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Raising the bar: What determines the ambition level of corporate climate targets?

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Abstract
Since the launch of the Science Based Targets initiative (SBTi), we have witnessed a steady increase in the number of companies committing to climate targets for large-scale reduction of greenhouse gas (GHG) emissions. While recent studies present various methodologies for establishing climate targets (e.g., sectoral decarbonization approach, near-term, long-term, net zero), we still don't understand the explanatory factors determining the level of ambition companies demonstrate in target setting. In this paper, a two-stage qualitative study is conducted with a sample of 22 companies from five countries. First, these companies' publicly disclosed climate targets are evaluated according to four target ambition criteria: target type, scope, timeframe, and temperature alignment. Secondly, multiple explanatory factors for target setting were identified during the content analysis of the interviews to see how present these factors appear in the ambition levels. Within companies with highly ambitious climate targets, the findings indicate that certain factors are highly present, including leadership engagement, continual management support, employee involvement, participation in climate initiatives, and stakeholder collaboration. Conversely, none of these key factors are highly present in companies with less ambitious climate targets. Rather, these companies strongly identify the initiating factors of market-related pressures and non-market stakeholder influence as being the driving forces behind their target setting. This paper contributes to the literature on corporate responses to climate change by expanding our understanding of explanatory factors for different corporate climate target ambition levels.

Keywords Climate change · Carbon management · Target setting · Ambitiousness · Explanatory factors

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1 Introduction

Private sector climate targets will play a vital role in advancing corporate responses to climate change in efforts to realize the goals outlined in the Paris Agreement to limit global warming to 1.5° C above pre-industrial levels (Marland et al. 2015). Since the launch of the Science Based Targets initiative (SBTi) in 2015, the number of companies committing to climate targets that pledge to significantly reduce their greenhouse gas (GHG) emissions has steadily grown. According to the SBTi, more than 7,800 companies have committed to science-based targets (SBT) with almost half of these targets already been approved. At current rates, this growing number of commitments appears to double each calendar year. Beyond the SBTi, countless other companies are disclosing climate targets in sustainability reports as part of a commitment to mitigate the impacts of a changing climate (Kuo and Chang 2021; Lee 2012).

While the growing number of corporate climate targets provides an optimistic outlook that the Paris Agreement could eventually be fulfilled, the ambitiousness and effectiveness of these targets are still highly contested (Tilsted et al. 2023). Only 5% of global emissions are presently covered by climate targets (CDP 2023), which remain voluntary (Faria and Labutong 2020; Hadziosmanovic et al. 2022; Immink et al. 2022). As a consequence, the autonomy of choosing between various target-setting methodologies could result in companies approaching target setting symbolically rather than significantly reducing GHG emissions (Dahlmann et al. 2019), which could ultimately lead to an overshoot of emission allowances (Bjørn et al. 2021).

Although we have a better understanding of how companies establish climate targets, especially those recognized by the SBTi (Bjørn et al. 2021; Chang and Lo 2022; Faria and Labutong 2020; Hadziosmanovic et al. 2022; Immink et al. 2022), we still do not know what determines companies' target ambitiousness. In general, target ambitiousness refers to the scope, temperature alignment, and overall timeframe that companies pledge to reduce carbon emissions to make significant contributions to limiting global warming to 1.5° C by 2050 (Dahlmann et al. 2019; Bjørn et al. 2021; Rekker et al., 2022). According to the SBTi (2023), companies can set different levels of ambition for climate targets according to type (absolute vs. relative), scope (single vs. multiple), time frame (near-term vs. long-term), and temperature alignment (1.5 °C vs. well below 2° C). The latter is important since an additional 0.5 °C global temperature increase would mean severe consequences for weather patterns, crop yields, human health, and mass migration.

Since there are currently no binding rules how companies set climate targets (Bjørn et al. 2021; Dahlmann et al. 2019), we would like to better understand the organizational and stakeholder-related factors that lead companies to set these targets of varying ambitions. Thus, we frame our study around the following research question: *What determines the level of ambition for corporate climate targets?* Using a purposive and heterogeneous sample of 22 international companies, we conduct a two-stage qualitative study by assessing the ambitiousness of companies' climate targets and then matching various explanatory factors according to each ambition level. In our findings, we identify six ambition levels of corporate climate targets according to target type, scope, time frame, and temperature alignment. Furthermore, we detect ten explanatory factors. These factors are assessed by four degrees of presence within the sampled companies: no presence, low presence, moderate presence, and high presence. Matching target ambition level to the degree of presence of

these explanatory factors provides novel insights into how ambitiously companies pursue climate targets.

This paper makes two contributions to the existing literature on corporate responses to climate change. First, the paper broadens target setting types beyond two categories (symbolic vs. substantive target setting; see Dahlmann et al. 2019; Freiberg et al. 2021; Truong et al. 2021) to six levels, and in doing so, provides an extensive qualitative framework for assessing corporate climate targets with clearly defined criteria. We reveal that corporate climate targets vary significantly in ambition levels, which corresponds with previous observations that many corporate targets are not aligned with Paris Agreement goals (Bjørn et al. 2022; Gieskam et al. 2021). Even targets approved by SBTi can vary significantly in target reduction ambitions (e.g., see Bjørn et al. 2023). Second, our study goes beyond a descriptive examination of climate mitigation drivers and pressures by matching explanatory factors to corporate climate target ambition levels. As corporate climate targets become more ambitious, we found the high presence of key explanatory factors, including leadership engagement, continual management support, employee involvement, participation in climate initiatives, and stakeholder collaboration. Conversely, companies with the lowest ambition levels demonstrate either no presence or low presence for these factors.

The remainder of this paper is structured as follows: a review of the literature examines the significance of corporate carbon responses, especially within the context of setting climate targets. This highlights the fact that we still don't fully grasp the factors that influence differing amounts of aim ambition. Next, the methodology is described, including the purposeful sample, multiple sources of data, and coding methodologies. The findings are divided into three sections: assessing corporate climate target ambitions, assigning explanatory factors to the assessed ambition levels, and summarizing the key explanatory factors. The discussion recaps the findings while concentrating on the paper's main contributions. The final part discusses the consequences of future research and practice.

