted that 'our past commitment to carbon neutrality was no longer sufficient for leadership' (ICT3).

These observations point to the existence of 'one-uppership' dynamics and also the extent to which reputational factors propel changes in the trajectory of low-carbon commitments. As shifts take place in the institution of net zero, firms with the agility to respond to evolving norms may adjust their strategy accordingly. Firms in medium- and low-intensity sectors were found to be most malleable from a positioning standpoint.

4.4.2 | Sectoral standardisation

Not all early movers were able to maintain their initial status as front-running, opportunity seekers. In some industries with low levels of initial standardisation, early movers may help pave the way for peers but fail to surpass their competitors once net zero pledges become more ubiquitous. Rather than supporting a race to the top, some industries such as oil and gas and finance had thus started pursuing a more uniform sectoral approach that is backed by sectoral methodologies and common best practices (OG1, OG2, OG3, F1, F2 and F3). As a finance participant articulated when describing the dynamics of being an early mover, 'it's best to do your own work first and be a good example—and maybe later convince others to do it the way you do it ... so therefore forming a sectoral alliance will be important going forward' (F2).

Instead of passively acquiescing to new industry norms, early movers were often able to forge some compromise with latecomers, further enabling them to retain some of the competitive advantage cultivated by being standard setters. Early movers also benefit from mimetic dynamics and from the credibility afforded to industries with greater cooperation on net zero alignment. A participant in the oil and gas sector revealed:

If you look at what subsequently followed our leadership, with the announcements from [our] other major [peers] ... there are some remarkably similar approaches out there. Which is good ... because I think that it gives legitimacy to the industry's actions. (OG3)

4.4.3 | Dynamic positioning typology

Figure 4 maps out four different pathways through which firms had adjusted their positioning over time. Note that the figure is not a statistical representation but seeks to capture distinct trajectories observed in our sample. The blue curve ('positional oscillators') is representative of first movers who sought to maintain their status as opportunity seekers and displayed strategic oscillation. These companies fluctuated between opportunity seeking and conformance. After demonstrating initial leadership in the net zero arena, firms in this category may have been matched or outpaced by peers. To reclaim their competitive advantage, oscillating firms eventually ratchet ambition and substantially reformulate their net zero commitments.

The purple curve ('former leaders') captures early mover firms who gravitated towards conformism as commitments proliferated

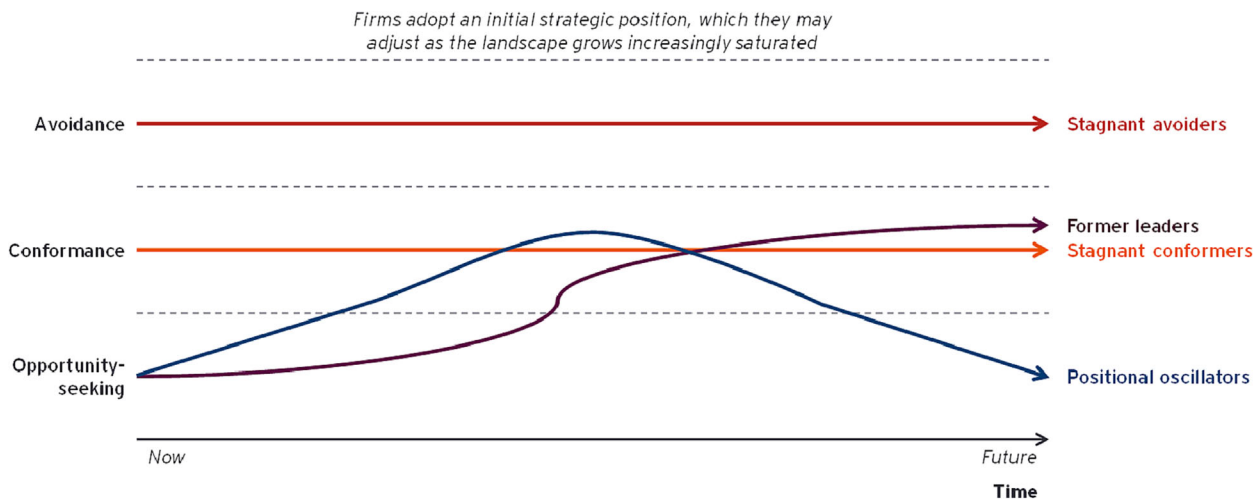


FIGURE 4 Observed dynamic strategic positioning behaviour of sample firms. Source: Authors.

within their sector and net zero increasingly became the norm. These companies tended to be medium- or high-intensity firms reticent to bolster prior decarbonisation commitments without sufficient economic and policy support. Many firms classified as former opportunity seekers have also been involved in shaping sectoral standards.

The orange line ('stagnant conformers') represents firms that maintained a static position of conformance over time. This applies to companies in low-carbon sectors who displayed industry-wide unity since the beginning of the net zero movement. For example, two medium-sized firms in the telecommunications sector commented on their perpetual conformance to industry standards and their allegiance to the trade associations involved in applying normative pressure (ICT2 and ICT4). Finally, as shown by the red line ('stagnant avoiders'), static positioning was exhibited by companies that adopted seemingly symbolic targets to satisfy stakeholder demands without any intent of ever displaying substantive leadership. Firms pursuing avoidance did not communicate any clear intent to gravitate towards conformance or opportunity seeking, often because they faced little industry-wide competition or saw little immediate market benefit from investing in low-carbon innovation. This was especially prevalent for high-emitting firms that would still 'need a license to operate in the future' (R3) after the world transitions away from fossil fuels.

Table 2 identifies several characteristics that influenced firms' decision to be static or change their strategic positioning over time. A key distinguishing factor was the extent to which companies perceived pressures for, and competitive advantage from, differentiation and sectoral leadership.

5 | DISCUSSION

Our findings reveal similarities between past corporate climate action and the recent wave of net zero targets. We find considerable overlap with work examining the drivers of voluntary carbon pledges, including the importance of cultivating a public image aligned with

TABLE 2 Firm and sectoral characteristics influencing dynamic positioning.

