

Business as usual trumps transformation:

1.5°C Businesses not on track

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Lund University Centre for
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Abstract:

Averting catastrophic climate change requires private businesses to reach net zero emissions while staying within 1.5°C of global warming. The nonprofit organization Project Drawdown and the literature suggest that companies have to engage all capacities to achieve ambitious emissions reductions, including their social power, governance, political advocacy, finance, and employee creativity. I evaluated the climate strategies of 21 U.S. firms currently best in class (approved by Science Based Targets initiative and compatible with 1.5°C) against a typology of 27 effective climate actions.

Findings suggest that the companies fulfill many climate actions, but it is far from ideal. 76% engage employees on climate action, but only 5% plan on divesting from fossil fuels. 90% focus on low-impact solutions like acting as role models compared to highly transformational measures like advocating for climate policy at all levels of government (only 34%). Companies must step up their climate action game to not exceed a 1.5°C trajectory.

Keywords: climate policy, business climate action, emissions reduction targets, sustainable business, high-impact, Paris Agreement

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List of abbreviations

1.5C Businesses =	the 21 companies that were chosen to answer research question 2
AAM =	American Axle & Manufacturing, Inc.
CDP =	Carbon Disclosure Project
Drawdown framework =	Drawdown-aligned business framework
Etsy =	Etsy, Inc.
GHG =	greenhouse gas
GRI =	Global Reporting Initiative
RQ=	research question
IPCC =	Intergovernmental Panel on Climate Change
SASB =	Sustainability Accounting Standards Board
SBT =	Science Based Targets
SBTi =	Science Based Targets initiative
TCFD =	Task Force on Climate-Related Disclosures
UNFCCC =	United Nations Framework Convention on Climate Change
U.S. =	United States of America
U.S. EPA =	U.S. Environmental Protection Agency
WBCSD =	World Business Council for Sustainable Development
WRI =	World Resources Institute

1 Introduction

Global warming has to be stabilized at 1.5°C to avoid catastrophic climate change (IPCC, 2022). Therefore, aggregate CO₂ emissions need to be limited to reach net zero emissions by 2050, while other greenhouse gas (GHG) emissions must be strongly declining (IPCC, 2023). The Intergovernmental Panel on Climate Change (IPCC) clarifies that to reach 1.5°C “would require rapid and far-reaching transitions in energy, land, urban and infrastructure ..., and industrial systems (high confidence). These systems transitions ... imply deep emissions reductions in all sectors ...” (IPCC, 2022, p. 15).

The urgency of the issue demands concerted action by all entities, including states, businesses, organizations and individuals (e.g. Bollinger & Neukam, 2021). Taking up a corporate lens, companies across a wide variety of industries of the private sector have been and still are emitting a substantial amount of GHGs. But CO₂ emissions have to be reduced to near zero, removing any remaining emissions to achieve net zero (IPCC, 2023).

Businesses also have a moral obligation to ensure the wellbeing of future generations and thus drive down their carbon footprint, because they are part of a social context for producing products and services for other actors within society (Schwenkenbecher, 2018). Corporations provide employment and drive the economy, which they must steer towards a low-carbon future.

However, companies are currently not fulfilling their responsibility to reduce emissions. A lot of corporate net zero pledges are based in large part on offsetting, which means that emissions are counterbalanced by removing them elsewhere on the planet (Christiansen et al., 2023). However, offsets should only be used for remaining unavoidable emissions, after removing as many emissions as possible (Global Compact Network Germany, 2017) to stay within a 1.5 °C trajectory.

Other widespread low-impact or greenwashing practices include setting vague pathways to achieve emissions reduction targets (Giesekam et al., 2021b) or only focusing on large-scale systems transformations in the long-term, instead of taking responsibility for current CO₂ emissions (Christiansen et al., 2023). To identify greenwashing in climate strategies, the Corporate Responsibility Monitor (NewClimate Institute, 2022) assessed the integrity of the climate strategies of 25 major global companies and found that only 10% of the sample was prepared to reduce 90% of their emissions.

Given the above showing need for rapid emissions reductions, but current status of insufficient climate action, I will focus this research on effective climate action to identify how to overcome this climate action gap.

The Science Based Targets initiative (SBTi) has the overall goal to make the setting of emissions reduction targets, that are informed by climate science, a common practice (SBTi, 2020). This is currently the highest standard available for businesses to make meaningful climate action, as the SBTi reviews and validates science based targets (SBTs) against their methodological criteria (SBTi, 2023a).

While SBTi primarily focuses on emissions reductions, I will take a broader view to include enabling conditions and a range of social and political responses to make climate action effective. To get meaningful results, I will evaluate the current state of the art of climate actions against best-practice criteria.

The research questions are:

1. What is effective climate action for business?
2. What climate actions do corporations engage in?

2 Background and Theory

2.1 Definition of net zero and offsetting

First of all, the concepts of net zero emissions and offsetting need to be clarified. Christiansen et al. (2023) define a net-zero commitment as a pledge that GHG emissions and removals will be balanced out by a certain point in the future. Net zero cannot be equated with emissions reductions, because to reach net zero, emissions can be offset as well.

The strategy of offsetting is based on a market mechanism where payments are made for projects that counterbalance GHG emissions that arise (Bumpus & Liverman, 2008). These projects reduce emissions elsewhere on the planet or engage in carbon capture and storage, for example through afforestation or reforestation (Bumpus & Liverman, 2008; Seymour, 2020). The carbon credits that are traded represent how much carbon has been removed from the atmosphere (Christiansen et al., 2023).

2.2 Emission scopes

When it comes to corporate emissions reductions, it is important to understand how emissions are addressed. The GHG Protocol “establishes comprehensive global standardized frameworks to measure and manage [...] GHG emissions from private and public sector operations, value chains and mitigation actions” (GHG Protocol, 2023). It was established in 1998 by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) and set three scopes of direct and indirect sources of emissions, to make it possible to operationalize their reduction (WRI & WBCSD, 2004):

1. Scope 1 emissions entail an actor’s direct emissions “that are owned or controlled by the company” (WRI & WBCSD, 2004, p. 25), for example the packaging that is used during product shipping (e.g. Boston Scientific Corporation, 2021).
2. All electricity that is purchased to be consumed counts as Scope 2 emissions. “Scope 2 emissions physically occur at the facility where electricity is generated” (WRI & WBCSD, 2004, p. 25), but are used to power services at the company such as data analytics and software solutions (e.g. Cisco Systems, Inc., 2022).
3. Scope 3 emissions account for all other products and services that are bought (WRI & WBCSD, 2004). They are a company’s indirect emissions that arise due to its activities but that “occur from sources not owned or controlled by the company” (WRI & WBCSD, 2004, p. 25). Scope 3 emissions usually represent the highest share of a company’s emissions (WRI & WBCSD, 2004). For example, “business travel, employee commuting, downstream transportation and distribution and end-of-life treatment of sold products” (SBTi, 2023a) are all Scope 3 emissions of the automobiles company American Axle & Manufacturing, Inc..

The three scopes cover different emission types to avoid double counting, which would mean that companies account for the same emissions in the same scope (WRI & WBCSD, 2004). Hence, the third scope puts its emission sources in context to other companies that sell their products and services, as a companies’ Scope 3 emissions are accounted for as Scope 1 emissions by another company (WRI & WBCSD, 2004). This makes it very important to work with suppliers on creating clear pathways to reduce their emissions as well.

2.3 The Science Based Targets initiative

Since the SBTi currently offers the highest standard for effective climate action (SBTi, 2020), I will present the initiative in this section. The SBTi aims to make sure that emissions reduction targets are clearly defined in terms of their extent and timeframe and ambitious enough to stay within the terms of the Paris Agreement (Global Compact Network Germany, 2017). The initiative further works on making it possible to compare the aspiration level of business climate targets (Gieseckam et al., 2021b). Most companies involved in the SBTi are based in ANNEX 1 states, mainly in Europe, Asia and North America (Gieseckam et al., 2021a).

Several methodological calculation tools for creating SBTs are available on the SBTi website (Global Compact Network Germany, 2017). Targets are increasingly being aligned with a 1.5 °C pathway, due to the UN Global Compact's 'Business Ambition for 1.5 °C' campaign from the time leading up to COP26 in 2021 (SBTi, 2023b), and as of November 2021 the SBTi has included a net-zero standard (Gieseckam et al., 2021b). This makes it the best standard currently available for setting emissions reduction targets.

However, the SBTi does not require companies to report progress towards meeting their targets. Reporting is done on a voluntary basis and through organizations like the Carbon Disclosure Project (CDP), a "not-for-profit charity ... [that] runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts" (CDP, 2023b). CDP owns the largest database on climate action, where actors report on their environmental impacts and their efforts to reduce GHG emissions, safeguard water resources and protect forests (CDP, 2023a).

Interesting to note is that target setting is only required for Scope 1 and 2 emissions. Scope 3 emissions must merely be screened and if these emissions are at least 40% of total emissions, then a target must be set, but it does not have to be science-based. Instead, according to the latest SBTi Target Setting Manual, version 4.1. (SBTi, 2020), the target should address "at least two-thirds of total Scope 3 emissions and [demonstrate] an appropriate "level of ambition", i.e., delivering absolute reductions consistent with the level of decarbonisation required to keep global temperature increase below 2 °C compared to pre-industrial temperatures" (Gieseckam et al., 2021b, p. 5). With this approach the SBTi acknowledges the "more limited control and influence" (Gieseckam et al., 2021b, p. 5) that companies have on Scope 3 emissions.

2.4 Aligning corporate purpose and climate strategy

I am going more into detail on what is important when developing a climate, because this frames how a company commits to meaningful climate action. This context will be relevant for answering the research questions.

To ensure that the importance of the climate strategy is conveyed and its implementation is guaranteed, the climate strategy must align with the corporate strategy. Bollinger & Neukam (2021) studied how firms need to position themselves towards making a social and sustainable contribution to stay competitive.

Innovation requires creativity from the employees, for which intrinsic motivation is a prerequisite, as Bollinger & Neukam (2021) explain. To evoke this intrinsic motivation, employees have to consider their work as meaningful. Besides, the company's purpose has to match with an individual's purpose to create intrinsic motivation. If this is not the case, employees are not incentivised to give their best, which might lead to lower global performance.

Moreover, businesses have to combine innovation and altruism (Bollinger & Neukam, 2021). Bollinger & Neukam (2021) point out that the corporate world has had to face a lot of mistrust as well as pressure from governments and civil society, being criticized for their mere profit focus without caring for the communities they engage in. So, too, have corporate sustainability efforts been condemned for just serving marketing purposes without actually providing a meaningful contribution to society. This is why in addition to being innovative, businesses have to integrate an altruistic purpose into their business strategy to ensure that their activities serve the people and the planet.

To conclude, a company's purpose and corporate strategy have to align with its climate strategy, and its employees need to be able to identify themselves with it (Bollinger & Neukam, 2021, 2022). Only then can businesses survive long term.

2.5 The Drawdown-aligned business framework: enabling conditions to achieve emissions reduction targets

As explained before, businesses have to integrate their climate strategy into the whole corporate strategy. The nonprofit organization Project Drawdown (2023a) has institutionalized this together with the fact that companies need to engage all their capacities to be successful in driving down their emissions.