2 Literature review

2.1 Corporate carbon responses to climate change

While businesses generate tremendous quantities of global GHG emissions, they may also serve as a driving force behind the technological, social, and organizational solutions required to drastically decarbonize industries and economies (Besio and Pronzimi 2014; Newell 2020; Zhang et al. 2022). Recent literature (Cadez et al. 2018; Lopes de et al. 2019; Vieira et al. 2022) highlights multiple interlinked corporate transition strategies to significantly reduce GHG emissions towards a decarbonized future, including (1) replacing carbon-intensive raw materials with low-carbon alternatives, especially in the (re)design and development of core products (a.k.a., "low carbon products"; Böttcher and Müller 2015; Shakeel 2021); (2) improving production processes through energy efficiency as well as the adoption of renewable energy sources (i.e., "low carbon production"; Vieira et al. 2022; Wang and Sueyoshi 2018); and (3) optimizing supply chains and transportation routes suited a low-carbon economy (i.e., "low-carbon logistics"; Cadez et al. 2018; Janipour et al. 2022).

In general, corporate carbon responses encompass various mitigation strategies and practices. Lee (2012) offers a comprehensive framework of corporate responses in six cat-

egories, including emission reduction commitments, product development, process and supply improvement, new markets and business development, organizational involvement, and external relationship development. While each activity area constitutes an integral part of corporate carbon responses, Damert et al. (2017) reveal several activity areas that can enhance corporate competitiveness, including product development as well as new markets and business development. Realizing that companies have a limited amount of resources to invest in carbon mitigation strategies, Cadez and Czerny (2016) suggest strategic prioritization starting with internal carbon reduction (e.g., reduction of combustible emissions, substituting fossil fuels with renewables, and investing in energy efficiency projects), followed by external carbon reduction in supply chains, and finally carbon compensation as a last-resort option. Relying too heavily on compensation strategies poses considerable risks for companies due to concerns they frequently fail to deliver their stated emissions reductions (West et al. 2020) and that they encourage a continuation of carbon-intensive business practices (Trencher et al. 2023).

Previous research has offered various drivers that motivate or pressure companies into developing substantial carbon responses. Recent literature reviews (Lopes de et al. 2019; Johnson et al. 2023) differentiate drivers into institutional, organizational, and individual drivers, allowing for a comprehensive understanding of the forces at play. Institutional drivers encompass political and regulatory pressures, financial market incentives as well as media and public scrutiny (Hirsch 2019; Wahyuni & Ranatunga 2015). These external factors shape companies' responses to climate change, from compliance with formal policies to adapting to evolving market demands and public perceptions.

Within organizations, various business drivers propel corporate decarbonization, including cost reduction, risk minimization, reputation improvement, and profit and sales growth (Littlewood et al. 2018; Joo et al. 2023; Sump and Yi 2021). In addition to top management commitment (Aldy and Gianfrate 2019), these internal motivations drive companies to implement measures such as energy efficiency improvements and risk management strategies to address climate-related challenges (Böttcher and Müller 2015; Collins and Schultz 2021). Individual drivers, such as visionary leadership and employee initiatives, play a crucial role in fostering a climate-conscious culture within organizations (Jiang et al. 2020). Visionary leaders can bolster innovation and commitment to climate goals (Jiang et al. 2020; Subramaniam et al. 2015), while employee-driven initiatives harness bottom-up activism to spur corporate responses to climate change (Böttcher and Müller 2015; Littlewood et al. 2018).

Notably, several authors underline how a combination of organizational drivers and external stakeholder pressures has the dual potential of driving corporate carbon responses (Boiral et al. 2012; Littlewood et al. 2018). Many drivers behind voluntary carbon reduction strategies are combinative, such as visionary leadership linked to government regulations and consumer demands, which can lead companies to enhance climate mitigation strategies (Adams et al. 2023; Dós et al. 2023; Littlewood et al. 2018).

Nevertheless, current research underscores the importance that corporate carbon responses must extend beyond basic commitments and symbolic target setting, and should simultaneously focus on measures that will significantly decrease company-internal carbon emissions (Block et al. 2023; Wimbadi and Djalante 2020). The mere establishment of targets, policies, and management programs runs the risk of falling short; what's needed are corporate carbon strategies that yield tangible, absolute GHG emission reductions across the

operations and supply chains (Doda et al. 2016; Zhang et al. 2022). Thus, setting ambitious corporate climate targets should be taken seriously to achieve the goals of the Paris Agreement (Adhikari et al. 2023; Bendig et al. 2023; Bjørn et al. 2022; Dahlmann et al. 2019). The next section will highlight the existing literature on corporate climate targets and show the various requirements of target setting.

2.2 Setting corporate climate targets

Corporate climate targets serve as commitments by companies towards reducing GHG emissions and supporting decarbonization efforts. Setting corporate climate targets is an essential condition for concerted global action to limit global warming to 1.5° C above pre-industrial levels (Marland et al. 2015; Maxwell et al. 2015). Therefore, companies can demonstrate their commitment to achieving the goals of the Paris Agreement and support the transformation towards decarbonization by setting such climate targets (Faria and Labutong 2020). Particularly adopting science-based target (SBT) strategies is seen as crucial for translating the socio-political objectives of the Paris Agreement into actionable plans (Bjørn et al. 2022; Faria and Labotung 2020). SBT strategies can leverage the most up-to-date and relevant scientific evidence, and they are considered an essential method for demonstrating a company's commitment to significant carbon reductions.

Target-setting activities typically involve multiple steps, including clear implementation and financial plans to attain them (Bendig et al. 2023; Bjørn et al. 2022). SBT strategies encompass robust GHG data tracking and accounting, a thorough analysis of reduction potentials, and the formulation of investment plans (Hadziosmanovic et al. 2022). However, the approach to setting corporate climate targets still lacks universal standardization, as the set-up process can vary depending on factors such as industry sector, geographical location, company size, and specific environmental circumstances. Several authors highlight various SBT methods. Faria and Labutong (2020) cover four common methods, whereas Bjørn et al. (2021) expand this to seven overall methods, including but not limited to the sectoral decarbonization approach, absolute contraction approach, GHG emissions per unit of value-added, and the corporate finance approach to climate-stabilizing targets. Bjørn et al. (2021) conclude that adopting any of these methods should align with global temperature goals; however, they warn that organizations selecting less ambitious targets might lead to overshooting emissions allowances.