Factors that lead to staticism	Factors that lead to dynamism
<ul style="list-style-type: none"> • Creating desired impression of climate action through act of target adoption being valued over substantive target ambition. • Competitive advantage, and monetisation of benefits, from more ambitious targets perceived by firms as limited. • Belief that there are commercial risks from ratcheting-up ambitions. • Collective action on net zero viewed as advantageous by firms within sector. 	<ul style="list-style-type: none"> • Firms perceive tangible link between (more ambitious) climate action and market benefits. • Palpable competitive pressure from industry peers to be frontrunner in net zero targets. • Individualistic leadership by firms seen as path to securing greatest market advantage and opportunities from net zero.

Source: Authors.

stakeholder expectations (Pinkse & Busch, 2013). We also find that, in common with previous work, pressures for net zero alignment elicit a wide range of strategic responses that inform the ambition of response pathways (Bui et al., 2020; Okereke & Küng, 2013; Vieira et al., 2022). Broadly consistent with existing typologies, these strategies lie on a continuum, stretching from resistance and conformity, through to opportunity seeking (Kolk & Pinkse, 2005; Lee, 2012; Pedersen & Gwozdz, 2014). Additionally, in line with other forms of climate action (Dahlmann et al., 2019; Kim & Lyon, 2015) and recent work on net zero targets (Comello et al., 2021), we show significant differences in the substantivity of net zero response pathways.

In explaining corporate responses, our research supports the idea that firm-level characteristics are significant determinants of climate action (Bento & Giafrante, 2020; Todaro et al., 2021; Yin et al., 2017). Factors such as technological preparedness, exposure to climate-related risks and willingness/ability to bear transition costs partially explain inter-firm variation in our sample. Yet our study also points to

the importance of considering sectoral aspects. Several studies have drawn attention to inter-industry differences in climate action (Damert et al., 2017; Wang & Sueyoshi, 2018). Our contribution sheds light onto the underlying reasons why a firm's sector can potentially influence its responses to pressures for net zero. One is because of carbon dependence. With some exceptions (e.g., Sprengel & Busch, 2011; Witte, 2020), the role of carbon dependence has not been explored in great depth, although several studies have purposely focused on carbon-intensive sectors (Abraham-Dukuma, 2021; Cadez & Czerny, 2016; Green et al., 2022; Vieira et al., 2022). We reveal how carbon dependence has a major influence by shaping the 'discretionary space' for corporate net zero. To a degree, this is related to stakeholder expectations, although even low-emitting firms face strong (internal) pressures. More important still, carbon dependence shapes the costs and feasibility of net zero alignment. Firms in low-carbon-intensity sectors have far more flexibility in how they respond to pressures for net zero than firms in high-carbon-intensity ones. Significant differences in carbon intensity also exist *within* sectors, and these can have important implications for strategy and response substantivity. Notwithstanding these variations, our findings draw attention to important differences in the scale of the mitigation challenge facing firms in different sectors (Eckardt & Mazutis, 2020).

Another way in which sectors matter is by providing the relational context for climate action. We find evidence of sectoral inter-dependencies, with firms' strategic response influenced by the behaviour of peers. A feature of many past studies that have investigated factors shaping corporate climate change strategy, policy and practice is their focus on independent, uncoordinated action (Abreu et al., 2021; Bento & Giafrante, 2020). Our findings add to existing work (e.g., Bryant et al., 2020; Daddi et al., 2020), which suggests that it is important to consider relational dynamics. An important caveat: the sample analysed here is drawn from a group of firms who, through their commitment to SBTi, had already engaged in co-ordinated action. We nevertheless observe highly influential, interdependent dynamics that go beyond this membership.

A further contribution of our study is to foreground the importance of considering temporal dynamics. Our study examines a nascent stage in the emergence of a new institution that, consistent with previous work in other contexts, is characterised by dynamism (Avetisyan & Ferrary, 2013; Garud et al., 2002; Maguire et al., 2004). We expose corporate net zero as a rapidly evolving terrain in which there is considerable experimentation, benchmarking and competition. Firms may well adopt strategic positions vis-à-vis net zero. However, against a backdrop of shifting expectations, interdependency and standardisation, these can change, sometimes quite abruptly. Rather than fixed positions, therefore, we witness dynamic ones that are informed by evolving norms, sectoral dynamics and entrepreneurial leadership. It is for this reason that we find it apt to talk about *trajectories* of net zero. We are not the first to document change over time (Bach, 2019; Bui & Fowler, 2019; Skjærseth & Skodvin, 2001). However, our novel contribution is a typology of temporal positioning and the identification of factors that lead firms to remain static or change their strategic position over time.

These observations about time caution against over-generalising on a snapshot of corporate responses and raise the prospect that future developments could precipitate shifts in firms' strategic positioning. One such development is further standardisation. As we show, the emergence of sectoral standards can be an important factor in propelling firms towards conformity, particularly when supported by trade associations. Another is public policy interventions. We found that firms, particularly those in medium- and high-intensity sectors, were attentive to policy developments such as carbon prices and support packages (e.g., citing the EU's Green Deal Industrial Plan). It is possible that more ambitious public policy could animate changes in firms' strategic positioning, for example, by creating incentives for investments in more rapid decarbonisation.

Finally, we contribute to debates about greenwashing and climate washing (Coen et al., 2022; Dahlmann et al., 2019; Lyon & Montgomery, 2015). A tendency in past work has been to equate less substantive forms of climate action with corporate deception, manipulation and impression management (Westphal & Zajac, 1994). We readily accept that—in line with the findings of Christiansen et al. (2023)—certain firms may use net zero targets symbolically to placate stakeholder demands rather than as a transformational vehicle to enact Paris-aligned decarbonisation. We also accept that deciphering true motives and intent from corporate interviews is fraught with difficulties (Van Audenhove & Donders, 2019). Our findings nevertheless offer-up a more sympathetic critique. They suggest that genuine constraints—including the availability of proven technology, limited know-how and carbon lock-in—can make it considerably more difficult for emissions-intensive firms to credibly commit to ambitious climate policy. In making this observation, the paper lends support to work calling into question the substantive–symbolic dichotomy, recognising that the inconsistent implementation of firms' stated policy may not always be purposeful, strategic and self-serving (Crilly et al., 2012; Slawinski et al., 2017).