Project Drawdown (2023a) works towards reaching a turning point where emissions get to zero and then via removals below zero, so that the concentration of CO₂ in the atmosphere starts declining. For the private sector, Project Drawdown has implemented the program 'Drawdown Labs' where it sets a new standard for corporate leadership with key leverage points that all businesses should tackle to reach drawdown.

The 'Drawdown-aligned business framework' (Project Drawdown, 2023b; hereafter "Drawdown framework") implements this new leadership standard (Figure 1). Concretely, the framework specifies 8 areas for business climate action:

1. Emissions reductions
2. Climate disclosures
3. Stakeholder engagement and collaboration
4. Climate policy advocacy
5. Products, partnerships and procurement
6. Business model transformation
7. Investments and financing
8. Long-term thinking

Project Drawdown (2023a) argues that it is not sufficient for companies to only focus on cutting emissions by setting SBTs, but a transformation in business leadership is required to make a low-carbon future reality. With the Drawdown framework (Project Drawdown, 2023b) they have outlined the necessary enabling factors to achieve SBTs. This entails activating companies' social power, political advocacy, finance and the creativity of employees (Project Drawdown, 2023a).



Figure 1. The drawdown-aligned business framework with 8 areas for businesses climate action (Project Drawdown, 2023b). To provide a better resolution, the orientation of the page is ‘landscape’.

2.6 Five roles for meaningful climate action

In order to reduce GHG emissions, many private organizations have adopted leading roles, as Nielsen et al (2021) note. In a number of countries, “private climate governance” (p. 1013) is lowering emissions more quickly than public policy, which may even open the door for governmental climate measures. Nielsen et al. (2021) developed 5 roles through which high-income individuals can have a significant impact on GHG emissions reductions: *consumers*, *investors*, *role models*, *organizational participants* and *citizens*. I argue that these 5 roles for individuals can be translated to how **businesses** apply their “private climate governance” (p. 1013).

First I will explain how Nielsen et al. (2021) defined each role for individuals to reduce emissions reductions. In their role as *consumers*, they found that an effective climate action, for example in housing, could be to change to renewable energy as well as renovations for more energy efficiency (Nielsen et al., 2021).

As *investors*, individuals with a high socio-economic status can pressure organizations to divest from fossil fuels, either through their influence or because they hold a board position themselves (Nielsen et al., 2021).

Moreover, they could act as a *role model* within social networks by “shaping societal and cultural conceptions of ‘the good life’ and related social norms” (Nielsen et al., 2021, p. 1013).

Furthermore, in their role as an *organizational participant*, corporate emissions could be impacted “directly through occupying positions such as owner, manager, board member, employee and consultant, and indirectly influence the emissions of their suppliers, customers and competitors” (Nielsen et al., 2021, p. 1014).

Lastly, people with a high-income level can act as *citizens* to engage in high-impact climate action through voting, lobbying or participation in social movements (Nielsen et al., 2021).

I draw the connection between the five roles for individuals by Nielsen et al. (2021) and the roles that companies can take on to make a meaningful climate contribution, like the Drawdown framework shows in their 8 areas for business climate action. Instead of looking at how individuals reduce GHG emissions through *consumption*, a corporate lens could investigate how a company decreases their Scope 1, 2 and 3 emissions. This includes their supplier engagement strategy and their use of offsetting.

As *investors*, corporations can influence banks and insurance companies to divest from fossil fuels.

Further, they can be *role models* by setting new industry standards and norms.

Also, people *participating within organizations* “as owner, manager, board member, employee and consultant” (Nielsen et al., 2021, p. 1014), as described earlier, is what enables businesses to engage their stakeholders on climate action.

And finally, a company’s role as a *citizen* suggests lobbying and engaging with governments on climate concerns through applying their influence.

3 Methods

The method for answering research question one is a literature review. (The research questions are further referred to as RQ1 and RQ2.) For RQ2, I analyzed the ESG reports (ESG for environmental, social and governance) of 21 chosen companies against the business climate action typology I made by combining the Drawdown framework and the 5 roles for high-impact climate action identified by Nielsen et al. (2021).

3.1 RQ1: Effective business climate action

To find out what effective business climate action is (RQ1), I reviewed relevant literature that was published between 2017 and 2023 to date. Search terms included ‘firm’, ‘company’ or ‘business’ and ‘corporate climate action’, ‘leadership’ or ‘strategy’ and ‘climate’ or ‘GHGs’ or ‘mitigation’ or ‘Scope 1, 2, 3’. To cover the actors behind climate action within businesses, I conducted a separate literature search, focusing on the terms ‘creativity’, ‘sustainability’, ‘technology innovation’ and ‘psychological safety’, ‘employee green behavior’ and ‘environmental psychology’. One cannot forget that employees are the ones behind a company’s activities, and those corporate activities are what drives businesses to emit carbon. Therefore, if companies want to reduce their emissions, they also have to address their employees’ behavior.

In total, I chose 6 relevant sources to read thoroughly and follow their understanding of effective climate action: Bollinger & Neukam (2021, 2022), Christiansen et al. (2023), Global Compact Network Germany (2017), Woerd et al. (2005) and Zacher et al. (2023). Woerd et al. (2005) is a special case. It was first published in 2005 by the American Planning Association but republished in 2017 by Routledge, which is why I deemed it relevant for this literature review.

3.2 RQ2: Climate actions by corporations

To provide an overview on what climate actions corporations engage in (RQ2), this research focuses on best practices, so those that are most ambitious regarding climate action. Businesses can have a considerable influence on other companies as role models, so if their emissions reduction plans were in line with a 1.5C trajectory, then other companies would be incentivized to follow their lead and also align their climate strategies. This way, the corporate world could be on a good track to avert catastrophic climate change. For selecting those best practices, I chose the database provided by the SBTi (2023a).

3.2.1 Case selection: 1.5°C Businesses

I exclusively selected corporations that have set the goal of reaching net-zero emissions before 2050, and have SBTi-approved emission reduction targets aligned with a 1.5 °C trajectory, to align the best practice selection with the most recent developments of standards by the SBTi (Gieseke et al., 2021b.)

To apply these best practice requirements, I filtered the dataset for having set near-term targets, which is a “prerequisite for companies wishing to set net-zero targets” (SBTi, 2023a), as well as long-term targets, and being net-zero committed. When these targets are set, it means that they are approved by the SBTi. This way I narrowed down the selection from the dataset of 4485 corporations worldwide with SBTs (SBTi, 2023a) to 142 businesses.

Focusing on the United States of America (further “U.S.”), the range was narrowed down to 24 corporations. I chose the U.S. for being the second largest emitter of CO₂ globally, after China (World Population Review, 2023). According to the U.S. Environmental Protection Agency (US EPA, 2023), the Industrial sector (manufacturing products and raw materials for everyday use) and the Commercial & Residential sector (commercial businesses and private homes) rank as the third and fourth biggest sources of emissions after the transportation and electric power sectors in the U.S..

Data is based on the companies’ ESG reports. Three businesses (Checkerspot Inc., Northwest Commonwealth LLC and NovaTech Automation) were excluded from the analysis as their ESG reports were not publicly available. It is voluntary for U.S. companies to publish their climate-related reports (Makersite GmbH, 2023). I based the analysis for MSCI Inc. on their Task Force on Climate-Related Disclosures (TCFD)-Report because they published no ESG report. The TCFD is an official reporting standard for financial disclosures (Gamsjäger & Ray, 2021), which justifies this decision.

Table 1 shows an overview of the chosen corporations and their sectors. I call these 21 companies “1.5C Businesses”. Overall the most common sectors are Professional Services, Consumer Durables, Household and Personal Products, Real Estate, Technology Hardware and Equipment, Textiles, Apparel, Footwear and Luxury Goods.

Table 1. Overview of 1.5C Businesses with sectors (SBTi, 2023a)

Company Name	Sector
AECOM	Construction and Engineering
American Axle & Manufacturing, Inc. (AAM)	Automobiles and Components
Beautycounter	Consumer Durables, Household and Personal Products
Boston Scientific Corporation	Healthcare Equipment and Supplies
Brooks Running	Textiles, Apparel, Footwear and Luxury Goods
Cisco Systems, Inc.	Technology Hardware and Equipment
Colgate Palmolive Company	Consumer Durables, Household and Personal Products
Cushman & Wakefield	Real Estate
CVS Health	Health Solutions, Specialty Pharmacies
Etsy, Inc.	Retailing
Hewlett Packard Enterprise Company	Technology Hardware and Equipment
Illumina, Inc.	Pharmaceuticals, Biotechnology and Life
Jacobs	Professional Services
JLL	Real Estate
Kearney	Professional Services
Milliken & Company	Textiles, Apparel, Footwear and Luxury Goods
Moody's Corporation	Professional Services
MSCI Inc.	Professional Services
Nasdaq, Inc.	Specialized Financial Services, Consumer Finance, Insurance Brokerage Firms
Philip Morris International	Tobacco
T-Mobile USA, Inc.	Telecommunication Services

3.2.2 A corporate climate action typology

To get meaningful results, the climate actions that the 1.5C Businesses engage in have to be evaluated against best-practice criteria. Therefore, I created a business climate action typology. Since the Drawdown framework (Project Drawdown, 2023b) offers an adequate overview of enabling factors to achieve SBTs (Project Drawdown, 2023a), I used the criteria from their 8 areas for business climate action in my typology. After translating the framework of 5 roles for individual climate action by Nielsen et al. (2021) to the business organization level, I used these roles for grouping the elements of the Drawdown framework (Project Drawdown, 2023b) in the typology.

I divided climate action into mitigation as well as adaptation. This is important to distinguish, as mitigation entails all activities that are done to reduce emissions, whereas adaptation includes measures to adapt to new conditions such as a different climate (IPCC, 2023). The typology that is shown in table 3 further down in the text is organized in 3 levels:

Level 1 divides the types of actions into *mitigation* and *adaptation*.

Under *mitigation* the categories *consumer*, *role model*, *citizen*, *investor* and *organizational participant* (**level 2**) from Nielsen et al. (2021) are allocated. *Adaptation* involves *increasing resilience* and *recovery from disasters* (**level 2**).

Level 3 adds the lens of the Drawdown framework (Project Drawdown, 2023b). I made several additions to the categories of the original framework as explained in table 2.

Table 2. Categories added to the Drawdown framework (Project Drawdown, 2023b) for level 3, with an explanation why it was added (own creation)

Category added to the Drawdown framework (Project Drawdown, 2023b)	Reason for addition
function as role model in creating new norms	to cover all roles for climate action from Nielsen et al. (2021)
pioneer work for climate action	adds a category for businesses that proactively start emissions reduction initiatives. This can be a sign that companies especially care about the climate.
stated emissions reduction goals	to assess whether companies use an absolute or relative metric for reporting their emissions (further explained in chapter 4.2.1.1.1)
achieved Scope 2 emissions	adds to the Scope 1 and 3 emissions reduction categories suggested by the Drawdown framework (Project Drawdown, 2023b)
stated goal to divest from fossil fuels	If investments in the fossil fuel industry stopped, further developments in this industry would not be profitable anymore. This is a high-impact lever on the path towards decarbonization.
donate money or resources to disaster areas	Most companies mention this in their sustainability reports, so I considered it useful to include this point.