The risk of ineffective action or even greenwashing emerges due to the variety of options for climate target parameters at hand (Dahlmann et al. 2019; Day et al. 2022; Gieskam et al. 2021). These parameters include target type (i.e., intensity targets vs. absolute targets), scope (i.e., narrow target limited to one scope vs. broad target aiming for multiple scopes, e.g., Scopes 1, 2, and 3), reduction rate (i.e., lower vs. higher annual decarbonization rates), and time frame (i.e., near-term vs. long-term goals). This variability highlights the risk of greenwashing, as companies may set symbolic targets without genuine efforts towards emission reductions (Dahlmann et al. 2019; Nemes et al. 2022). Symbolic targets can be considered as articulated replies to external demands, yet they have little to no connection to real performance changes and can therefore be considered "greenwashing" by falsely stating or overstating an environmental claim (Truong et al. 2021). Nemes et al. (2022) provide a framework for assessing greenwashing, and state that net-zero targets that are not

science-based with vague or unsubstantiated claims and rely heavily on compensation may be considered greenwashing.

Alternatively, substantive targets with sincere mitigation plans represent genuine efforts to significantly reduce GHG (Dahlmann et al. 2019). Nemes et al. (2022) highlight that SBT strategies with intentions to reduce GHG emissions expressed in both near and long terms would not be considered greenwashing. However, even absolute targets with high reduction rates over the long term can still suffer from issues related to vagueness and ambiguity, especially when it's difficult to decipher between internal decarbonization actions and compensation via the inclusion of carbon credits (Day et al. 2022; Gieskam et al. 2021).

To ensure substantive target-setting, companies should align their goals with sector-specific emission pathways aligned with the Paris Agreement (CDP 2022; SBTi 2021). This includes near-term targets spanning 5 to 10 years, accompanied by long-term net-zero trajectories (Rekker et al. 2022; UN HLEG 2022). These targets should encompass emissions from all scopes and exclude offsetting through carbon credits in the near term, although carbon dioxide removals may be used after achieving net zero (ISO 2022; SBTi 2021). Moreover, there's a growing recognition of the necessity for companies to establish net-zero targets with an annual GHG reduction rate of 4.2% or higher, as part of their commitment to combating climate change (SBTi 2021).

International climate organizations, like the UN and SBTi, have reinforced their criteria for ambitious corporate target setting because of an urgency to promote substantial reductions of companies' GHG emissions (UNFCC 2022; SBTi 2021). Since 2019, the SBTi has made it imperative for companies already committed to reevaluating their emission reduction targets well below the 2° C range, and most of them have adjusted their targets to a 1.5° C target (SBTi 2021). Over two-thirds of all committed companies have either revised or committed to the more ambitious 1.5° C target (see Bjørn et al. 2022).

Nevertheless, we still do not know what drives ambitious target setting within business organizations. As such, a knowledge gap exists concerning the specific explanatory factors linked to the choice of corporate climate targets and the variations of ambition levels therein. This paper aims to fill this gap by analyzing various factors influencing the level of ambition in corporate climate targets. By doing so, it seeks to enhance the understanding of the complex decision-making processes involved in adopting and implementing climate targets, offering valuable insights for both academic research and practical decision-making.

3 Methodology

3.1 Research design

In this study, we adopt a two-stage qualitative research design. In the first stage, we assess the ambition levels of multiple companies' climate targets by adopting a set of criteria suggested by Dahlmann et al. (2019), including target type, scope, and timeframe. We include an additional criterion, temperature alignment. We find all criteria are relevant to provide a comprehensive assessment of the level of ambitiousness of corporate climate targets, which signals if these targets aim for substantive efforts towards corporate decarbonization (Dahlmann et al. 2019; SBTi 2021). In the second stage, we investigate various explanatory fac-

tors that company representatives shared via interviews about their corporate climate targets and goals. The interviews were coded openly and analyzed using MaxQDA software.

3.2 Sample selection

We employed maximum diversity sampling (Miles and Huberman 1994), a form of purposive sampling deliberately choosing a heterogeneous sample of companies from different backgrounds. This method allowed us to observe broad patterns and common experiences related to target setting, aiming "to incorporate as much diversity into our research design" (Lye and Hamilton 2000, p. 178). This allowed us to capture a wide range of variation for setting more or less ambitious climate targets as well as the explanatory factors behind these ambition levels. One such explanatory factor relates to the market factor that dictates the continual reliance on fossil fuels in current and near-term business practices. While it is not the sole focus of our study, we consider that companies heavily reliant on fossil fuels might strive for less ambitious climate goals due to this dependence.

Several criteria were used to select the companies in this study. First, the companies are publicly listed or provide sufficient non-financial information to the public. Second, all companies have expressed their intention to reduce GHG emissions to mitigate anthropocentric climate change. Third, all companies published sustainability reports, in which they provide further details about their climate target plans and ambitions. Although most companies have committed to SBTi (16 of 22), the companies in our sample were included in this study due to their communicated climate targets in sustainability reports and corporate websites.

Additionally, all 22 companies included in our analysis are headquartered in high-emitting countries (WRI 2023); however, they may experience varying national policies on corporate climate mitigation. We purposively chose companies from Brazil, Hong Kong/China, Germany, Japan, and the United States to have a huge variety in terms of intuitional settings in the climate context. Germany and the US are highly industrialized countries, whereas Germany has rather strict and the US rather relaxed climate policies. Brazil can be considered a rather emerging economy that has not yet launched a regulated carbon market, such as a cap-and-trade system. Furthermore, we included two Asian countries, Japan as one rather developed and China as one rather emerging economy, with both having significantly stringent national climate mitigation policies. For instance, the Japanese Ministry of Environment has engaged with and supported large companies to set up SBTs since 2020 (Giesekam et al. 2020). The companies are distributed according to the country as follows: Brazil (four firms), Germany (four firms), Hong Kong/China (four firms), Japan (six firms), and the United States (four firms). An overview of the companies included in the final sample can be found in Table 1.