6 | CONCLUSIONS

The recent proliferation of net zero targets by corporations is indicative of growing private sector involvement in governing climate change. Based on a sample of 25 companies, this paper fills a gap in the current understanding regarding the motives for, strategic positioning towards and substance of such targets. Much like other forms of corporate climate action (Aben et al., 2010; Abreu et al., 2021; Cadez et al., 2019), we find that firms are being propelled to adopt targets by heightened stakeholder pressure and competitiveness concerns. Yet firms' responses to these pressures vary significantly. The most robust pathways were found amongst firms in low-carbon-intensity sectors, reflecting the lower costs and higher feasibility of attaining net zero, together with common ambition and pressures to conform to sector-specific standards. More robust pathways were also configured by several opportunity-seeking companies with medium levels of carbon intensity. A common feature of such firms is that they were in sectors for which climate change presents

significant business risks and/or with the organisational agility to decarbonise. The least robust net zero targets were a feature of firms in medium-carbon-intensity and high-carbon-intensity sectors who, unwilling and/or unable to bear high transition costs, pursued a strategy of avoidance. However, we also find that strategic positions may change over time in response to peer pressure, standardisation and image cultivation. This, in turn, has consequences for the substantivity of net zero targets.

Our findings have implications for the study of corporate carbon mitigation. They suggest that, within the context of emergent fields (cf. Hoffman, 2001a; Pattberg, 2017), it is important for scholars to pay attention to developments that can transform the wider context for business decision-making. There is also a need to acknowledge the potentially relational nature of corporate responses and how cooperative and competitive dynamics shape firms' shifting climate/environment-related behaviour (cf. Meckling, 2015; Yang et al., 2018).

Another contribution is to demonstrate the value of an institutionalist framework for understanding corporate net zero. A particular advantage of new institutionalism is its openness to the possibility of a range of influences (coercive, normative and mimetic), not only on the decision to adopt targets but also on how they are configured. Referencing the above discussion, it also recognises how firms' decision-making is enmeshed in a wider context (i.e., the organisational field) wherein corporate behaviour on net zero is shaped by other organisations, including competitors, suppliers and trade associations. At the same time, our study exposes some of the challenges of operationalising an institutionalist approach. We thus found it difficult to disentangle competitive (rational and calculative) and institutional (legitimacy-seeking) pressures. More specifically, because firms may comply with institutional requirements for self-interested reasons related to profitability (Oliver, 1991), the distinction is less clear-cut in practice.

Our findings also have implications for debates about the contribution of corporate net zero to public climate goals (Hsu et al., 2020; Rogelj et al., 2021). On one hand, they offer a cautionary note. Though net zero alignment aims to bolster corporate mitigation efforts, recent targets have already fallen prey to some of the same challenges that plagued past voluntary targets, including definitional ambiguity and malleability (Dhanda & Hartman, 2011). In the period before net zero standards started to emerge, there was even greater potential for net zero terminology to be co-opted by corporations with little intent of credibly fulfilling targets. Indeed, it is precisely those firms whose contribution is most critical to meeting public climate goals—that is, the most carbon-intensive ones—that we found the weakest net zero targets. On a more positive note, our results suggest that a growing number of major corporates are convinced by the 'business case' for net zero alignment, which bodes well for both the ambitions and implementation of their commitments (Gouldson & Sullivan, 2014; Littlewood et al., 2018). We also found evidence of competitive ratcheting up, with a subset of firms vying to become frontrunners by setting more robust commitments, motivating others to revise their targets upward. Whilst some commitments remain weak, the overall trend is towards stronger targets, as well as greater standardisation.

Our research was conducted during the nascent stages of the net zero landscape. Some caution therefore needs to be exercised in drawing definitive conclusions regarding target robustness and effectiveness. When it comes to strategic positioning, dynamic, opportunity-seeking behaviour may lead certain firms towards higher levels of ambition given its association with individual leadership. However, from the perspective of decarbonising entire sectors, what may matter more is robust collective action. Our findings suggest that there are circumstances where conformance to industry norms or standards may drive substantive outcomes. Indeed, rather than promoting individualistic, opportunity-seeking behaviour, the greatest decarbonisation potential lies in the standardisation of high ambition across entire industries. This comes with an important caveat: the guidance, methodologies and pathways to which firms conform need to be sector specific, science based and credible (Allen et al., 2022). One potential risk is the proliferation of net zero principles and standards, with firms—especially in hard-to-abate, carbon-intensive sectors—gravitating towards less demanding, industry-led ones. Countering these concerns, recent years have witnessed considerable progress by initiatives such as SBTi in the development of rigorous, science-based standards. Conformity to such standards may play a positive role in normalising and upholding rigorous criteria for net zero target setting and achievement.

This paper has provided preliminary insights into net zero response pathways and strategies. We identify three important areas for future research. One is to investigate the techno-politics of net zero (Freidberg, 2014). Our findings reveal that certain firms are actively seeking to influence definitions, roadmaps and emerging standards of net zero in ways aligned with their interests. Research is needed to better understand these processes of setting collective standards and low-carbon norms, including why certain actors are more successful than others in enacting their vision and who is shaping evolving conceptions of net zero. Another important priority area is implementation. Our paper had little to say about the substantive enactment of targets. Through both qualitative and quantitative work, there is a need to examine whether, and under what conditions, commitments are being translated by corporates into policy, practice and genuine emissions reductions (Dahlmann et al., 2019; Galletta et al., 2021). This would be an opportunity to (more) critically scrutinise the substance of net zero and whether greater third-party standardisation impacts substantive outcomes. A third priority area is to interrogate the financial and other business benefits of net zero alignment. Research is required to both qualify and quantify the nature, magnitude and determinants of positive returns from net zero-aligned investments.