For coding I created a table with the framework categories in columns, and a row for each 1.5C Business (see table 4 in chapter 4.2). From every ESG report of the 1.5C Businesses I collected and allocated all information that fit in the **level 3** categories of the typology (see table 3). Then I evaluated each element whether it fulfilled the respective category.

To better illustrate my coding procedure, I will show on the example of Etsy how I coded the category *use carbon removal technology as a last resort and only for unavoidable emissions*. Esty (2021) writes in its ESG report that it is offsetting “100% of measured Scope 1, 2 and 3 emissions” (p. 22). As it offsets all of its emissions instead of reducing as many as possible first, I coded this category as not fulfilled.

I assessed all the other categories for the 1.5C Businesses accordingly. This allowed me to calculate the share of category fulfilment for each category to derive meaningful results, as will be shown in table 4 and figure 2 (see chapter 4.2).

For my internal analysis I added a row for each **level 2** category to evaluate the share of 1.5C Businesses that fulfilled at least one aspect of each role from Nielsen et al (2021). I also included a row for evaluating the level of fulfillment of *adaptation (level 1)* (adaptation is not covered by the 5 roles by Nielsen et al. (2021) as they focus only on high-impact climate actions to reduce emissions).

Table 3 presents the climate action typology I created for this thesis. For providing a better overview of the results under chapter 4.2, I added a category index that covers all **level 3** categories and the evaluation rows for each **level 2** category. Therefore, the index includes more elements than only the categories from the Drawdown framework (Project Drawdown, 2023b).

Table 3. Corporate climate action typology I developed for this thesis (Nielsen et al., 2021; Project Drawdown, 2023b) with category index and explanation on category allocation from level 3 to the 5 groups by Nielsen et al. (2021) in level 2.

I aligned the colors for the **level 3** categories with those of the 8 areas for business climate action from the Drawdown framework (Project Drawdown, 2023b). These 8 areas are mentioned in the column 'categories of Drawdown framework'. All categories that I included additionally in **level 3** are not colored. I added an explanation for how I coded every **level 3** category in the last column. To provide a better resolution, the orientation of the page is 'landscape' and the table is split into 4 parts, horizontally divided, but should be considered as a whole.

Regarding the category use carbon removal technology as a last resort and only for unavoidable emissions, the SBTi (2021) sets a standard for what emissions count as unavoidable: To stay within a 1.5 °C path, the majority of companies need to draw down 90-95% of their emissions, while maximum the last 5-10% can be offset.

level 1	level 2: from Nielsen et al. (2021)	explanation of category allocation (level 2&3)	category index	categories of Drawdown framework (Project Drawdown, 2023b)	level 3: inspired by the Drawdown framework (Project Drawdown, 2023b)	category definition/ concrete examples
MITIGATION	role model	A company acts as a <i>role model</i> when it sets new industry standards and norms.	1		function as role model in creating new norms	setting of new standards in the industry
			2			role model for consumers
	fulfillment of at least one aspect of 'role model'		3			
	citizen <i>lobbying and engaging with governments on climate concerns through applying their influence</i>	<i>Citizen</i> covers these level 3 categories because they all include political engagement, like lobbying, policy negotiations and partnerships to influence climate policy.	4	climate policy and advocacy	use influence to advocate for climate policy at all levels of government	engagement with government on climate concerns through company's influence, e.g. passing relevant laws, increase transparency
5			climate policy and advocacy	align political contributions	examples of political contributions/ climate actions	
6			climate policy and advocacy	focus lobbying dollars on just climate solutions	lobbying activities connected to climate action	
7			climate policy and advocacy	push trade associations to align	strategic partnerships to set a clear statement on climate policies, working together with trade partners to improve climate considerations	
8				pioneer work for climate action	e.g. founding member of industry collaborations	
	fulfillment of at least one aspect of 'citizen'		9			

	consumer	Consumer includes targets and achieved Scope 1, 2 and 3 emission reductions and business practices regarding products, the supply chain and offsetting.		Emissions reductions	stated climate goals		
	how a company decreases their Scope 1, 2 and 3 emissions			10		overall goal	
				11		scope 1 and 2 (reducing own emissions)	
				12		scope 3 (work with supply chain)	
				13	products, partnerships and procurement	ensure products and partnerships don't serve bad climate actors	e.g. thorough Supplier Code of Conduct/Responsible Sourcing program/Responsible Minerals Policy in place, make sure suppliers share company's vision
				14	products, partnerships and procurement	require suppliers to adopt science based emissions reductions targets	this can also be currently in progress, e.g. there is a target for X percent of suppliers to set SBTs until year Y. yellow=organization works with suppliers to reduce emissions
					Emissions reductions	achieved emission reductions	
				15	products, partnerships and procurement	scope 1	e.g. low carbon materials/products (Drawdown)
				16		scope 2	switch to/generate renewable electricity
				17	products, partnerships and procurement	scope 3	e.g. travel policy, work with supply chain
				18	emissions reductions	phase out use of offsets	
				19	emissions reductions	use carbon removal technology as a last resort and only for unavoidable emissions	carbon removal technology = offsetting
				20	emissions reductions	institutionalize emissions reduction efforts	emissions reduction efforts integrated in main business, like operations, business practices
			21	emissions reductions	embed climate justice	support marginalized communities most impacted by climate change	
	Share of organizations that fulfill at least one aspect of 'consumer'		22				

	investor	<i>Investor</i> entails climate-friendly investments.	23	investments and financing	climate-friendly retirement plans and investment opportunities for employees	
	<i>how companies provide green investment opportunities and use their influence towards divestment from fossil fuels</i>		24	investments and financing	push banks and asset managers to align investments with the Paris Agreement	
			25	investments and financing	pressure insurance companies to stop underwriting and investing in carbon-intensive projects	
			26		stated goal/specific plan to divest from fossil fuels	
	Share of organizations that fulfill at least one aspect of 'investor'		27			
	organizational participant	<i>Organizational participant</i> includes environmental reporting, business model transformations, strategies concerning employees and leadership.	28	climate disclosures	publicly disclose climate-related risk and support mandatory disclosure standards	
	<i>people participating in organizations "as owner, manager, board member, employee and consultant" (Nielsen et al., 2021, p. 1014), is what enables businesses to engage their stakeholders in climate action</i>		29	stakeholder engagement and collaboration	engage employees on climate action	e.g. training on the implementation of the organization's ESG strategy, bonus schemes for climate action or 'green' competitions
			30	stakeholder engagement and collaboration	create pathways for every job to be a climate job	enable all employees to engage in climate action at their workplace, even if their job does not directly have to do with sustainability
			31	stakeholder engagement and collaboration	ensure the board is climate-competent	either the board itself is climate-competent or a team of sustainability experts informs the board
			32	business model transformation	embed climate considerations into every part of the business	are all parts of the organization considered, e.g. the impact of employee climate action on corporate emissions reductions
			33	business model transformation	phase out part of the business that are incompatible with climate action	
			34	long-term thinking	value long-term thinking	This is a given for companies with approved SBTs
	Share of organizations that fulfill at least one aspect of 'organizational participant'		35			

ADAPTATION	increase resilience		36	stakeholder engagement and collaboration	engage and support local communities	
	recover from disasters		37		donate money or resources to disaster areas	
Share of organizations that fulfill at least one aspect of the category 'adaptation'			38			

3.2.3 Four stages to evaluate the current state of emissions reduction efforts

To evaluate the achieved emissions reductions that companies report in a meaningful way, I used a 4-stage framework that I based on a study by Google Cloud & The Harris Poll (2023). This enabled me to make a statement on how progressed the 1.5C Businesses are in their work towards sustainability and thus interpret whether it is realistic for the 1.5C Businesses to achieve their SBTs.

According to a corporate survey of 1500 executives in 17 countries on the state of the art of emissions reduction efforts, more than one fourth of the organizations are merely working on establishing a sustainability program, 22% have an ESG strategy that is being put into action, 22% have the tools in place to measure the impact of their ESG strategy, and 14% are refining their ESG strategy based on what they have measured (Google Cloud & The Harris Poll, 2023).

From this finding I derived four stages that I used to evaluate how far along the 1.5C Businesses are in their emissions reduction efforts, as I noticed that especially for Scope 3 emissions, not all of the chosen companies have started to implement a clear measurement or are only about to start measuring those. If the actors have not progressed their efforts far enough to be able to measure emissions and derive meaningful actions from these measurements, achieving their SBTs is unrealistic. The four stages are (based on Google Cloud & The Harris Poll, 2023):

1. Develop ESG programs
2. Have a ESG strategy that is implemented
3. Can measure impact of ESG strategy
4. Are able to optimize ESG strategy based on what was measured

If all four stages based on Google Cloud & The Harris Poll (2023) were completed by a 1.5C Business, I coded this topic as fulfilled. I could thus derive a share of fulfilment here as well. This evaluation for the 1.5 Businesses can be found under *Evaluation of the current state of emissions reduction efforts* in chapter 4.2.1.

3.3 Ethics

As I used published, public data for my analysis, there are no ethical concerns to be addressed. Possible limitations of the study due to this are addressed in chapter 5.5 Limitations of the study.

4 Results

4.1 RQ1: Effective business climate action

This literature review indicated 6 types of meaningful business climate action: Political advocacy, investments, institutionalizing emissions reduction efforts, employee engagement, offsetting, and reduction measures for Scope 3 emissions.

4.1.1 Political advocacy for emissions reductions

An important aspect of businesses' climate action is their engagement in government policy negotiations (Woerd et al., 2005). Trade associations play a significant role in shaping the perception of the corporate role in addressing climate change (Woerd et al., 2005). (The fact that business is a formal constituency of United Nations Framework Convention on Climate Change (UNFCCC) negotiations (UNFCCC Observer Relations Team, 2023), shows their power in influencing policy developments.)

4.1.2 Investments

Woerd et al. (2005) clarify that companies can shape the climate action agenda through their investment behavior. Therefore, they should align their external investments with climate change considerations. Internal investments and research should focus on energy efficiency and renewables as well as technological innovations.

4.1.3 Institutionalize emissions reduction efforts

The reviewed literature further suggests that businesses should institutionalize emissions reduction efforts to make climate action effective. Many companies wrap their core business around technology to ensure their long-term competitiveness (Bollinger & Neukam, 2022). In order to be successful, sustainability considerations, including emissions reductions, have to be incorporated into all technology innovations (Bollinger & Neukam, 2021, 2022). Therefore, a company needs to adapt its corporate culture and values, and create business models that are aligned with emissions reductions (Global Compact Network Germany, 2017). To manage GHG emissions effectively, businesses should focus on efficiency improvements and innovations for emissions reductions and connect them to internal reduction targets (Woerd et al., 2005).

Neukam & Bollinger (2022) stress that it is the creativity of teams that drives innovation. Particularly psychological safety is a factor that impacts team creativity. It is needed so that employees have no fear of negative consequences when sharing ideas freely, even if they are unconventional. If the company's culture and values go hand in hand with the climate strategy and business model, then teams will have the necessary level of psychological safety to be creative and propose solutions that have real transformational character towards emissions reductions. This will lead to innovations that are shaped from a team level in line with the emissions reduction commitment of the company.