3.3 Data collection and analysis

In the first stage of this study, we assessed our sample's climate targets using their corporate sustainability reports and information released via the companies' websites. In total, we reviewed the corporate sustainability reports of all 22 companies that were released in the year 2022. These reports contain the emissions data from 2021 and reflect the existing knowledge at the time of the interviews. This part of the investigation was exclusively based on secondary data. To determine the ambition levels, we adapted multiple criteria by Dahl-

Table 1 Overview of companies included in the study

Company code	Country headquarters	Sector	Approx. Employees	SBTi status (31 December 2022)
BR1	Brazil	End-consumer products (beauty and homecare)	35,000	Committed
BR2	Brazil	Retail and logistics	1,000	Not committed
BR3	Brazil	Energy provider	45,000	Not committed
BR4	Brazil	Industrial manufacturing (aerospace)	15,000	Not committed
DE1	Germany	Retail and logistics	50,000	Committed
DE2	Germany	Industrial manufacturing (chemicals)	110,000	Not committed
DE3	Germany	Energy provider	25,000	Committed and approved
DE4	Germany	Industrial manufacturing (electrical equipment)	9,000	Committed
HK1	Hong Kong/China	Insurance	6,000	Not committed
HK2	Hong Kong/China	Construction and real estate	10,000	Committed
HK3	Hong Kong/China	Construction and real estate	1,000	Committed
HK4	Hong Kong/China	Energy provider	2,000	Not committed
JP1	Japan	End-consumer products (pharmaceuticals)	10,000	Committed and approved
JP2	Japan	Industrial manufacturing (IT, electronics)	115,000	Committed and approved
JP3	Japan	Construction and real estate	4,000	Committed and approved
JP4	Japan	Insurance	1,000	Committed
JP5	Japan	Construction and real estate	3,000	Committed and approved
JP6	Japan	End-consumer products (beverages)	30,000	Committed and approved
US1	USA	Industrial manufacturing (flooring)	4,000	Committed and approved
US2	USA	Industrial manufacturing (food processing)	40,000	Committed
US3	USA	End-consumer products (beverages)	79,000	Committed and approved
US4	USA	Industrial manufacturing (power technology)	60,000	Committed and approved

mann et al. (2019) for assessing the corporate climate target proposed, including target type, target scope, and target time frame. We include temperature alignment to replace reduction rate as an additional criterion, which deals with a written commitment to align with 1.5° C or well below 2° C, and we also consider net-zero pledges (SBTi 2021). Aligning corporate climate targets to 1.5° C and net-zero pledges both indicate a very strong commitment to reducing companies' absolute GHG emissions in line with global efforts to halve emissions before 2030 and to achieve net-zero emissions at the latest by 2050 (SBTi 2023).

In the second stage, we conducted semi-structured interviews with sustainability managers from the selected companies. We aimed to gather insights on various aspects, including implementation plans, organizational structure, and external factors influencing these targets. Sample questions for each aspect are provided in Appendix A. We conducted interviews with managers in sustainability departments. These interviews were occasionally

conducted with a single manager; however, a small team (i.e., two to five managers) often participated as part of a group interview. We held interviews with 45 managers in the 22 firms and only interviewed each manager one time. All names, both corporate and personal, remain strictly anonymous.

Interviews were conducted between January and May 2022. The interviews were conducted online using video-conferencing software (i.e., Zoom). Most interviews were held in English; however, several interviews were also conducted in the managers' native languages of German and Japanese. All interviews were transcribed, and if necessary, translated into English to establish consistency for coding and further analyses. The interviews dealt with various corporate carbon management topics with a particular focus on climate targets. These questions led to lengthy discussions concerning the intricate processes involved in the initiating and further developmental stages of target setting, allowing for a deeper understanding of the explanatory factors behind these targets. The average interview lasted approximately 90 min.

A qualitative content analysis was performed on all interview transcriptions using the software MaxQDA 2022. The main goal of the qualitative content analysis was to reduce the complexity of a text while keeping the main research focus (Kuckartz 2014). This analysis helped and comprehend the main explanatory factors for target setting.

To illustrate the process, Table 2 presents the development of first-order concepts, which were then grouped into second-order themes, ultimately culminating in the creation of the final categories.

As shown in Table 2, we have identified ten explanatory factors derived explicitly from the interviews that have been categorized into two primary groups. The first group, labeled initiating factors, pertains to the driving forces behind a company's decision to adopt climate-target-setting strategies in the initial phase (i.e., the first three months of the target-setting process). We have detected three initiating factors, including leadership engagement, market-related pressures, and non-market stakeholder influence, including pressure from governments and NGOs. The second group is referred to as enabling factors, which encompasses factors that helped to facilitate the implementation of these targets (i.e., frequently considered after the first three months). Seven enabling factors have been identified, including continual management support, employee involvement, previous experience, climate leadership, cost strategy, participation in climate initiatives (e.g., SBTi), and collaboration with external stakeholders.

In the next section, we will present the main results of the study based on the research design. First, we allocate the sample companies' GHG emission reduction targets across six ambition levels. Second, we explore the relationship between the identified explanatory factors according to the level of ambition. By examining these connections, we aim to gain insights into how different factors influence the setting of GHG emission reduction targets at different levels of ambition.

Table 2 Coding table (first-order topics, second-order themes, overall categories)

First-order topics	Second-order themes	Overall categories
• Executives become aware of and engage with target-setting initiatives • Top management initiates target-setting processes • Senior leadership reveals the importance of climate matters to the company	Leadership engagement	Initiating factors
• Inquiries from shareholders for firms to improve their carbon performance and climate actions • Keeping up with the competition on climate issues • Customers signal greater interest in climate issues (e.g., request for low-carbon products and services)	Market-related pressures	
• Governments are seen as having the power to influence company's decision-making on climate actions • The perceived influence of NGOs and other non-market stakeholders is seen as significant	Non-market stakeholder influence	
• Top management and board of directors engaged in organizational climate efforts beyond initial vision • Newly founded decarbonization teams and task forces act as intermediaries between top management and other departments • Decarbonization action plans made by top managers	Continual top management support	Enabling factors
• Company culture allows awareness raising among employees to embrace decarbonization • Motivated employees (bottom-up) • Idea management and incentive systems encouraged by top managers	Employee involvement	
• Previous commitments to decarbonization • Previous environmental programs (e.g., pollution prevention and environmental management)	Years of experience	
• A desire to lead their specific market/industry in terms of climate action • Desire to be an industry climate leader • Desire to be the world's leading provider of low-carbon production/products	Climate leadership	
• Short-term cost reduction • Long-term investment decisions	Cost strategy	
• Actively seeking/finding collaboration partners • Joint effort along supply chains	Collaboration with external stakeholders	
• Climate organizations provide guidelines and frameworks for target-setting • Climate organizations are seen as necessary sources of knowledge, networking, and support	Participation in climate organizations	

4 Results

4.1 Assessment of corporate climate target ambitiousness

Based on the academic and practical literature (CDP 2022; Dahlmann et al. 2019; Dahlmann 2023; SBTi 2021), a qualitative assessment of all sampled companies' climate targets was conducted. As a result, we are able to distinguish six ambition levels (A to F; see Table 3).