CONFLICT OF INTEREST STATEMENT

Zola Berger-Schmitz currently works at the World Resources Institute (WRI) as a target validation manager for the Science Based Targets Initiative (SBTi). As part of the SBTi's target validation team, she evaluates corporate science-based reduction targets against the SBTi criteria and is involved in the SBTi's net zero validation process. Zola Berger-Schmitz's work on the main data collection, results and analysis presented in the paper took place whilst at the LSE and prior to

her employment with the WRI. Douglas George currently works for EY Port Jackson Partners (EY PJP), a firm that provides strategic advice to organisations on a range of issues, including sustainability. Douglas George's main work on the data collection, analysis and results presented in the paper took place during an extended sabbatical and whilst at the LSE, with complete independence from EY PJP. Cameron Hindal currently works at the International Sustainability Standards Board (ISSB) at the International Financial Reporting Standards (IFRS) Foundation, a not-for-profit public interest organisation that oversees globally accepted accounting and sustainability disclosure standards. The findings, discussion and conclusions of the paper have no affiliation with the ISSB or IFRS Foundation. Cameron Hindal's work on the main data collection, results and analysis presented in the paper took place whilst at the LSE and prior to his employment with the ISSB/IFRS Foundation. Richard Perkins has declared no conflict of interest. Maria Travaile currently works for Carbon Direct, a science-first carbon management firm helping organisations reduce, remove and monitor their emissions. The findings, discussion and conclusions of the paper have no affiliation with Carbon Direct. Maria Travaile's work on the main data collection, results and analysis presented in the paper took place whilst at the LSE and prior to her employment with Carbon Direct.

ORCID

Richard Perkins  <https://orcid.org/0000-0002-4963-6494>

REFERENCES

- Aben, K., Hartley, I. D., & Wilkening, K. (2010). Reducing greenhouse gas emissions in the British Columbia forest industry, 1990–2005. *Technology in Society*, 32(4), 288–294. <https://doi.org/10.1186/s13021-020-00155-2>
- Abraham-Dukuma, M. C. (2021). Dirty to clean energy: Exploring 'oil and gas majors transitioning'. *The Extractive Industries and Society*, 8(3), 100936. <https://doi.org/10.1016/j.exis.2021.100936>
- Abreu, M. C. S. D., Webb, K., Araújo, F. S. M., & Cavalcante, J. P. L. (2021). From "business as usual" to tackling climate change: Exploring factors affecting low-carbon decision-making in the Canadian oil and gas sector. *Energy Policy*, 148, 111932. <https://doi.org/10.1016/j.enpol.2020.111932>
- Allen, M. R., Friedlingstein, P., Girardin, C. A. J., Jenkins, S., Malhi, Y., Mitchell-Larson, E., Peters, G. P., & Rajamani, L. (2022). Net zero: Science, origins, and implications. *Annual Review of Environment and Resources*, 47, 849–887. <https://doi.org/10.1146/annurev-environ-112320-105050>
- Avetisyan, E., & Ferrary, M. (2013). Dynamics of stakeholders' implications in the institutionalization of the CSR field in France and in the United States. *Journal of Business Ethics*, 115(1), 115–133. <https://doi.org/10.1007/s10551-012-1386-3>
- Bach, M. (2019). The oil and gas sector: From climate laggard to climate leader? *Environmental Politics*, 28(1), 87–103. <https://doi.org/10.1080/09644016.2019.1521911>
- Backman, C. A., Verbeke, A., & Schulz, R. A. (2017). The drivers of corporate climate change strategies and public policy: A new resource-based view perspective. *Business & Society*, 56(4), 545–575. <https://doi.org/10.1177/0007650315578450>
- Barnett, M. L., & King, A. A. (2008). Good fences make good neighbors: A longitudinal analysis of an industry self-regulatory institution. *Academy of Management Journal*, 51(6), 1150–1170. <https://doi.org/10.5465/amj.2008.35732609>