Another advantage of institutionalizing sustainability is the positive image that helps to attract new talents to the company, as Zacher et al. (2023) found. Therefore, the climate strategy should be highlighted in all parts of the recruitment process as well as in business operations and policies.

4.1.4 Employee engagement for climate action

Zacher et al. (2023) focus on employee green behavior and give recommendations on how to integrate climate action into the workplace. From a human resource perspective, companies should already look for sustainability skills when hiring, and develop them further through employee training. They should create incentives, point out employee benefits for green behavior and include ESG in performance assessments.

4.1.5 Emissions reductions before offsetting

Effective climate action requires offsetting to only be used as a last resort for emissions that cannot be reduced otherwise (Global Compact Network Germany, 2017). To achieve this, a company could set internal targets so that certain departments would be required to reduce their emissions, while a group that acts independently from these units handles emissions offsets for remaining emissions (Woerd et al., 2005). An internal emissions trading scheme could also be a way to incentivize emissions reductions (Woerd et al., 2005).

4.1.6 Reducing Scope 3 emissions across the value chain

An integral part of effective corporate climate action indicated in the selected literature is the reduction of Scope 3 emissions across the value chain. There are various measures to do this. The Global Compact Network Germany (2017) divides these in upstream, site-specific and downstream emissions reduction actions. These categories refer to the stages within the value chain where Scope 3 emissions arise, and where these measures are applied accordingly.

Firstly, upstream measures include the implementation of “purchasing guidelines or codes of conduct, travel guidelines, emissions reduction projects with suppliers, [and the] use of alternative packaging materials” (Global Compact Network Germany, 2017, p. 71).

Secondly, site-specific measures focus on “increasing transparency, control, and coordination, energy efficiency, vehicle fleet strategy, [the] site’s own renewable energy generation, ... [and] compensation of GHG emissions” (Global Compact Network Germany, 2017, p. 71).

Thirdly, downstream measures involve “[research and development] for continuous product efficiency, [the] development of sustainable products [and] business models, measures with reduction potential, [and] cooperation with [business] customers around product innovations and for product returns” (Global Compact Network Germany, 2017, p. 71).

By implementing these actions, businesses can take important steps toward reducing their environmental impact and achieving SBTs.

4.2 RQ2: Climate actions by corporations

In this chapter I present the results of the analysis for RQ2, what climate actions the 1.5C Businesses engage in. Table 4 shows a summary of the results for RQ2. For every company, categories that are fulfilled are marked in green, those that are not fulfilled are in red. The category *require suppliers to adopt science based emissions reductions targets* has elements colored in yellow when the businesses work with suppliers to reduce emissions. I added this evaluation because it is already a step towards an SBT requirement for suppliers, better than if companies do not work with their suppliers at all, but the category is not completely fulfilled. This overview already suggests that the investor role is not well fulfilled by the 1.5C Businesses.

Table 4. Overview of results for RQ2 (own creation). Color coding as described in text above. No color coding was added for the columns 10-12 and 15-17. In these cases no clear evaluation of the category fulfillment was possible because the elements comprise absolute values, like “commits to reach net-zero GHG emissions across the value chain by FY2040 from a FY2018 base year” (SBTi, 2023a). To provide a better resolution, the orientation of the page is ‘landscape’ and the table is split into 2 parts, vertically divided, but should be considered as a whole.

	level 1	MITIGATION																									
	level 2: from Nielsen et al. 2021	role model			citizen						consumer																
	category index	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
companies from SBT database with the goal of reaching net-zero emissions before 2050, with SBTi approved reduction target	AECOM																										
	American Axle & Manufacturing, Inc.																										
	Beautycounter																										
	Boston Scientific Corporation																										
	Brooks Running																										
	Cisco Systems, Inc.																										
	Colgate Palmolive																										
	Cushman & Wakefield																										
	CVS Health																										
	Etsy Inc.																										
	Hewlett Packard Enterprise Company																										
	Illumina Inc.																										
	Jacobs																										
	JLL																										
	Kearney																										
Milliken & Company																											
Moody's Corporation																											
MSCI Inc.																											
Nasdaq, Inc.																											
Philip Morris International																											
T-Mobile USA, Inc.																											
share of category fulfilment	fulfilled	90%	14%		38%	24%	10%	62%	19%					71%	33%				5%	38%	95%	19%					
	partly fulfilled														52%												
Share of organizations that fulfill at least one aspect of the category		90%									71%																100%

	level 1	MITIGATION													ADAPTATION			
	level 2: from Nielsen et al. 2021	investor					organizational participant											
	category index	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
companies from SBT database with the goal of reaching net-zero emissions before 2050, with SBTi approved reduction target	AECOM																	
	American Axle & Manufacturing, Inc.																	
	Beautycounter																	
	Boston Scientific Corporation																	
	Brooks Running																	
	Cisco Systems, Inc.																	
	Colgate Palmolive																	
	Cushman & Wakefield																	
	CVS Health																	
	Etsy Inc.																	
	Hewlett Packard Enterprise Company																	
	Illumina Inc.																	
	Jacobs																	
	JLL																	
	Kearney																	
	Milliken & Company																	
	Moody's Corporation																	
MSCI Inc.																		
Nasdaq, Inc.																		
Philip Morris International																		
T-Mobile USA, Inc.																		
share of category fulfilment	fulfilled	10%	0%	0%	5%		90%	67%	52%	76%	81%	19%	100%		95%	52%		
	partly fulfilled																	
Share of organizations that fulfill at least one aspect of the category						24%							100%				100%	

Figure 2 shows a ranking of category fulfillment. The most fulfilled categories, by 80% or more of the 1.5C Businesses, are *value long-term thinking, engage and support local communities, institutionalize emissions reduction efforts, publicly disclose climate-related risk and support mandatory disclosure standards, and embed climate considerations into every part of the business.*

Again, the lack of engagement in climate-friendly investments becomes apparent, as none of the 1.5C Businesses *push banks and asset managers to align investments with the Paris Agreement nor pressure insurance companies to stop investing in carbon-intensive projects.*

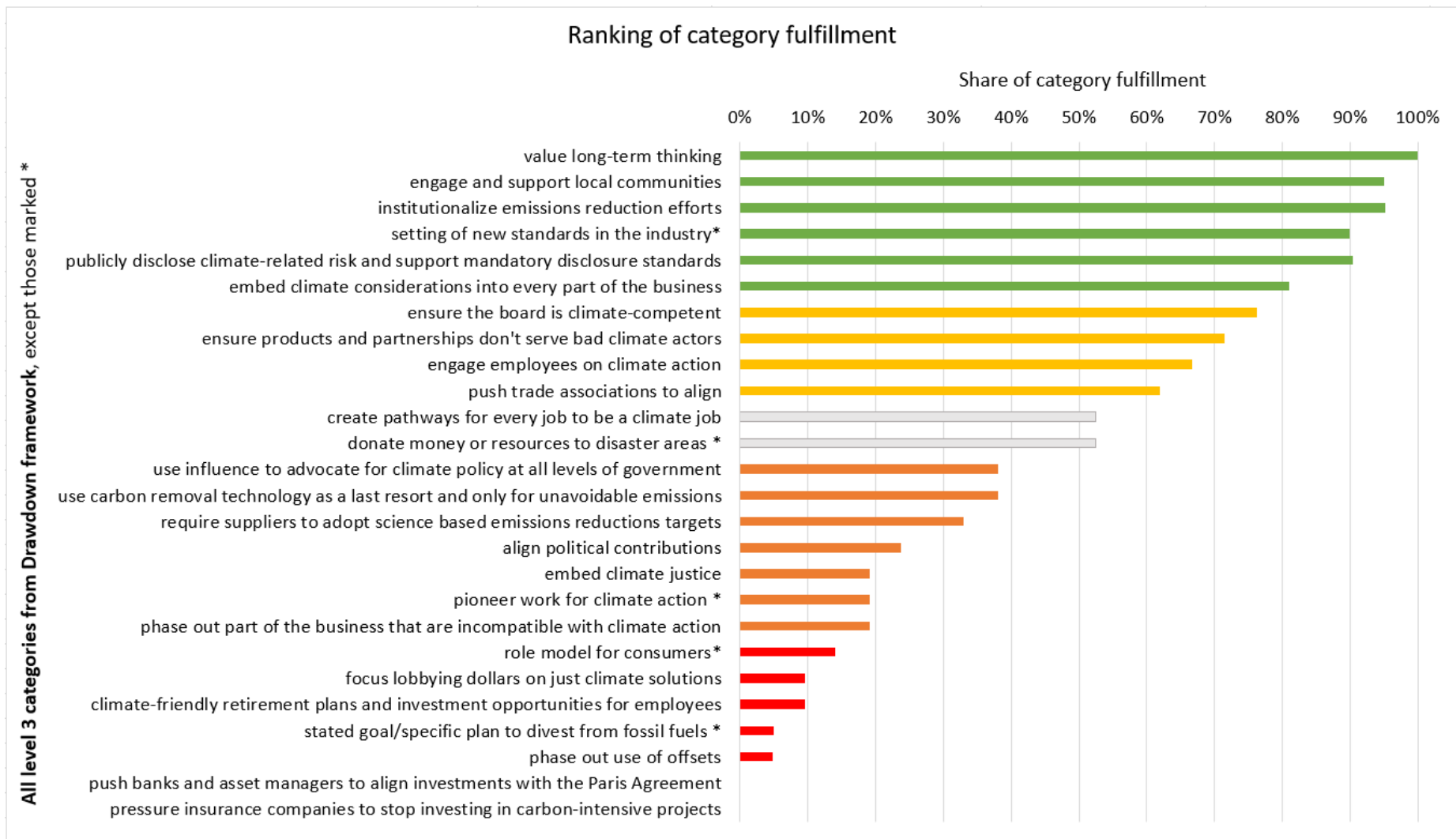


Figure 2. Ranking of category fulfillment (own creation). 52% of 1.5C Businesses partly fulfill the category require suppliers to adopt SBTs. To provide a better overview, this is not included in this ranking. The color code for the evaluation of category fulfillment is as follows: $\geq 80\%$: green for well fulfilled; 60-80%: yellow for sufficiently fulfilled; $\approx 50\%$: no color for half fulfilled; 15-35%: orange for poorly fulfilled; $\leq 15\%$: red for barely covered. To provide a better resolution, the orientation of the page is 'landscape'.

4.2.1 Mitigation

In the following I am going into detail on the results for the **level 2** categories *consumer, role model, citizen, investor* and *organizational participant* under *mitigation (level 1)*.

Consumer

Within their function as *consumers*, 71% of the 21 cases *ensure that products and partnerships do not serve bad climate actors*. Thus, this category is well fulfilled. It entails having an adequate Supplier Code of Conduct, a Responsible Sourcing Program or a Responsible Minerals Policy in place and making sure that suppliers share the company's vision to draw down carbon emissions (see table 3, column 'category definition/ concrete examples').

One third of the 1.5C Businesses specifically *require their suppliers to set SBTs* or have set such a commitment. More than half generally engage with their suppliers to reduce their emissions, without specifically setting SBTs. Judging from the created typology however, this is not sufficient. Altogether, I evaluate this category as not well fulfilled.