According to Table 3, a gradual progression of target ambition is first observed in our sample by target type: sampled companies that have relative targets reveal lower ambitions in the subsequent categories, whereas companies that have absolute targets can indicate greater variety in target ambitiousness. Second, companies with targets in only one scope

Table 3 Assessment of companies' GHG emission reduction targets

Ambition level	Target type	Target scope	Temperature alignment	Time frame	No. of companies (incl. code)
Level A (highest)	Absolute	Multiple	1.5° C and net-zero	Near + long term (latest by 2040)	5 (BR1, HK2, JP4, JP6 & US1)
Level B	Absolute	Multiple	1.5° C and net-zero	Near + long term (by 2050)	4 (DE1, JP2, JP3 & US4)
Level C	Absolute	Multiple	1.5° C but not net-zero	Near + long term (by 2050)	4 (DE3, DE4, JP1 & US3)
Level D	Absolute	Multiple	WB 2° C but not net-zero	Near term only	5 (BR4, DE2, HK1, JP5 & US2)
Level E	Relative	Single	WB 2° C but not net-zero	Near term only	2 (BR3 & HK4)
Level F (lowest)	In planning stages	n/A	n/A	n/A	2 (BR2 & HK3)

(i.e., only Scope 1 – direct emissions) present overall less ambitious targets than companies with targets in multiple scopes (i.e., including Scope 1, Scope 2 – indirect emissions from purchased energy, and Scope 3 – indirect emissions in upstream and downstream business activities). Third, companies that set targets aligned with a 1.5° C trajectory and pledge to pursue net-zero emissions by 2050 adopt more ambitious targets than companies with a well below 2° C trajectory that is not net-zero compatible. Finally, companies that set both near-term and long-term time frames indicate greater ambition than companies setting only near-term targets, which also reveals a change in temperature alignment from well-below 2° to 1.5° Celsius. Additionally, several companies (5) aim to achieve net zero emissions in a shorter timeframe, latest by 2040, which is deemed as the most ambitious climate targets observed.

In summary, sampled companies that represent the most ambitious climate targets disclose absolute targets in all scopes (1–3) that align with a 1.5 °C, net-zero trajectory, and will achieve this by 2040 at the latest. While recognizing these results cannot be generalized from a small sample, they do reflect the usefulness of these criteria to evaluate the companies' target ambitiousness.

4.2 Assigning explanatory factors to ambition levels

The qualitative content analysis of the interviews aided us in identifying ten explanatory factors in two groups – initiating and enabling factors. In this part of the study, we observed the degree to which these factors were present in each company, embracing the heterogeneity of the sample while looking for common experiences regarding target-setting practices. The following text will highlight the explanatory factors detected in the sampled companies of each aspiration level (A to F).

4.2.1 Level A

Companies with the highest climate target ambition level (A) aim for greater reductions than stipulated by the Paris Agreement and also aim to achieve net zero by 2040. Leadership engagement in level A companies is highly present, which is regarded as the key initiating factor for setting climate targets. Surprisingly, both market-related pressures and non-

market stakeholder influence were only considered moderately present for companies at this ambition level. Although the companies sent strong signals to their investor base about their climate-related targets and programs, they indicated during the interviews that investors showed only a lukewarm interest regarding climate issues.

Continuous management support is highly prominent among the enabling factors, and it is revealed to persist throughout the entire target setting process. Furthermore, all level A companies state that employees are very knowledgeable and greatly involved in climate actions, which enables a company to aim for very ambitious climate targets. Companies offer a wide range of programs as part of their workforce engagement, particularly to improve environmental awareness and create a sense of urgency to act on decarbonization. Furthermore, these companies provide incentive packages for their staff, as demonstrated by the following quote:

> *"One of them related to [company's name] is the bonus compensation – since 2009, we have introduced a KPI connected to climate change, which means that we have at least an awareness that the bonus compensation for the entire company depends upon the performance of the carbon emissions."* (BR1).

Furthermore, these companies boost many years (>20) of experience in environmental sustainability, and they have been striving to be climate leaders in their respective industries, as expressed by one company official:

> "*We're always striving to be a leader. That's why I said 2035, not 2050. We're striving to push the bar higher, but also keep it low enough so that people will join our efforts as well."* (HK2).

Level A companies participate in climate initiatives to varying degrees. For example, three of the five companies at this level currently respond to the CDP questionnaire annually, although the other two companies have done so in the past. Beyond CDP, the influence of other climate initiatives, including SBTi, was considered only moderately present throughout target setting process. In contrast, stakeholder collaborations are indicated to be highly prominent, includes both value chain activities with customers and suppliers as well as climate advocacy projects with non-market stakeholders. Through market-related stakeholder collaborations, the companies seek to deliver new technologies and solutions:

> "*…we collaborated with one of our suppliers to do a small pilot project that showed them a different [low-carbon] production method. By doing so, we can stand behind our commitment to reduce Scope 3 emissions."* (US1).

Cost strategies related to target setting are considered to be only moderately present, and they are associated mostly with the parallel activities of carbon pricing, risks, opportunities, and carbon offsetting projects. As one interviewee at this level explained, the cost of offsetting emissions tends to become too expensive over time. Therefore, reducing GHG emissions internally under a company's control is the best way to avoid unnecessary future costs of carbon compensation.

4.2.2 Level B

Companies in the second highest ambition level (B) have absolute GHG reduction targets in multiple scopes that are also claimed on the 1.5 °C trajectory and are net-zero aligned in the near term and long term. All three initiating factors – leadership engagement, market-related pressures, and non-market stakeholder influence – are regarded as being highly present.

> "*The influence of environmental NGOs is huge. Mainly when it comes to reputation… As long as we continue to use coal, and investment also continues, we receive more and more bashing, and the company reputation goes down." (JP4)*.

As for enabling factors, continual top management support is highly present in level B companies, providing a strong mission to mitigate climate change, as indicated by one manager:

> *"We set climate-related goals based on the [company's] philosophy, and those goals are included as part of that philosophy. The philosophy embraces the integration of sustainability into our business. The fact that the goals are incorporated in the philosophy is one of the supporting factors to implement climate-related strategies."* (JP6).