- Bento, N., & Giafrante, G. (2020). Determinants of internal carbon pricing. *Energy Policy*, 143, 111499. <https://doi.org/10.1016/j.enpol.2020.111499>
- Bondy, K., Moon, J., & Matten, D. (2012). An institution of corporate social responsibility (CSR) in multi-national corporations (MNCs): Form and implications. *Journal of Business Ethics*, 111(2), 281–299. <https://doi.org/10.1007/s10551-012-1208-7>
- Bryant, A., Griffin, J. J., & Perry, V. G. (2020). Mitigating climate change: A role for regulations and risk-taking. *Business Strategy and the Environment*, 29(2), 605–618. <https://doi.org/10.1002/bse.2391>
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Bui, B., & Fowler, C. J. (2019). Strategic responses to changing climate change policies: The role played by carbon accounting. *Australian Accounting Review*, 29(2), 360–375. <https://doi.org/10.1111/auar.12213>
- Bui, B., Houque, M. N., & Zaman, M. (2020). Climate governance effects on carbon disclosure and performance. *The British Accounting Review*, 52(2), 100880. <https://doi.org/10.1016/j.bar.2019.100880>
- Cadez, S., & Czerny, A. (2016). Climate change mitigation strategies in carbon-intensive firms. *Journal of Cleaner Production*, 112, 4132–4143. <https://doi.org/10.1016/j.jclepro.2015.07.099>
- Cadez, S., Czerny, A., & Letmathe, P. (2019). Stakeholder pressures and corporate climate change mitigation strategies. *Business Strategy and the Environment*, 28(1), 1–14. <https://doi.org/10.1002/bse.2070>
- Chithambo, L., Tingbani, I., Agyapong, G. A., Gyaopong, E., & Damoah, I. S. (2020). Corporate voluntary greenhouse gas reporting: Stakeholder pressure and the mediating role of the chief executive officer. *Business Strategy and the Environment*, 29(4), 1666–1683. <https://doi.org/10.1002/bse.2460>
- Cho, C. H., Laine, M., Roberts, R. W., & Rodrigue, M. (2018). The front-stage and backstage of corporate sustainability reporting: Evidence from the Arctic National Wildlife Refuge Bill. *Journal of Business Ethics*, 152(3), 865–886. <https://doi.org/10.1007/s10551-016-3375-4>
- Christiansen, K. L., Hajdu, F., Planting Mollaoglu, E., Andrews, A., Carton, W., & Fischer, K. (2023). "Our burgers eat carbon": Investigating the discourses of corporate net zero commitments. *Environmental Science and Policy*, 142, 79–88. <https://doi.org/10.1016/j.envsci.2023.01.015>
- Clarke, V., & Braun, V. (2014). Thematic analysis. In T. Teo (Ed.), *Encyclopedia of critical psychology* (pp. 1947–1952). Springer New York.
- Coen, D., Hernan, K., & Pegram, T. (2022). Are corporate climate efforts genuine? An empirical analysis of the climate 'talk-walk' hypothesis. *Business Strategy and the Environment*, 31(7), 3040–3059. <https://doi.org/10.1002/bse.3063>
- Comello, S., Reichelstein, J., & Reichelstein, S. C. (2021). Corporate carbon reduction pledges: An effective tool to mitigate climate change? Working paper, Steyer-Taylor Center for Energy Policy and Finance, April.
- Crilly, D., Zollo, M., & Hansen, M. T. (2012). Faking it or muddling through? Understanding decoupling in response to stakeholder pressures. *Academy of Management Journal*, 55(6), 1429–1448. <https://doi.org/10.5465/amj.2010.0697>
- Daddi, T., Bleischwitz, R., Todaro, N. M., Gusmerotti, N. M., & De Giacomo, M. R. (2020). The influence of institutional pressures on climate mitigation and adaptation strategies. *Journal of Cleaner Production*, 244(20), 118879. <https://doi.org/10.1016/j.jclepro.2019.118879>
- Dahlmann, F., Branicki, L., & Brammer, S. (2019). Managing carbon aspirations: The influence of corporate climate change targets on environmental performance. *Journal of Business Ethics*, 158(1), 1–24. <https://doi.org/10.1007/s10551-017-3731-z>
- Damert, M., & Baumgartner, R. J. (2018). Intra-sectoral differences in climate change strategies: Evidence from the global automotive industry. *Business Strategy and the Environment*, 27(3), 265–281. <https://doi.org/10.1002/bse.1968>