Furthermore, the impression that is conveyed regarding offsetting is diverse. Only Brooks Running (2021) is planning on *phasing out its use of offsets*, clearly stating that offsets are going to be reduced gradually as net zero is approached. This category is barely covered.

38% of the 1.5C Businesses *use carbon removal technology as a last resort and only for unavoidable emissions*. So only after reaching the maximum possible level of emissions reductions do they purchase offsets. The other two thirds do not specifically state that carbon removal is only used if unavoidable, or they do not mention offsetting at all in their ESG reports. As the majority of the 1.5C Businesses are not clear about their offsetting strategy, this category is poorly fulfilled.

A special case in regard to its offsetting strategy is Etsy, Inc. (2021, further referred to as Etsy). The company's retail platforms support investments in communities that have promising economic and creative potential, its mission being to improve sustainability through economic development. In the near term, however, this strategy is not compatible with a reduction of emissions, as the drastic increase of Scope 3 emissions by 252% from 2019 to 2021 clearly shows.

Its statement about this situation is as follows:

The most significant drivers of our Scope 3 emissions are largely outside of our control, such as the shipping our sellers do directly to our buyers. That's why our reduction levers for this goal are long-term and systemic in nature. While we begin to activate these levers, in the near-term we still expect to see an increase in emissions as our business grows (Etsy, 2021, p. 21).

Therefore, the company uses offsetting as its general strategy to achieve net zero, while emissions reductions are only addressed in the long-term strategy (Etsy, 2021).

This is also the reason why Etsy does not fulfill the category of *institutionalizing emissions reduction efforts* in the climate action typology. The other 95% fulfill this point. This category reflects whether emissions reduction efforts have been integrated into the main business, like operations and business practices (see table 3, column 'category definition/ concrete examples').

Furthermore, *climate justice* concerns, which here entail the support for marginalized communities most impacted by climate change (see table 3, column 'category definition/ concrete examples'), are only directly mentioned by the companies Beautycounter (2022), Etsy (2021), Illumina Inc. (2022) and Jacobs (2022). Other 1.5C Businesses like AECOM include some aspects of justice but without articulating a **climate** justice agenda. Its social impact strategy is taking on projects "that rectify inequities through their design, development and delivery" (AECOM, 2022, p. 19). Overall, this category needs to be worked on substantially.

Reporting in absolute or relative terms

Regarding their emissions reduction progress, companies can choose to report this in relative instead of absolute terms (Gieseckam et al., 2021b). Some actors do this to shed a more positive light on their progress towards net zero (Christiansen et al., 2023). A relative metric for measuring the progress towards net zero is calculated in relation to financial turnover, so even though absolute emissions might rise, their impact per unit decreases (Christiansen et al., 2023).

In fact, Etsy has set its Scope 3 emissions reduction targets relative to its turnover. For example, its near-term targets are "to reduce scope 3 GHG emissions 52% **per million dollar of gross profit** by [2030 from a 2020 base year]" (SBTi, 2023a). Regarding its progress towards these targets, Etsy remains unclear whether referring to absolute or relative targets (SBTi, 2023a).

Comparing this finding to other 1.5C Businesses, two thirds report their targets and progress against these in absolute terms. (Beautycounter remains unclear about its used metric both for targets and progress against these.)

Overall, this analysis shows that the criticism of potential emissions reporting tricks remains unfulfilled for the majority of the 1.5C Businesses.

Evaluation of the current state of emissions reduction efforts

As explained in methods (chapter 3.2.3), to evaluate the achieved emissions reductions, I use a framework of 4 stages of an organization's progress in their work towards sustainability (based on Google Cloud & The Harris Poll, 2023) as a tool to evaluate whether it is realistic for the 1.5C Businesses to achieve their SBTs. (for an overview of the results for this evaluation see appendix 1)

81% of the 1.5C Businesses are at stage 4 in their progress on emissions reduction efforts, so they are able to optimize their climate strategy based on their earlier Scope 1, 2 and 3 emission measurements. (I assumed this stage for AAM, Beautycounter, Colgate Palmolive and CVS Health as well, even though they do not state specific Scope 3 emissions reductions.)

Looking more specifically at how Scope 3 emissions reductions are reported provides further noteworthy results. Brooks Running and Illumina Inc. provide interesting insights into possible approaches to reduce Scope 3 emissions. They both plan on intensifying their use of recyclable materials (Brooks Running, 2021; Illumina Inc., 2022). Illumina Inc. (2022) further mentions “updates to [its] investment policy, communication campaign to [its] supplier base, ..., expanding green travel policy, and shifting purchased goods from air to ocean freight wherever possible” (p. 47).

Furthermore, AECOM (2023) expresses that it has only started to request information on Scope 3 emissions from suppliers. I allocate these efforts to stage 2, as this lack of information impedes AECOM still from measuring Scope 3 emissions. Furthermore, Hewlett Packard Enterprise Company (2021) notes: “Progress on our Scope 3 target will be reported starting from FY2022 “ (p. 7). As it has not started reporting them yet, it is on stage 3 in its emissions reduction efforts.

Generally, the majority of the companies have achieved a stage in their work towards sustainability that allows them to make meaningful adjustments to their climate strategy based on their emissions measurements. Therefore, it is not unrealistic that they can achieve their SBTs.

Role model

Another way of business climate action is to *function as role models in creating new norms*, which 90% of the 1.5C Businesses do (see table 4).

19 of the 21 engage in this through *setting new standards in the industry*, such as for responsible sourcing of minerals, the use of chemicals in cosmetics or recycling.

Three of the 1.5C Businesses are also *role models for consumers*. They see their customers as a significant lever for reducing emissions. Colgate Palmolive (2021), who manufactures consumer products, mentions a campaign to raise awareness about the possibility of recycling the offered goods after use. Similarly, the health solutions company CVS Health (2021) plans a campaign to take back its customers' empty pill bottles. Moreover, Etsy (2021) introduced a 'shop local'-label in its retail platforms to show buyers when a product is from the same region as their location.

Citizen

Under *citizen*, the landscape of political advocacy is very diverse among the chosen businesses. 29% of the 1.5C Businesses do not mention political work in connection with climate action at all in their ESG reports.

Looking at the other two thirds that mention political advocacy (see table 4), 38% of the 1.5C Businesses *use their influence to advocate for climate policy at all levels of government*, meaning to engage with governments on climate concerns (see table 3, column 'category definition/ concrete examples'). For instance companies help to pass relevant laws or increase the transparency of environmental issues. In this sense, Colgate Palmolive (2021) claims to engage in the "Ocean Plastics Leadership Network (OPLN) call-to-action for a United Nations treaty on plastics pollution" (p. 54), while MSCI Inc. (2022) "proactively support[s] the implementation of local and governmental measures to increase renewable energy use where applicable." (p. 16). In total, this category is poorly fulfilled.

Additionally, barely one quarter of the 1.5C Businesses state specific examples of how they *align their political contributions*. This category includes examples of political contributions or climate actions. Beautycounter (2022) for instance works to put cosmetics safety to the top of the agenda, through creating a movement that makes it possible for everyone to express their concern about the issue.

Various companies that focus their climate advocacy on long-term change in the political landscape do this in connection to their core business. The textile company Brooks Running (2021) and the retailer Etsy (2021) advocate for reaching net zero by 2050 in the shipping and aviation sector as well as infrastructure. Moreover, the technology hardware provider Hewlett Packard Enterprise Company (2021) mainly advocates for low-carbon policies and solutions in energy. MSCI (2022) pushes for renewable energy but also founded the “Net Zero Financial Service Providers Alliance (NZFSPA)” (p. 4), bringing together players of the financial sector that all aim for net zero by 2050. This is part of its core business as well, as MSCI “help[s] investors make climate change part of their strategies” (p. 4).

Furthermore, only 2 of the 1.5C Businesses mention that they *focus lobbying dollars on just climate solutions*. More concretely, Beautycounter (2022) helped pass 11 laws for safety and sustainability in the beauty industry, while Nasdaq, Inc. (2021) “concentrates its efforts on education and outreach and utilizes a modest Political Action Committee, or PAC, program, known as the Nasdaq PAC. The Nasdaq PAC is funded entirely through employee contributions and supports only federal campaigns” (p. 50). This category needs to be worked on substantially.

Yet, the share of 1.5C Businesses that *push trade associations to align* with climate targets is much higher with 62%. Under this well-fulfilled category fall for example strategic partnerships to make a clear statement on climate policies, as done by Beautycounter (2022), Cisco Systems, Inc. (2022), Colgate Palmolive (2021), JLL (2021) and MSCI Inc. (2022). Other 1.5C Businesses fulfill this category by working with trade partners to improve climate considerations, like Etsy (2021), Hewlett Packard Enterprise Company (2021) and Kearney (2021).

Interestingly, about one fourth exclusively focuses on strategic partnerships for climate advocacy, while not engaging in any other political advocacy category. This includes Brooks Running (2021), Moody's Corporation (2021) and T-Mobile USA, Inc. (2021). Additionally, the consumer products manufacturer Colgate Palmolive (2021) and the health solutions company CVS Health (2021) push for phasing out plastic waste and achieving a circular economy in their sectors, which seems logical as the products they bring to the market include large amounts of packaging.

Moreover, 4 of the 1.5C Businesses do *pioneer work for climate action* by being a founding member of relevant industry associations (see table 3, column ‘category definition/ concrete examples’). These are Cisco Systems, Inc. (2022), Hewlett Packard Enterprise Company (2021), JLL (2021) and Milliken & Company (2021). This category is poorly fulfilled.

Investor

As table 4 clearly shows, the 1.5C Businesses were performing weakly in the domain of climate action as *investors*. In fact, barely one fourth fulfilled at least one of the aspects of this category.

To go into detail, only AECOM (2022) and Jacobs (2022), provide *climate-friendly retirement plans and investment opportunities for employees*.

Besides, none of the corporations mentioned in their ESG reports that they were *pushing banks and asset managers to align investments with the Paris Agreement*, nor that they *pressured insurance companies to stop underwriting and investing in carbon-intensive projects*.

Furthermore, only Illumina Inc. (2022) has the *stated goal to divest from fossil fuels*. Its report specifically states: “We modified our investments policy to eliminate investing in Energy and Utilities sector bonds unless the associated issuance is identified as a Green, Social or Sustainability (GSS) Bond” (p. 48).

The other 95% of the companies either do not mention fossil fuel divestment at all, or their investment strategy does not completely phase out fossil fuel investment. Those cases aim at ‘greening’ investments that are made, like beginning to finance projects which only do sustainable investments or that have set SBTs themselves. Beautycounter (2022) for instance acquired the global investment firm Carlyle Group to invest 1 billion dollars in safer, more sustainable ingredients. The cosmetics firm claims that the investment business is the first major private equity firm to set “a 2050 net zero commitment across investments” (Beautycounter, 2022). Besides, Colgate Palmolive (2021) “prioritizes investments in projects that support [its] sustainability goals” (p. 68).

Overall, this role needs to be worked on considerably.

Organizational participant

Regarding the role of companies as *organizational participants*, it is worth highlighting that 90% of the 1.5C Businesses *publicly disclose climate-related risk and support mandatory disclosure standards*, so this category is among the highest in the ranking of category fulfillment (see figure 2).