The firms at level B have been implementing their corporate carbon strategies for over a decade, and their environmental awareness began several decades ago. Furthermore, these companies have set their climate targets through the SBTi and have responded to the CDP questionnaire for many years. Cost reduction is a supporting factor and is associated with energy saving, thus it is considered highly present in these companies. Furthermore, participation in climate initiatives is extremely important in all companies, and most of them boast of having achieved an "A" CDP score, and participation in the SBTi triggers a high positive impact on these businesses:

> *"I think a large contribution can be externally assessed with getting a so-called objective assessment […] the company was able to get on the CDP Climate A list. The previous year was A minus, but having such an external organization assess and rank our activities is, in a sense, a motivation."* (JP2).

Employee involvement is considered moderately present in level B firms. Although it is not at the highest level, there are various activities offered to get employees involved, including inter-departmental collaboration on climate targets. Climate leadership was also identified as being moderately present within companies in level B. Top-level management emphasizes the importance of cooperation. Thus, the firms carry out different types of partnerships with several stakeholder groups.

> "*Our president thinks that we can obtain a greater ability to resolve environmental issues by cooperating with other firms in the industry or with firms across industries instead of tackling these issues alone as an individual firm. He thinks whenever we work on environmental issues, we should collaborate with firms across industries as much as possible."* (JP6).

4.2.3 Level C

Companies in level C cover absolute climate targets in both the near term and the long term, and while these targets are aligned with the 1.5° C trajectory, they are not claimed as net-zero targets. According to the results, both market-related pressures and non-market stakeholder influences are highly present in these companies, especially from investors, regulatory bodies, and governments. Furthermore, leadership engagement plays a central role and is highly present in target setting, as managers genuinely advocate for climate issues to be integrated into the business and show great passion for facilitating the implementation and the success of the firms' climate actions.

This strong mission spurs two enabling factors, continual top management support, and employee involvement, but both are perceived to be moderately present in level C companies, as exemplified by the following quote:

> *"And to a certain extent, employees in this organization have been advocates for emissions reductions but mostly focused on compliance. I think, from the structure, it's a little bit of both, like 'This is your job'."* (US4).

Participation in climate initiatives is perceived as having a high presence for companies at this ambition level. Adopting guidelines and achieving high rankings from external climate organizations, like CDP and the SBTi, provides additional incentives for these companies to set more ambitious targets and continually improve their carbon performance, as the following quote demonstrates:

> "*It appeared in the news release that our firm made the A list (CDP), and the employees share the achievement on the intranet. So, I believe it positively impacts them. It's motivating, making them think, "Now that we made the A list, we don't want to go down in the ratings, so let's keep up and do our best."* (JP1).

Collaboration with external stakeholders appears to be moderately present, encompassing several stakeholder groups, including suppliers, customers, and NGOs. Additionally, the concept of shared advocacy provides additional credibility and engages the public to join forces in efforts toward decarbonization. Although climate leadership was not detected in any companies at this ambition level, cost strategy was highlighted as a strong enabling factor, linking money saved through energy efficiency projects to further investment in onsite renewable energy schemes, as explained by one manager:

> *"We're doing a ton of on-site solar in India right now where it is VERY cost-effective, and the carbon benefits are big. We're just displacing high-carbon grid power, and the panels are relatively cost-effective there."* (US4).

4.2.4 Level D

Companies in level D present a mid-level of ambition for their climate targets, including setting absolute reduction targets in multiple scopes, specifically Scopes 1 and 2. How-

ever, these appear to be based on targets well below 2° C target (SBTi 2021). Leadership engagement has a moderate presence at this level, as companies pursue comprehensive decarbonization plans. The companies do perceive a high presence of external pressure from market-related actors, especially investors, banks, and other financial institutions, which are also observed to be strong initiating factors for undertaking more ambitious target setting:

> *"So, we do see that those benefits from banks and rating agencies are a driving force that allows us to consider bolder targets because we're a lot of times cost-conscious, and often it costs more than we've considered. But if there are benefits, such as a subsidy or a faster track, then I guess people will consider it."* (HK1).

Furthermore, governments and NGOs appear to have a strong presence in influencing these companies' target setting. For example, the encompassing Nationally Determined Contributions (NDCs) established by the Japanese (i.e., net zero by 2050) and German governments (e.g., GHG neutral by 2045) have filtered down via legislation to the companies' reduction goals, as one German company representative observed:

> *"So, since there is also a lot of foreseeable regulation coming, or has come in the last few years, such information is also brought [to the company] regarding climate or sustainability issues in general. I would definitely include legislation in this. In other words, the issues that we have just mentioned play a role in our climate strategy."* (DE4).

The companies at ambition level D perceive continual management support to be moderately present as an enabling factor. For instance, the CEO of one company was seen as being somewhat active in promoting decarbonization through awards:

> *"We have the president of the region providing those awards [for sustainability achievements]. So, that was an additional recognition also because he was visiting the different facilities, and they said: "Okay, you achieved this award." They've made nice photos, and everybody was really, really happy to receive their own award."* (US2).

Furthermore, employee involvement is moderately present in all companies at this level, evidenced by education programs, codes of conduct, and other involvement schemes. However, most of these schemes were discussed but have not yet been implemented, because it seems that employees were not motivated to start bottom-up initiatives without proper incentivizing, as one manager stated:

> *"The involvement is low up till now. It's one of our targets to raise the discussion internally. But of course, the employees need to see that the company is really engaged in that."* (BR4).

Other enabling factors, including previous experience, climate leadership, and cost strategy are moderately present. For example, the companies in level D have experience with environmental management, including emission reduction schemes, for about five to seven

years. The cost strategy is directly associated with key performance indicators, such as energy efficiency, which have been in place for the same amount of time.

Both participation in climate organizations and collaboration with external stakeholders have only a low presence in level D companies, appearing to play little to no role concerning target setting. Collaborations with various external stakeholders were discussed during the interviews, yet they were presented as planned or early-stage projects, as one manager explains:

> *"I won't say that [collaboration] is fruitful yet because it's in progress. So, we are working on that and we don't know the result of that. But yeah, we are partnering with a customer in a specific supply chain, in the oil seed supply chain TODAY to understand…to have a long-term partnership, to reduce GHG emissions."* (US2).

4.2.5 Level E

The sample companies in level E have formulated climate targets, although these remain associated with relative measures (i.e., intensity targets), and none of them are committed to the SBTi. From the initiating factors, leadership engagement is hardly present in this group of companies. Rather, market-related pressures, especially from investors, appear as the key explanatory factor for this group of companies. More specifically, financial institutions seem to drive companies to set these types of targets, as one company representative stated:

> *"Three years ago, we launched the green bond. And inside it actually funded like four or five projects, all of them are doing good for climate change, for carbon reduction. And recently, I understand that we are doing other kinds of financial movements. That will also require us to set more aggressive carbon reduction targets in order to discuss with the bank about how they do their loan terms."* (HK4).