- Damert, M., Paul, A., & Baumgartner, R. J. (2017). Exploring the determinants and long-term performance outcomes of corporate carbon strategies. *Journal of Cleaner Production*, 160, 123–138. <https://doi.org/10.1016/j.jclepro.2017.03.206>
- Dhanda, K. K., & Hartman, L. P. (2011). The ethics of carbon neutrality: A critical examination of voluntary carbon offset providers. *Journal of Business Ethics*, 100(1), 119–149. <https://doi.org/10.1007/s10551-011-0766-4>
- Dhanda, K. K., Sarkis, J., & Dhavale, D. G. (2021). Institutional and stakeholder effects on carbon mitigation strategies. *Business Strategy and the Environment*, 31(3), 782–795. <https://doi.org/10.1002/bse.2917>
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147–160. <https://doi.org/10.2307/2095101>
- Dupuis, J., & Schweizer, R. (2019). Climate pushers or symbolic leaders? The limits to corporate climate leadership by food retailers. *Environmental Politics*, 28(1), 64–86. <https://doi.org/10.1080/09644016.2019.1521947>
- Eckardt, A., & Mazutis, D. (2020). Banking for a low carbon future: Explaining climate change responses in a low-salience industry. *Academy of Management Proceedings*, 2020(1), 18425. <https://doi.org/10.5465/ambpp.2020.178>
- Fankhauser, S., Smith, S. M., Allen, M., Axelsson, K., Hale, T., Hepburn, C., Kendall, J. M., Khosla, R., Lezaun, J., Mitchell-Larson, E., Obersteiner, M., Rajamani, L., Rickaby, R., Seddon, N., & Wetzler, T. (2022). The meaning of net zero and how to get it right. *Nature Climate Change*, 12, 15–21. <https://doi.org/10.1038/s41558-021-01245-w>
- Freidberg, S. (2014). Footprint technopolitics. *Geoforum*, 55, 178–189. <https://doi.org/10.1016/j.geoforum.2014.06.009>
- Galletta, S., Mazzù, S., & Naciti, V. (2021). Banks' business strategy and environmental effectiveness: The monitoring role of the board of directors and the managerial incentives. *Business Strategy and the Environment*, 30(5), 2656–2670. <https://doi.org/10.1002/bse.2769>
- Garud, R., Jain, S., & Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. *Academy of Management Journal*, 45(1), 196–214. <https://doi.org/10.5465/3069292>
- Gasbarro, F., & Pinkse, J. (2016). Corporate adaptation behaviour to deal with climate change: The influence of firm-specific interpretations of physical climate impacts. *Corporate Social Responsibility and Environmental Management*, 23(3), 179–192. <https://doi.org/10.1002/csr.1374>
- Gouldson, A., & Sullivan, R. (2013). Long-term corporate climate change targets: What could they deliver? *Environmental Science & Policy*, 27, 1–10. <https://doi.org/10.1016/j.envsci.2012.11.013>
- Gouldson, A., & Sullivan, R. (2014). Understanding the governance of corporations: An examination of the factors shaping UK supermarket strategies on climate change. *Environment and Planning A: Economy and Space*, 46(12), 2972–2990. <https://doi.org/10.1068/a130134p>
- Green, J., Hadden, J., Hale, T., & Mahdavi, P. (2022). Transition, hedge, or resist? Understanding political and economic behavior toward decarbonization in the oil and gas industry. *Review of International Political Economy*, 29(6), 2036–2063. <https://doi.org/10.1080/09692290.2021.1946708>
- Hoffman, A. J. (2001a). *From heresy to dogma: An institutional history of corporate environmentalism*. Stanford University Press.
- Hoffman, A. J. (2001b). Linking organizational and field-level analyses: The diffusion of corporate environmental practice. *Organization & Environment*, 14(2), 133–156. <https://doi.org/10.1177/1086026601142001>
- Hoffman, A. J. (2005). Climate change strategy: The business logic behind voluntary greenhouse gas reductions. *California Management Review*, 47(3), 21–46. <https://doi.org/10.2307/41166305>
- Hsu, A., Brandt, J., Widerberg, O., Chan, S., & Weinfurter, A. (2020). Exploring links between national climate strategies and non-state and subnational climate action in nationally determined contributions (NDCs). *Climate Policy*, 20(4), 443–457. <https://doi.org/10.1080/14693062.2019.1624252>
- Hyatt, D. G., & Berente, N. (2017). Substantive or symbolic environmental strategies? Effects of external and internal normative stakeholder pressures. *Business Strategy and the Environment*, 26(8), 1212–1234. <https://doi.org/10.1002/bse.1979>
- Intergovernmental Panel on Climate Change. (2018). *Global warming of 1.5°C. An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press. <https://doi.org/10.1017/9781009157940>
- Intergovernmental Panel on Climate Change. (2023). AR6 synthesis report. Climate change 2023. Summary for policymakers. <https://www.ipcc.ch/report/ar6/syr/>
- Ioannou, I., Li, S. X., & Serafeim, G. (2016). The effect of target difficulty on target completion: The case of reducing carbon emissions. *The Accounting Review*, 91(5), 1467–1492. <https://doi.org/10.2308/accr-51307>
- Jabbour, A. B. L. S., Vazquez-Brust, D., Chiappetta Jabbour, C. J., & Andriani Ribeiro, D. (2020). The interplay between stakeholders, resources and capabilities in climate change strategy: Converting barriers into cooperation. *Business Strategy and the Environment*, 29(3), 1362–1386. <https://doi.org/10.1002/bse.2438>
- Jeswani, H. K., Wehrmeyer, W., & Mulugetta, Y. (2008). How warm is the corporate response to climate change? Evidence from Pakistan and the UK. *Business Strategy and the Environment*, 17(1), 46–60. <https://doi.org/10.1002/bse.569>
- Keefe, B. (2022). *Climateonomics: Washington, Wall Street and the economic battle to save our planet*. Rowman & Littlefield.
- Kim, E.-H., & Lyon, T. P. (2011). Strategic environmental disclosure: Evidence from the DOE's voluntary greenhouse gas registry. *Journal of Environmental Economics and Management*, 61(3), 311–326. <https://doi.org/10.1016/j.jeeem.2010.11.001>
- Kim, E.-H., & Lyon, T. P. (2015). Greenwash vs. brownwash: Exaggeration and undue modesty in corporate sustainability disclosure. *Organization Science*, 26(3), 705–723. <https://doi.org/10.1287/orsc.2014.0949>
- King, N., Horrocks, C., & Brooks, J. (2019). *Interviews in qualitative research* (2nd ed.). Sage.
- Kolk, A., & Pinkse, J. (2005). Business responses to climate change: Identifying emergent strategies. *California Management Review*, 47(3), 6–20. <https://doi.org/10.2307/41166304>
- Kyaw, K., Trepongkaruna, S., & Jiraporn, P. (2022). Board gender diversity and environmental emissions. *Business Strategy and the Environment*, 31(7), 2871–2881. <https://doi.org/10.1002/bse.3052>
- Lee, B. (2021). *How do I collect documentary evidence?* Edward Elgar. <https://doi.org/10.4337/9781839104725>
- Lee, S.-Y. (2012). Corporate carbon strategies in responding to climate change. *Business Strategy and the Environment*, 21(1), 33–48. <https://doi.org/10.1002/bse.711>
- Littlewood, D., Decelis, R., Hillenbrand, C., & Holt, D. (2018). Examining the drivers and outcomes of corporate commitment to climate change action in European high emitting industry. *Business Strategy and the Environment*, 27(8), 1437–1449. <https://doi.org/10.1002/bse.2194>
- Lyon, T. P., & Montgomery, A. W. (2015). The means and end of greenwash. *Organization & Environment*, 28(2), 223–249. <https://doi.org/10.1177/1086026615575332>
- Maguire, S., Hardy, C., & Lawrence, T. B. (2004). Institutional entrepreneurship in emerging fields: HIV/AIDS treatment advocacy in Canada. *Academy of Management Journal*, 47(5), 657–679. <https://doi.org/10.5465/20159610>
- Margolick, M., & Russell, D. (2001). *Corporate greenhouse gas reduction targets*. Pew Center on Global Climate Change.