These standards include the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB) disclosure frameworks, recommendations from the Carbon Disclosure Project (CDP), and the TCFD.

They are not mandatory, but I still interpret this category as well fulfilled because of the official character of these reporting standards. Table 5 provides an overview of the initiatives together with an explanation of their purpose.

Table 5. Overview of environmental disclosure standards that the 1.5C Businesses compiled to, and their description (Gamsjäger & Ray, 2021)

Initiative	Name	Description
GRI	Global Reporting Initiative	Sector-wide reporting requirements for sustainability are intended to provide information for all actors.
SASB	Sustainability Accounting Standards Board	reporting approach specific to the industry oriented for investors and capital providers with a financial materiality focus
CDP	Carbon Disclosure Project	emphasis on gathering data for climate reporting
TCFD	Task Force on Climate-Related Financial Disclosures	disclosure of climate-related risks concentrated on the financial implications associated with ESG risks

As Gamsjäger and Ray (2021) clarify, GRI and SASB are the most commonly used initiatives whose general frameworks inform about advances in sustainability. SASB focuses on financial effects connected to ESG to inform investors, while GRI provides ESG disclosures beyond sectors. Still, the two are equivalent. TCFD and CDP are frameworks for climate-related disclosures that provide transparency on emissions and offer an understanding of how closely a corporation adheres to standards from climate science, according to Gamsjäger and Ray (2021). More specifically, CDP has its unique selling proposition in providing sector-specific, standardized ESG performance disclosures through a questionnaire that businesses fill out. TCFD requires disclosing the corporate strategy including targets and incentives for reaching emissions targets.

Going further in the analysis, the category of *valuing long-term thinking* has to be fulfilled by all of the 1.5C Businesses, because it is a requirement for SBTs to be approved.

When it comes to *engaging their employees on climate action*, two thirds fulfill this category, so it is sufficiently covered. Strategies entail training on the implementation of the company's ESG strategy, bonus schemes for climate action or 'green' competitions (see table 3, column 'category definition/ concrete examples'). These are for instance treasure hunts or innovation competitions with a focus on emissions reductions.

About half of the 1.5C Businesses *create pathways for every job to be a climate job*. However, Colgate Palmolive (2021) and Illumina Inc. (2022) have special ESG working groups taking care of this topic instead. Similarly, CVS Health (2021) does not incentivise every job for working towards emissions reduction goals, only departments whose work affects the environment.

Moreover, about three quarters of the 1.5C Businesses *ensure the board is climate-competent*, so this category is sufficiently fulfilled. In most of these cases, special ESG committees or sustainability experts inform the board on climate-related issues and give performance updates. Hewlett Packard Enterprise Company (2021), JLL (2021) and Nasdaq, Inc. (2021) even require the board members themselves to have personal skills and experience regarding ESG topics.

Embedding climate considerations into every part of the business is important to 81% of the 1.5C Businesses. This well-fulfilled category examines whether all parts of the company are addressed through the environmental strategy (see table 3, column 'category definition/ concrete examples'). Etsy (2021), Hewlett Packard Enterprise Company (2021), MSCI Inc. (2022) and T-Mobile USA, Inc. (2021) do not fulfill this category, as they fail to consider the impact of employee climate action on corporate emissions reductions in their ESG strategies.

Interestingly, only 4 of the 1.5C Businesses plan on *phasing out the parts of the business that are incompatible with climate action*. To give an example for how some companies fulfill this category, Brooks Running (2021) will replace conventional dyeing with a different dyeing method with "approximately 92% fewer carbon emissions" (p. 32) and Illumina Inc. (2022) will stop investing in the energy sector, unless certain sustainability requirements are fulfilled. This category needs to be worked on substantially.

4.2.2 Adaptation

I am now going into detail on the results for the **level 2** categories *increase resilience* and *recover from disasters* under *adaptation (level 1)*.

Increase resilience

Regarding *increasing resilience*, the category *engagement and support of local communities* is the only one apart from *institutionalizing emissions reduction efforts* that is fulfilled by 95% of the 1.5C Businesses, as figure 2 clearly shows. This is done in different ways, ranging from employee volunteering over financial and product donations to strategic philanthropic partnerships and investments. This serves a variety of goals, including "energy saving projects" (Colgate Palmolive, 2021, p. 5), "support local families, youth outreach, education, wellness, and social equality" (AAM, 2021, p. 20) and assisting relevant research (Beautycounter, 2022; T-Mobile USA, Inc., 2021).

Recover from disasters

Slightly more than half of the 1.5C Businesses *donate money or resources to help disaster areas to recover*. Help for Ukraine is mentioned most often for being a very recent disaster hotspot in 2022, for instance by AECOM (2022), AAM (2021) or Cisco Systems, Inc. (2022). Other examples are donations after natural disasters or extreme weather events (Cushman & Wakefield, 2021; Hewlett Packard Enterprise Company, 2021; Illumina Inc., 2022; Milliken & Company, 2021).

4.2.3 Company ranking regarding typology fulfillment

Figure 3 shows a ranking of the 1.5C Businesses on how well they fulfill the categories of the typology. The 4 businesses Boston Scientific Corporation, Cisco Systems Inc., Jacobs and JLL each fulfill 56% of the business climate action typology. The lowest share of category fulfillment is 37%, so the minimum number of categories that are fulfilled is 10.

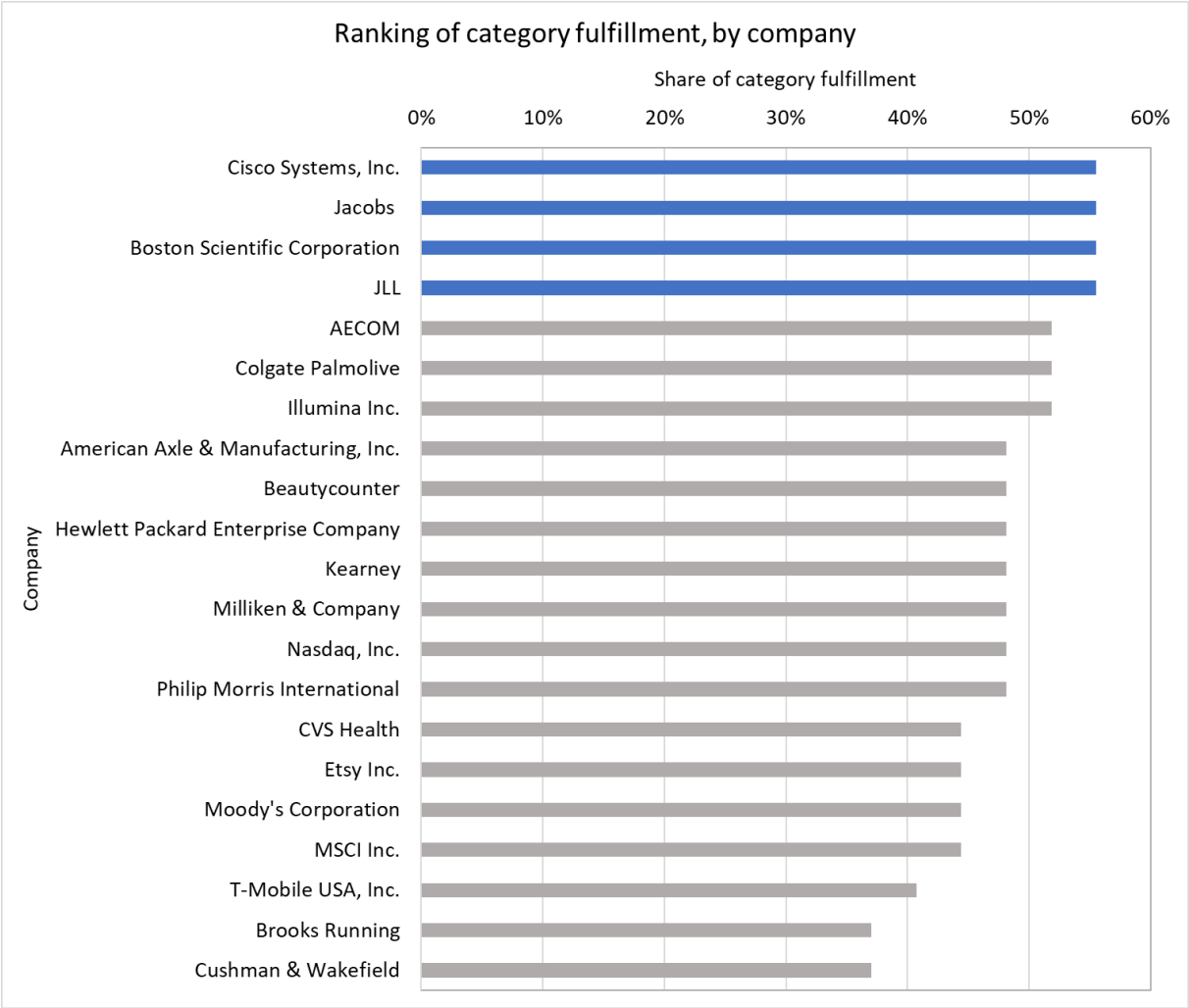


Figure 3. Ranking of category fulfillment, by company (own creation). The bars for companies that fulfill the most categories are filled in blue.

5 Discussion

5.1 The answers to RQ1 and RQ2

In this chapter I present the answers to RQ1 and RQ2. The first research goal was to find what the literature suggests as effective business climate action. I identified 6 types of corporate climate action, which are political advocacy, investments, institutionalizing emissions reduction efforts, employee engagement, emissions reductions before offsetting and reducing Scope 3 emissions across the value chain.

The second research question was what climate actions corporations engage in in practice, and to evaluate them against best-practice criteria. To conclude, the companies fulfill a large number of the optimal set of climate actions, but a considerable amount of categories in the typology remains insufficiently covered.

In the following, I will expand on how the results for RQ1 and RQ2 lead to the main conclusions.

5.1.1 Inferring the answer for RQ1 from the results

Concluding the results for RQ1, political advocacy for emissions reductions is a type of effective climate action. In this context, businesses participate in negotiations over government policy, whereas trade associations play an essential role in influencing the political agenda of these climate negotiations.

Also, investments must match with climate change considerations to make a meaningful contribution to business climate action.

Moreover, companies need to adapt their corporate culture and values towards achieving a low-carbon future and create business models that are aligned with emissions reductions. I aggregated this under the climate action type 'institutionalizing emissions reduction efforts'.

Furthermore, businesses should develop their employees' climate action skills through training, and create incentives for reducing corporate emissions. Already in the recruitment process human resource managers should look for sustainability skills.

Additionally, meaningful climate action means only using carbon offsets for unavoidable emissions.

Finally, not only Scope 3 emissions that are site-specific should be reduced, but also those that arise upstream and downstream.

Altogether, the 6 types of corporate climate action are political advocacy, investments, institutionalizing emissions reduction efforts, employee engagement, emissions reductions before offsetting and reducing Scope 3 emissions across the value chain.