Furthermore, non-market stakeholder influence, especially from governments, appears to be a strong explanatory factor, as indicated by one corporate official:

> *"Then the government is actually pushing us to lower carbon emission as well over the last 2 years. The ENB [the Environmental Bureau] has been having a meeting with us to discuss the long-term decarbonization plan of [company's name]. The last meeting was held right before Christmas. That seems to be an increasing demand on how well we perform."* (HK4).

Continual management support and employee involvement were observed to have little to no presence at this level. While the companies have responded to the CDP questionnaire, they do not participate with any further climate organizations, such as the SBTi. Further enabling factors, including previous experience, climate leadership, and cost strategy, were not mentioned by these companies. On average, these companies only have two years of experience with environmental and carbon management activities, yet they still express a strong desire to achieve greater climate leadership while formulating an aggressive cost strategy associated with target setting:

"The strategic direction of the company for the next five years is to develop the highly competitive [low] carbon assets that we already have and that we will continue to require. We assess that this will cost our company multiple billion dollars to achieve. We made it very clear that we want to be one of the greatest players for low-carbon production in the world for energy." (BR3).

4.2.6 Level F

The companies in level F have not yet fully established formal climate targets, but rather have only communicated their commitment to acting towards GHG emission reduction. These companies are still in the early stages of formulating their decarbonization strategies, performing tasks such as preparing corporate-wide GHG emission inventories. Leadership engagement currently appears to be at a minimum in these companies, which are motivated instead by an overarching organizational mission, as one manager stated:

"We are doing this [target setting] because that's important for the company and we want to survive and want to live forever." (BR2).

Companies in level F have been convinced to take up target setting due to both market-related pressures and non-market stakeholder influences. For the latter, it was noted that NDCs set by government officials can serve as strong external pressure for these companies, as one manager said:

"The Hong Kong government has said by 2050 we want to be carbon neutral. […] As a responsible developer, *so what we're trying to do is to tell the government what our targets are*, *how do we address*, *you know*, *all this issue by coming up with our target*, *maybe." (HK3)*.

We could not detect any of the enabling factors (e.g., continual management support, employee involvement, participation in climate initiatives) in level F. One reason could be that these companies have not yet fully formulated their targets, even for internal stakeholders such as employees.

4.3 Overview of key explanatory factors

As previously stated, the majority of the explanatory factors were present, to varying degrees, in all six ambition levels. In a concluding analysis, we exemplify several of these explanatory factors based on their presence at the highest levels of ambition (see Fig. 1). This group of five factors includes leadership engagement (LE), continual management support (MS), employee involvement (EM), participation in climate organizations (PC), and collaboration with external stakeholders (SC). Figure 1 depicts the degree of presence for each of these key explanatory factors from the lowest to the highest degrees of ambition.

While these five explanatory factors represent the essential drivers and enablers of ambitious climate targets, the fact that their presence varies across the spectrum sheds light on critical divergence. The highest levels of target ambition are marked by a combination of

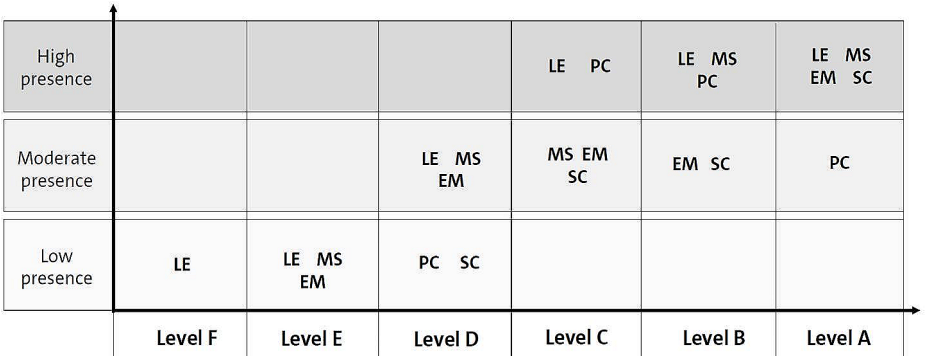

Fig. 1 Presence of most important explanatory factors according to levels
Legend: Leadership engagement (LE), Continual management support (MS), employee involvement (EM), participation in climate initiatives (PC), and stakeholder collaboration (SC)

leadership engagement, continual management support, employee involvement, participation in climate initiatives, and collaboration with external stakeholders. These five key factors appear to catalyze a high climate target ambition, empowering corporations to transcend average efforts and pursue a well-rounded commitment to decarbonization. The absence of these characteristics at lower levels of ambition suggests that these key factors are essential for higher levels of ambition. Therefore, companies that are actively establishing more ambitious climate targets should pay attention to these salient factors.

5 Discussion and conclusion

In an era when the consequences of climate change are becoming increasingly evident, it becomes imperative for companies to play a substantial role in mitigating global warming. Corporate climate targets have surged to the forefront of many sustainability discussions, reflecting a growing awareness of the need for rapid and transformative action (Chang and Lo 2022; Dahlmann et al. 2019; Faria and Labutong 2020; Imminek et al. 2022). While commendable strides have been taken to establish corporate climate targets, it has become abundantly clear that merely setting arbitrary climate targets is not sufficient to stave off the impending climate crisis (Eide et al. 2021).

Recent studies (CDP 2023; Tilsted et al. 2023) underscore the crucial importance why more companies should be setting ambitious climate targets for decarbonization. Combining ambitious reduction targets with corresponding decarbonization actions, companies have the potential to significantly contribute to slowing down the rise in global temperatures. This matters immensely in the fight against climate change, as limiting temperature increases is vital for preserving the planet's ecosystems, biodiversity, and human well-being (Hoegh-Guldberg et al. 2018).