- McDonnell, C., Rempel, A., & Gupta, J. (2022). Climate action or distraction? Exploring investor initiatives and implications for unextractable fossil fuels. *Energy Research & Social Science*, 92, 102769. <https://doi.org/10.1016/j.erss.2022.102769>
- Meckling, J. (2015). Oppose, support, or hedge? Distributional effects, regulatory pressure, and business strategy in environmental politics. *Global Environmental Politics*, 15(2), 19–37. https://doi.org/10.1162/GLEP_a_00296
- Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. *American Journal of Sociology*, 83(2), 340–363. <https://doi.org/10.1086/226550>
- Net Zero Tracker. (2022). *Net Zero Stocktake 2022*. NewClimate Institute, Oxford Net Zero, Energy & Climate Intelligence Unit and Data-Driven EnviroLab. <https://zerotracker.net/analysis/net-zero-stocktake-2022>
- Newell, P. (2020). The business of rapid transition. *WIREs Climate Change*, 11(6), e670. <https://doi.org/10.1002/wcc.670>
- Okereke, C., & Küng, K. (2013). Climate policy and business climate strategies: EU cement companies' response to climate change and barriers against action. *Management of Environmental Quality: An International Journal*, 24(3), 286–310. <https://doi.org/10.1108/14777831311322622>
- Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review*, 16(1), 145–179. <https://doi.org/10.5465/amr.1991.4279002>
- Oliver, C. (1997). Sustainable competitive advantage: Combining institutional and resource-based views. *Strategic Management Journal*, 18(9), 697–713. [https://doi.org/10.1002/\(SICI\)1097-0266\(199710\)18:9<697::AID-SMJ909>3.0.CO;2-C](https://doi.org/10.1002/(SICI)1097-0266(199710)18:9<697::AID-SMJ909>3.0.CO;2-C)
- Orsato, R. J., de Campos, J. G. F., Barakat, S. R., Nicolletti, M., & Monzoni, M. (2015). Why join a carbon club? A study of the banks participating in the Brazilian “Business for Climate Platform”. *Journal of Cleaner Production*, 96, 387–396. <https://doi.org/10.1016/j.jclepro.2014.01.007>
- Panwar, R. (2021). Optimism amid despair: How to avoid a net zero debacle. *Business & Society*, 62, 9–13. <https://doi.org/10.1177/00076503211053816>
- Pattberg, P. (2017). The emergence of carbon disclosure: Exploring the role of governance entrepreneurs. *Environment and Planning C: Politics and Space*, 35(8), 1437–1455. <https://doi.org/10.1177/2399654417723341>
- Pedersen, E. R. G., & Gwozdz, W. (2014). From resistance to opportunity-seeking: Strategic responses to institutional pressures for corporate social responsibility in the Nordic fashion industry. *Journal of Business Ethics*, 119(2), 245–264. <https://doi.org/10.1007/s10551-013-1630-5>
- Pinkse, J., & Busch, T. (2013). The emergence of corporate carbon norms: Strategic directions and managerial implications. *Thunderbird International Business Review*, 55(6), 633–645. <https://doi.org/10.1002/tie.21580>
- Rietbergen, M. G., van Rheede, A., & Blok, K. (2015). The target-setting process in the CO₂ Performance Ladder: Does it lead to ambitious goals for carbon dioxide emission reduction? *Journal of Cleaner Production*, 103, 549–561. <https://doi.org/10.1016/j.jclepro.2014.09.046>
- Rogelj, J., Geden, O., Cowie, A., & Reisinger, A. (2021). Three ways to improve net zero emissions targets. *Nature*, 591(7850), 365–368. <https://doi.org/10.1038/d41586-021-00662-3>
- Science Based Targets Initiative. (2019). SBTi criteria and recommendations. TWG-INF-002, version 4.0, April. <https://sciencebasedtargets.org/resources/legacy/2020/04/SBTi-criteria-V4-0.pdf>
- Science Based Targets Initiative. (2021). Business Ambition for 1.5°C campaign. <https://sciencebasedtargets.org/business-ambition-for-1-5c>
- Singh, S., Khare, A., Pandey, S. K., & Sharma, D. P. (2021). Industry and community peers as drivers of corporate social responsibility in India: The contingent role of institutional investors. *Journal of Cleaner Production*, 295, 126316. <https://doi.org/10.1016/j.jclepro.2021.126316>
- Skjærseth, J. B., & Skodvin, T. (2001). Climate change and the oil industry: Common problems, different strategies. *Global Environmental Politics*, 1(4), 43–64. <https://doi.org/10.1162/152638001317146363>
- Slawinski, N., & Bansal, P. (2012). A matter of time: The temporal perspectives of organizational responses to climate change. *Organization Studies*, 33(11), 1537–1563. <https://doi.org/10.1177/0170840612463319>
- Slawinski, N., Pinkse, J., Busch, T., & Banerjee, S. B. (2017). The role of short-termism and uncertainty avoidance in organizational inaction on climate change: A multi-level framework. *Business & Society*, 56(2), 253–282. <https://doi.org/10.1177/0007650315576136>
- Sprengel, D. C., & Busch, T. (2011). Stakeholder engagement and environmental strategy—The case of climate change. *Business Strategy and the Environment*, 20(6), 351–364. <https://doi.org/10.1002/bse.684>
- Sump, F., & Yi, S. (2021). Different reasons for different responses: A review of incumbents' adaptation in carbon-intensive industries. *Organization & Environment*, 34(2), 323–346. <https://doi.org/10.1177/1086026619893990>
- Todaro, N. M., Testa, F., Daddi, T., & Iraldo, F. (2021). The influence of managers' awareness of climate change, perceived climate risk exposure and risk tolerance on the adoption of corporate responses to climate change. *Business Strategy and the Environment*, 30(2), 1232–1248. <https://doi.org/10.1002/bse.2681>
- Van Audenhove, L., & Donders, K. (2019). Talking to people III: Expert interviews and elite interviews. In H. Van den Bulck, M. Puppis, K. Donders, & L. Van Audenhove (Eds.), *The Palgrave handbook of methods for media policy research* (pp. 179–197). Springer International Publishing. https://doi.org/10.1007/978-3-030-16065-4_10
- Van Coppenolle, H., Blondeel, M., & Van de Graaf, T. (2022). Reframing the climate debate: The origins and diffusion of net zero pledges. *Global Policy*, 14(1), 48–60. <https://doi.org/10.1111/1758-5899.13161>
- Vieira, L. C., Longo, M., & Mura, M. (2022). From carbon dependence to renewables: The European oil majors' strategies to face climate change. *Business Strategy and the Environment*, 1–12. <https://doi.org/10.1002/bse.3185>
- Walenta, J. (2020). Climate risk assessments and science-based targets: A review of emerging private sector climate action tools. *WIREs Climate Change*, 11(2), e628. <https://doi.org/10.1002/wcc.628>
- Wang, D. D., & Sueyoshi, T. (2018). Climate change mitigation targets set by global firms: Overview and implications for renewable energy. *Renewable and Sustainable Energy Reviews*, 94(October), 386–398. <https://doi.org/10.1016/j.rser.2018.06.024>
- Westphal, J. D., & Zajac, E. J. (1994). Substance and symbolism in CEOs' long-term incentive plans. *Administrative Science Quarterly*, 39(3), 367–390. <https://doi.org/10.2307/2393295>
- Witte, D. (2020). Business for climate: A qualitative comparative analysis of policy support from transnational companies. *Global Environmental Politics*, 20(4), 167–191. https://doi.org/10.1162/glep_a_00560
- Wright, C., & Nyberg, D. (2015). *Climate change, capitalism, and corporations. Processes of creative self-destruction*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139939676>
- Yang, X., Wang, Y., Hu, D., & Gao, Y. (2018). How industry peers improve your sustainable development? The role of listed firms in environmental strategies. *Business Strategy and the Environment*, 27(8), 1313–1333. <https://doi.org/10.1002/bse.2181>
- Yin, H., Mo, F., & Wang, D. (2017). Determinants of corporate climate change mitigation targets in major United States companies. *Journal of Sustainable Investment*, 10(1), 71–80. <https://doi.org/10.5539/jsd.v10n1p71>