5.1.2 Inferring the answer for RQ2 from the results

To outline how I derived the conclusion for RQ2, I will first assess the categories under *mitigation*. Evaluating the *consumer* role, two thirds of the 1.5C Businesses need to specify their *offsetting strategy*. Moreover, they have to *stop seeing carbon credits as a long-term strategy* and *push their suppliers to set SBTs*. However, the majority of businesses fulfill this role well when it comes to *ensuring that products and partnerships do not serve bad climate actors* (71%, see table 4 and figure 2) and *institutionalizing emissions reduction efforts* (95%). Besides, I draw the conclusion that it is generally realistic for them to accomplish their SBTs.

Furthermore, the majority of the 1.5C Businesses adequately act as *role models by setting new standards in the industry or for their consumers* (90%).

Overall, the role as *citizens* is reasonably covered by over two thirds of the 1.5C Businesses. Trying to *push trade associations to align* through strategic partnerships connected to the environment is the category under *citizen* that is covered the most (62%). However, it is also important to understand that one fourth of the 1.5C Businesses engage exclusively in this realm of political advocacy, failing to engage with governments on climate concerns and also neglecting the transformative power of lobbying.

Moreover, as table 4 clearly shows, the businesses do not fulfill their *investor* role well. Nearly 90% of the businesses do not at all address fossil fuel divestment, or not sufficiently.

Generally evaluating the role of companies as *organizational participants*, I can conclude that all of the 1.5C Businesses have taken a long-term lens on their ESG strategies and 90% are *reporting according to proper environmental disclosing standards*. Three quarters ensure that their *board has the necessary competence to establish an adequate climate leadership* and the majority of businesses ensures that *all parts of the business are addressed through the environmental strategy*. *Employee engagement* is considered by a sufficient share of the 1.5C Businesses (67%), but only half see the potential impact that every person in the company can have on climate action. However, corporations need to draw consequences of the climate emergency and start *phasing out the parts of the business that are incompatible with climate action*.

Finally, the assessment for *adaptation* shows that all the 1.5C Businesses fulfill this type of climate action.

To conclude, first steps of the leadership transformation are visible that are needed for a low-carbon future, but a lot of work remains to be done. It is also important to keep in mind that the 1.5C Businesses represent the best in class regarding the setting of climate targets. Therefore, it can be expected that the average performance of U.S. businesses is far behind these 21 frontrunners.

5.2 Agreement with the literature

This section evaluates how far the findings agree with the literature.

5.2.1 Comparison of results for RQ1 with elements of the corporate climate action typology

This paragraph shows which specific elements of the results for RQ1 can be found in the business climate action typology. (for an overview of the results for this analysis see appendix 2) The 6 types of climate action defined through the literature review are marked in bold in the following section, to make the allocation easier.

Firstly, **political advocacy** corresponds to the categories *using influence to advocate for climate policy at all levels of government, aligning political contributions* and *pushing trade associations to align*.

Secondly, **investments** for business climate action can be found in the categories *pushing banks and asset managers to align investments with the Paris Agreement* and *having a specific plan to divest from fossil fuels*. However, the typology does not cover internal investments and research focusing on energy efficiency and renewables, which the results for RQ1 suggest.

Thirdly, that companies should **institutionalize emissions reduction efforts** is specifically covered in the typology. This role for corporate climate action is additionally included in the categories of *employee engagement for climate action, embedding climate considerations into every part of the business, phasing out parts of the business that are incompatible with climate action* and *valuing long-term thinking*.

Moreover, **employee engagement** for climate action is covered through a specific category in the typology, together with *creating pathways for every job to be a climate job*.

The element of **offsetting** corresponds to the category *using carbon removal technology as a last resort and only for unavoidable emissions*.

Lastly, elements of the section on **reduction measures for Scope 3 emissions** can be found in the categories of *ensuring products and partnerships don't serve bad climate actors*, and *achieved Scope 1 and 2 emissions reductions*.

Overall, every element of the results for RQ1 can be found in one or more categories in the typology. Therefore, the developed framework to answer RQ2 matches with what the literature suggests.

5.2.2 Agreement of findings for RQ2 with the literature

I now discuss which results for RQ2 are in alignment with the literature.

Focus on low-impact climate actions

To start, that companies prioritize low-impact climate actions over measures with high transformational potential seems to be an issue both mentioned in the literature and found in this study. Christiansen et al. (2023) looked under the surface of corporate net-zero pledges by applying a discourse analysis on the food chain MAX Burgers AB, which is described as “a pioneer in corporate climate action” (p. 80). This judgment is based on the MAX Burgers AB’s pledge that it “removes more carbon from the atmosphere than it emits” (Christiansen et al., 2023, p. 80). However, Christiansen et al. (2023) found that “MAX is pushing non-transformative solutions, such as offsetting and voluntary corporate action, while shifting responsibility for climate action onto others, such as consumers and smallholder farmers in the global South” (p. 79).

This finding is in alignment with the results of this thesis. Pro-climate political advocacy has a bigger transformational potential than actions taken voluntarily according to Christiansen et al. (2023). However, while almost all of the 1.5C Businesses fulfill the category *engagement and support of local communities*, almost one third does not at all engage in political advocacy for climate action. Also, only 34% *advocate for climate policy at all levels of government* and merely 24% provide concrete examples of their climate-related activities that *are consistent with their political contributions*.

Additionally, it becomes apparent from the results that the 1.5C Businesses rather engage in political advocacy that is connected to their core business, where changes are unavoidable if they want to stay competitive.

The role of carbon offsetting

Companies often do not specify the role that carbon offsetting plays in reaching their net zero commitments, which is an indicator for greenwashing SBTs (Christiansen et al., 2023; Hale et al., 2022). Research found that a lot of net-zero commitments do not include specific information to what extent carbon credits are used (Christiansen et al., 2023). An example is a study by Hale et al. (2022) which examined the net zero pledges of more than 4000 countries, governments and corporations and concluded that half of the businesses with net-zero pledges did not explain whether their strategy included offsetting. Again, I can draw a parallel to the results in this thesis, since almost half of the 1.5C Businesses do not explain their carbon offsetting strategy in their ESG reports. In line with Hale et al. (2022), I interpret that those 50% do not seem to strive for actually drawing down their emissions.

A concrete example from the 1.5C Businesses where a company apparently makes up its net zero status mostly by purchasing carbon credits is Nasdaq, Inc.. The financial service provider has set offsetting as a focus area in its climate strategy through purchasing a “majority stake in Puro.earth, the world’s first marketplace to offer industrial carbon removal instruments that are verifiable and tradeable through an open online platform” (Nasdaq, Inc., 2021, p. 4). Nasdaq, Inc. (2021) also emphasizes its net-zero status for the fourth consecutive year through advertising its leading role in ESG efforts. However, it is not publishing any concrete information on its achieved emissions reductions in its ESG report. Thus, it seems likely that most of its emissions reduction accomplishments come from offsets rather than real reductions.

Furthermore, it becomes apparent that some businesses claim to have reached net zero while their emissions keep increasing considerably. This is only possible if large parts of the net zero pledge depend on offsetting. Companies thereby miss the point of setting SBTs. This is the case both for the 1.5C Business Etsy and the firm MAX Burgers AB. They both claim to have reached net zero, but this is based to a large extent on offsetting, while emissions have recently been rising significantly (Christiansen et al., 2023; Etsy, 2021). In both cases this trend is due to business expansion and it is expected to continue (Christiansen et al., 2023; Etsy, 2021).

Moreover, even though the SBTi acknowledges that actors can only influence their Scope 3 emissions to a certain extent (Gieseckam et al., 2021b), it is no valid excuse to say that they are primarily beyond their control. Among the 1.5C Businesses, Etsy (2021) is one actor that claims this. As the WRI & WBCSD (2004) clarify, the category of Scope 3 emissions is important because it puts those who generate emissions into a wider context to each other. A company’s Scope 3 emissions are accounted for by another company as Scope 1 emissions for its produced products and services.

Therefore, it is a company's responsibility to work with suppliers on creating clear pathways to reduce their Scope 1 emissions which will draw down the company's Scope 3 emissions. Corporations must start seeing their activities in context to other actors globally, to make their efforts towards net zero effective. All this suggests that companies prefer to focus on climate actions that are not transformative.

Voluntary character of emission reduction target setting and progress reporting

A further concern that limits the potential effectiveness of current business climate action is its voluntary nature. The SBTi has only limited options to sanction companies that do not comply with its target setting rules or that do not actually aim at achieving their targets (Christiansen et al., 2023; Gieseckam et al., 2021b). No mandatory reporting framework or government regulation exists and the SBTi only **recommends** that companies should state where they report their progress, if they do so (Gieseckam et al., 2021b).

Moreover, expanding the range of companies that participate in voluntary climate action initiatives seems unrealistic, given the fact that the vast majority of those businesses that set emissions reduction targets are already engaged in ESG measures and have a GHG management system in place (Gieseckam et al., 2021b).

Therefore, some experts demand regulations for setting corporate emission reduction targets and businesses' compliance towards those (Christiansen et al., 2023; Gieseckam et al., 2021b).

5.3 Using the climate strategy as a warranty to continue business as usual

Etsy uses its climate strategy and communication with its customers to justify business as usual. The company has a considerably different climate strategy than the other 1.5C Businesses. It sees economic development as the most effective lever to improve equity globally, and has shaped its corporate strategy around this which it sees as its contribution to global sustainability (Etsy, 2021). This is also used to justify its high share in Scope 3 emissions, as entrepreneurs around the world can only benefit from this system if their products can be delivered around the globe (Etsy, 2021). The solution that is put forward to drive down carbon emissions depends completely on a large-scale systemic change in the long term (Etsy, 2021).

It becomes apparent that in their communication with buyers Etsy also presents offsetting as a meaningful climate action. Its planned sustainable shopping initiative sheds a positive light on purchasing activities, while the message that is conveyed does not go as far as to advocate for emissions reductions. Instead, it makes offsetting seem as a sufficient climate action, obscuring its low transformational potential. The initiative is planning on showing the positive impact that buyers make when shopping through the retail company's platforms, which should also create an incentive for sellers to increase their sustainability efforts (Etsy, 2021). The information will focus on the support buyers provide for small businesses, the amount of emission offsets is calculated, and the extent of the contribution to Etsy's green fund is shown (Etsy, 2021).

Through this, a warranty for business as usual is created.

5.4 Net-zero as a concept

Net zero pledges should be treated with caution. Barron et al. (2021) studied 21 higher education institutions in the U.S. that stated to already have reached net zero in 2020. They found that only 23% of emissions were actually reduced, while the remaining 77% could only be included in the carbon neutrality claims through accounting adjustments, which were in line with current accounting regulations. This shows that a big part of environmental reporting depends on accounting, which invites actors to focus on optimizing this instead of actually reducing emissions.

Offsetting is also an accounting scheme that tends to be used to optimize a climate performance claim (Barron et al., 2021). Here the actual goal of reducing emissions can be lost in an effort to 'neutralize' current emissions.

Various offset options have even been shown to greenwash or use insufficient accounting measures (Timperley, 2021). It is important to note that in practice, the majority of carbon removal credits currently on the market are generated from nature-based projects located in the global South, which is why concerns are raised about offsetting to evoke an unprecedented trend for land grabbing and greenwashing (see ActionAid International, 2021; Corporate Accountability et al., 2021; FOEI, 2021; Sen & Dabi, 2021). According to Woerd et al. (2005), several offsetting approaches including afforestation, hydropower, and biomass-generated electricity, could have a considerably harmful impact on biodiversity and might even lead to a net rise in carbon emissions if not appropriately managed.