This paper makes two contributions to the existing literature on corporate responses to climate change. First, we provide a broad spectrum of corporate climate targets in six levels of ambition (versus the previous two: symbolic and substantive; in Dahlmann et al. 2019), explicitly identifying the criteria that make the targets more or less ambitious. While most of these criteria overlap target characteristics in Dahlmann et al. (2019) and Dahlmann (2023),

including target type, scope, and timeframe, we have replaced the element of reduction rate with temperature alignment based on more current literature (Bjørn et al. 2022). Furthermore, our spectrum of six climate target ambition levels offers practical recommendations for companies to upgrade their targets based on these criteria, including modifying the timeframe to include long-term projections (i.e., a shift from level D to higher levels) and adjusting the temperature alignment to 1.5 °C and ultimately setting net-zero targets (i.e., a shift from level C to higher levels). The transition from rhetoric to tangible results necessitates that ambitious corporate climate targets are matched with the appropriate company-internal decarbonization actions. Since such actions may vary between abatement potential and achieved outcomes, it is strongly recommended that climate targets are reevaluated and adjusted, if necessary (Bjørn et al. 2022; Rekker et al. 2022). The assessment framework in this study can potentially compel companies to scrutinize both the loftiness of their ambition as well as their resolve during implementation.

Second, our study provides new insights by matching the degree of presence for ten explanatory factors across the six ambition levels. Prior research has investigated the drivers and pressures for general corporate carbon responses, demonstrating that the combination of business drivers and stakeholder pressures leads to proactive climate strategies and increased commitment (Adams et al. 2023; Boiral et al. 2012; Littlewood et al. 2018). Nonetheless, previous studies do not specify which explanatory factors are associated with more ambitious climate targets. We find that as the level of ambition in corporate climate targets rises, so too does the degree of presence for five key explanatory factors, including leadership engagement, continual management support, employee involvement, participation in climate initiatives, and stakeholder collaboration. Consequently, these findings could serve as a foundation for additional research to analyze the evolution of corporate climate targets over time, utilizing these factors as a guiding framework.

Setting ambitious targets is just the first step; companies must also demonstrate a commitment to realizing these goals. Whilst an increasing number of companies are setting climate targets, many of them are unsure about how they will achieve their commitments in reality. For instance, high-emitting industries often depend on new technology development and emerging green policies to support their carbon emission reductions (New Climate Institute 2023; van Sluisveld et al. 2021). Avoiding greenwashing, i.e., instances where companies mislead stakeholders by overstating their decarbonization efforts, is paramount in this process. Target transparency, accountability, and integrity (Bjørn et al. 2022; Day et al. 2022; Nemes et al. 2022) are critical elements in ensuring that climate targets are not merely ambitious on paper but also achievable in practice.

Companies can turn to practical guides, such as climate transition plans (CTPs), to create a strong link between ambitious targets and effective decarbonization actions (CDP 2023; TCFD 2022). CTPs help companies integrate climate considerations into their core business strategies, devising feasible financial and implementation plans, adopting robust measurement and reporting mechanisms, and collaborating with stakeholders. According to TCFD (2022), CTPs can be built on multiple pillars, including *climate governance* (i.e., board members and high-level leadership oversee climate-related issues and define governance mechanisms such as managerial incentives), *climate-related risks and opportunities*, *financial plans* (i.e., carbon price and cash flow sensitivity analyses leading to sufficient funds allocated to decarbonization actions), *implemented actions* (i.e., the realization of low-carbon products, operations, and transport), and *carbon accounting* (i.e., measuring, tracking,

and reporting GHG emissions). Our findings suggest that key factors such as leadership engagement, continual management support, employee involvement, and stakeholder collaboration may also facilitate companies CTPs to achieve decarbonization goals; however, more research is required in this area.

Encouraging companies to set more ambitious targets will also require additional support from external stakeholders and policymakers. A critical stakeholder group is investors; they should take a proactive role in engaging with corporate leadership and providing sufficient funding to achieve ambitious climate targets. Investors wield significant influence over corporate decision-making and can leverage initiatives to propel the adoption of science-based climate targets in the private sector (CDP 2024). Additionally, it is crucial to implement stringent climate policies that significantly impact both corporate and investor-driven decarbonization initiatives. Policymakers can utilize this insight to devise policies that are instrumental in reducing regulatory uncertainties and providing financial assistance and incentives for companies that are seriously pursuing decarbonization. If not already done so, new policies should be established and financial incentives provided, such as carbon taxes and regulated carbon markets, to encourage companies to reduce emissions (Cui et al. 2021; Xu et al. 2023).

Finally, international reporting frameworks need to be fortified to ensure transparent disclosure and effective implementation of climate targets. Collaborating with policymakers, these frameworks should advocate for mandatory standardized environmental reporting, to encourage and enhance environmental disclosure practices among companies. Bodies such as the International Sustainability Standards Board (ISSB) play crucial roles in this regard, providing a framework for companies to assess and disclose their climate-related risks, opportunities, and clear transition plans for decarbonization, such as the IFRS 2 (IFRS 2023).

While the small, heterogeneous sample poses a challenge for comparability and generalization, the utilization of purposive sampling with maximum variation allows for insightful exploration into how ambition manifests across diverse organizational contexts, shedding light on the nuanced interplay between varying company characteristics, regulatory frameworks, and social pressures. This is the first paper to match corporate climate target ambition levels to key explanatory factors. Although we cannot precisely define what needs to change beyond the obvious (e.g., continual management support, employee involvement, stakeholder collaboration), we suggest that future studies could examine how these factors interact with each other. Additional research could investigate if these factors support CTPs to achieve decarbonization goals, either with a diversified sample of companies or sector specific (e.g., companies in heavy industry or energy utilities).

In essence, matching ambitious targets to effective action requires concerted efforts from top management, active employees, investors, regulatory bodies, climate initiatives, reporting institutions, etc. While considerable progress has been made, ambition and effectiveness must converge to illuminate a transformative path forward (Bjørn et al. 2022; Dahlmann et al. 2019; Rekker et al. 2022). As the global thermometer continues its relentless climb, the choices made by corporations today will shape the climate trajectory for generations to come.

Appendix A. Sample questions (including aspect covered)

SQ1. How are these targets implemented internally? Who initiates the process of the climate strategy? (internal implementation)

SQ2. What departments are responsible and which ones are involved (organizational structure).

SQ3. What stakeholders influence climate-related decision-making? (external factors)

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Data availability The datasets generated during and/or analysed during the current study are not publicly available due to anonymity of all persons and organizations interviewed. Upon reasonable request, the associated author is happy to submit a modified dataset with all names and organizations anonymized.

Declarations

Ethics approval and consent to participate All authors are fully aware of all ethical issues, and can ensure that this article is original, based on our own work, and has not been submitted to any other journal prior to or during this submission.

Consent for publication All authors agreed with the content and have given explicit permission to submit. Furthermore, the authors received permission to submit from the appropriate authorities at the institute where the work was completed.

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