How to cite this article: Berger-Schmitz, Z., George, D., Hindal, C., Perkins, R., & Travaile, M. (2023). What explains firms' net zero adoption, strategy and response? *Business Strategy and the Environment*, 1–19. <https://doi.org/10.1002/bse.3437>

APPENDIX A: LIST OF INTERVIEWEE SECTORS AND ASSIGNED IDs

Sector	ID
Consultant	C1
Consultant	C2
Consumer goods manufacture and retail	CG1
Consumer goods manufacture and retail	CG2
Consumer goods manufacture and retail	CG3
Consumer goods manufacture and retail	CG4
Consumer goods manufacture and retail	CG5
Energy	E1
Financial services	F1
Financial services	F2
Financial services	F3
Food and beverage manufacture and retail	FB1
Food and beverage manufacture and retail	FB2
Food and beverage manufacture and retail	FB3
ICT	ICT1
ICT	ICT2
ICT	ICT3
ICT	ICT4
News	N1
News	N2
Oil and gas	OG1
Oil and gas	OG2
Oil and gas	OG3
Resources	R1
Resources	R2
Resources	R3
Standards	S1
Transport (aviation)	T1
Waste and water management	WW1
Waste and water management	WW2

Source: Authors.

APPENDIX B: DETAILED PARTICIPANT TARGET CLASSIFICATIONS

ID	Overall target	Time frame	Scope 1 + 2	Scope 3	Use of removals	Feasibility	Advocacy
CG1	Robust	Highly robust	Highly robust	Highly robust	Robust	Robust	Robust
CG2	Highly robust	Highly robust	Highly robust	Highly robust	Highly robust	Robust	Highly robust
CG3	Robust	Highly robust	Highly robust	Shallow	Highly robust	Robust	Robust
CG4	Robust	Robust	Robust	Highly robust	Highly robust	Robust	Shallow
CG5	Highly robust	Highly robust	Highly robust	Highly robust	Highly robust	Highly robust	Highly robust
E1	Highly robust	Highly robust	Highly robust	Highly robust	Robust	Highly robust	Highly robust
F1	Robust	Highly robust	Highly robust	Robust	Very shallow	Highly robust	Highly robust
F2	Highly robust	Highly robust	Highly robust	Robust	Highly robust	Robust	Highly robust
F3	Robust	Robust	Robust	Robust	Robust	Robust	Robust
FB1	Robust	Highly robust	Highly robust	Robust	Robust	Robust	Robust
FB2	Robust	Highly robust	Robust	Robust	Robust	Robust	Robust
FB3	Highly robust	Highly robust	Highly robust	Highly robust	Robust	Robust	Highly robust
ICT1	Highly robust	Highly robust	Highly robust	Robust	Highly robust	Highly robust	Highly robust
ICT2	Robust	Highly robust	Highly robust	Robust	Robust	Robust	Robust
ICT3	Highly robust	Highly robust	Highly robust	Highly robust	Robust	Highly robust	Highly robust
ICT4	Robust	Highly robust	Robust	Highly robust	Robust	Robust	Highly robust
OG1	Robust	Highly robust	Highly robust	Shallow	Robust	Highly robust	Robust
OG2	Highly robust	Highly robust	Highly robust	Highly robust	Robust	Robust	Highly robust
OG3	Robust	Highly robust	Robust	Highly robust	Robust	Shallow	Robust
R1	Shallow	Highly robust	Shallow	Shallow	Shallow	Shallow	Robust
R2	Shallow	Robust	Robust	Shallow	Shallow	Shallow	Robust
R3	Shallow	Highly robust	Shallow	Robust	Shallow	Shallow	Shallow
T1	Robust	Highly robust	Robust	Shallow	Robust	Robust	Highly robust
WW1	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
WW2	Shallow	Highly robust	Shallow	Shallow	Robust	Shallow	Robust

Note: To derive overall target categorisations, numeric scores were assigned based on the robustness of each dimension (highly robust = 1.5; robust = 1.0; shallow = 0.5; and very shallow = 0). These scores were aggregated across each dimension to form an overall score between 0 and 9. The aggregate score was used to assign an overall categorisation to each participant (highly robust: score greater than 7.5; robust: score between 5 and 7.5; shallow: score between 2.5 and 5; and very shallow: score \leq 2.5).

Source: Authors.

APPENDIX C: CRITERIA FOR ASSIGNING STRATEGIC POSITIONING OF SAMPLE FIRMS

Strategic position	Criteria
Opportunity seeking	<ul style="list-style-type: none"> • First movers within sector with differentiated strategy relative to peers • Clear motivation to capture competitive advantage (e.g., with consumers, investors and policymakers) • Desire to proactively manage and minimise climate-related risks and damages (e.g., to supply chains) • Transparent and comprehensive public disclosure
Conformance	<ul style="list-style-type: none"> • Collective (and similar) sectoral action • Motivated by strong interdependency amongst firms on a set of investors or suppliers with similar climate ambition • Prevalence of trade associations with strong climate ambitions and a high degree of influence over constituent climate targets
Avoidance	<ul style="list-style-type: none"> • Limited understanding of net zero alignment • Lack of urgency and deliberate strategic decision to avoid substantive action • Shallower targets (characterised by lower scores) • Low appetite to invest in delivery of climate targets • Limited and unclear public disclosure

Note: Criteria derived from the qualitative thematic analysis and scoring of target classifications.

Source: Authors.