Some offsetting programs are also unrealistic. ActionAid International (2021) found that the petrol company Shell alone would have to plant so many trees through its carbon offset strategy that they would cover an area as large as three times the size of the Netherlands. Hence, Dooley et al. (2022) warn that these nature-based offsetting strategies could demand carbon removals that far exceed planetary boundaries and jeopardize food production and biodiversity protection. Therefore, to ensure that climate targets are fair and realistic, actors should for instance justify whether global net-zero emissions could still be achieved if all actors followed the same plan in their target-setting, and take into account what the potential impacts on others might be (Rogelj et al., 2021).

Another problem is that emissions reductions and carbon offsetting are often used interchangeably (Christiansen et al., 2023). Therefore, McLaren et al. (2019) suggest that targets for emissions reductions and carbon offsetting should be set separate from each other, to avoid that the concepts are interpreted as the same. Setting specific targets like 90% emissions reductions makes clear that only a small fraction of net zero can come from offsets, even in the most optimistic scenarios.

Europe may be leading compared to the U.S. regarding the reformation of Green Claims. In March 2023, a proposal to regulate statements towards consumers regarding the environmental benefits of a company's products or services was adopted by the European Commission (2023). Under this directive, companies have to back up voluntary green claims with evidence that fulfill EU criteria, to make it easier for consumers to make informed product choices (European Commission, 2023). Additionally, used offsets will have to be reported separately from GHG emissions and businesses will have to specify the difference between emissions reductions and offsets in their labeling (European Commission, 2023). This shows that the U.S. is apparently not the leader when it comes to government policies on climate action.

5.5 Generalization of findings

Overall, this analysis raises serious concerns about the state of business climate action. The findings of this study cannot directly be generalized, for I only focused on the 21 best in class companies for the U.S. that have their emission reduction targets approved by the SBTi. The picture of the state of the art of climate strategies could look quite different in other regions. However, the following generalization can be drawn: If ‘best practices’ already miss a considerable number of points of an ideal set of climate actions, how would this look for other companies that set less ambitious SBTs, or no goals at all?

5.6 Limitations of this study

This study has limitations through its specific character and the type of data that was used to answer RQ2. I exclusively analyzed best practices from the U.S.. It is possible that companies in other regions engage more in climate action or perform better. However, as outlined before, I set this scope because the U.S. is the second largest emitter of CO₂ globally, which makes it vital that they reduce emissions rapidly.

Additionally, I based my analysis on ESG reports, trusting that data is correct and complete. However, it is important to note that ESG reports serve communication purposes. Companies present themselves in the best light, for one of the target groups of ESG reports are companies’ investors. Therefore, weak spots in the climate performance and strategy might be embellished or negative impacts played down.

Besides, my positionality played a role in the coding. To decide whether a category was fulfilled by a 1.5C Business or not, I needed to set very clear definitions for each category, see table 3. These definitions were not provided by the Drawdown framework (Project Drawdown, 2023b), nor could I use Nielsen et al.’s (2021) definitions after I had translated the 5 roles for individuals to roles for businesses. Moreover, coding only as “fulfilling the category” or “not fulfilling the category” narrows down the flexibility of evaluation. This constraint is clearly visible in the category *require suppliers to adopt science based emissions reductions targets*, where I made the decision to include a third evaluation option, colored in yellow in table 4. Here I made the decision to acknowledge the company’s efforts to work with their suppliers, even if they do not fulfill the category per se.

5.7 Speculation about other conclusions

The results provide insights into possible future developments. Many companies are in the process of starting to integrate an accounting system for their Scope 3 emissions and to work with their suppliers to reduce emissions, as the analysis showed. Perhaps in the near future this will give them better opportunities to reduce Scope 3 emissions, and also more businesses will require their suppliers to set SBTs.

However, if emission reduction initiatives keep their voluntary character and all actors set their targets to reach net zero individually, global emissions may not be reduced in the necessary pace to avert catastrophic climate change (Bhanumati et al., 2022).

5.8 Implications for future research

Future research could compare the findings in this study to climate strategies of companies in other regions of the world and evaluate which approaches are more successful in achieving emissions reductions. Also, interviews with different actors within companies would make it possible to dive deeper into internal mechanisms around business climate action. Moreover, it would be insightful to go further into the category of political engagement, for being an important leverage point for climate action. What drives businesses to engage in climate policy, and what are barriers to this? Lobbying could also be a focus area for future research, following money flows to see how many businesses in the U.S., that have set SBTs, are still involved with the fossil fuel industry.

6 Conclusion

To stabilize global warming at 1.5°C, CO₂ emissions around the world have to reach near zero and remaining emissions must be removed to achieve net zero. Corporations have a substantial role to play in this transformation, but they currently do not live up to it sufficiently.

Leading companies with approved SBTs are largely applying incremental solutions, the majority focusing on voluntary actions like supporting local communities and acting as role models rather than high-impact actions like divesting from fossil fuels or engaging in political climate advocacy. For various companies, political engagement towards emissions reductions seems only necessary when their core business is threatened if they do not start reaching out beyond the boundaries of their own activities.

Half of the 1.5C Businesses do not seem to strive for reducing the majority of their emissions, leaving it uncertain to what extent their net zero goal relies on offsetting. Concerning is also that the majority of companies stick to business as usual, not ready to phase out the elements of their corporate strategy that cannot be aligned with a low-carbon future.

The main topics that most businesses seem to take seriously are ensuring a climate-competent leadership and engaging employees for climate action. Also, 95% of the 1.5C Businesses have integrated emissions reduction efforts in their main operations and business practices.

Overall, findings from this analysis cannot be generalized, but they give reason for concern about the current state of corporate climate action. If the best in class fail to align their climate strategies with what is necessary to stay within a 1.5°C trajectory, then the average corporate engagement in climate action can be expected to be far below that.

The voluntary character of setting SBTs and the limited levers to pressure companies towards compliance have to be addressed (Christiansen et al., 2023). If no stop is put to making empty net zero claims, it is possible that businesses embellish themselves with climate commitments that seem to be forward-thinking for many years on, obscuring the fact that only actual emissions reductions will enable us to avert catastrophic climate change (Christiansen et al., 2023).

Clearly companies must step up their climate action game drastically.

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8. Appendix

8.1 Appendix 1: Results for the evaluation of the current state of emissions reduction efforts

Appendix 1. Results for the evaluation of the current state of emissions reduction efforts for the analysis in chapter 4.2.1.1.2. (own creation). The table columns show level 3 of the climate action typology that I created for this thesis based on (Nielsen et al., 2021; Project Drawdown, 2023b). A row for the category index was included to indicate that for this analysis only the achieved emissions reductions for Scope 1, 2 and 3 emissions are relevant, and the respective columns for categories 15, 16 and 17 are added. To evaluate the current state of emissions reduction efforts 2 columns were added at the end. The coding of each element is explained in the table itself. Color code: all elements in green that fulfill level 4 of the 4-stage framework to evaluate the stage of progress on ESG efforts. Color yellow only used for highlighting.

					evaluation of stage of progress on ESG efforts (Scope 1,2 emissions)	evaluation of stage of progress on ESG efforts (Scope 3 emissions)
	level 3: category index	15	16	17		

	level 3: inspired by the Drawdown- aligned business framework	scope 1	scope 2	scope 3	4 stages outlined, how far companies are in their ESG efforts: 1. develop sustainability programs 2. have a ESG strategy that is implemented 3. can measure impact of ESG strategy 4. be able to optimize ESG strategy based on what was measured (Google Cloud & The Harris Poll, 2023)	
<p>organizations from SBT database with the goal of reaching net-zero emissions before 2050, with SBTi approved reduction target</p>	<p>AECOM</p>	<p>"reduced Scope 1 and 2 emissions, covering fleet and office energy respectively, by 47% from our FY18 baseline year" SBT database</p>		<p>Supplier Engagement Strategy started, with request for information from suppliers; "Travel with Purpose guidance, prioritizing digital tools instead of travelling: substantial reduction in operational travel" SBT database; "Initiated work on our own pilot natural climate solution projects for carbon sequestration." https://publications.aecom.com/sustainable-</p>	<p>4, emissions progress was measured</p>	<p>2, because they only started to request information on Scope 3 emissions from suppliers</p>

			legacies/achieve-net-zero-carbon-emissions		
	American Axle & Manufacturing, Inc.	"reduction in emissions intensity of approximately 38% and similar reductions in energy usage and water consumption." p. 11	not mentioned	4, emissions progress was measured	not specifically mentioned whether progress was measured
	Beautycounter	currently 57% of packaging is "recycled, recyclable, refillable, reused, or compostable"; "Achieved zero net emissions at HQ and retail locations ... Verified the accuracy of our Scope 1, 2, and 3 emissions. Continued to source packaging closer to home"	"Verified the accuracy of our Scope 1, 2, and 3 emissions."	4, to be able to state that they have achieved net zero, they have to have measured their emissions. However, do not publish concrete emission reduction achievements	4, to be able to state that they have achieved net zero, they have to have measured their emissions

	Boston Scientific Corporation	<p>“68% reduction in greenhouse gas emissions since 2009 (Scope 1 and 2)” p. 11</p> <p>distribution centers in Quincy, Massachusetts and Kerkade, Netherlands:</p> <p>"Since 2011, Boston Scientific has reduced packaging during shipping by 30% in Kerkrade. In Quincy, we have reduced packaging during shipping by 27% since 2020.” p. 46</p>	<p>“Increased renewable electricity use to 73% and decreased carbon footprint to 52.3k metric tons. Our 2021 goals were 70% and 55.0k metric tons, respectively.” p. 8</p> <p>“38% of all energy used at Boston Scientific facilities from renewable sources, on track to meet our interim goal of 90% by 2027” p. 40</p>	<p>no, reduction plan for Scope 3 emissions remains inconcrete. Only reduction of emissions from shipping thorough more efficient packaging is mentioned</p>	4	<p>as reduction plan for Scope 3 emissions remains inconcrete. Only reduction of emissions from shipping thorough more efficient packaging is mentioned</p>
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	Brooks Running	<p>“61% of total polyester yarn is recycled yarn, an increase from 52% in 2020”; p. 4 “The result is 2,400 metric tons less in carbon emissions than if we continued to use conventional polyester.” p. 29; “59% of total nylon yarn is recycled yarn, an increase from 3% in 2020” p. 37; Dope dyeing instead of conventional dyeing: “ uses approximately 92% fewer carbon emissions, 94% less water, and results in a 99% reduction in energy</p>	reduced energy consumption through change to recycled materials, see achieved Scope 1 emissions	13% Scope 3 emissions reductions from a 2018 baseline year, but due to a methodology change of calculating Scope 3 emissions. in 2021 they increased by 3 %. Introduced the Higg Material Sustainability Index (Higg MSI) which is a “industry-standardized lifecycle assessment tool that calculates the environmental impact of materials”	4	4
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		consumption contrasted to batch dyeing methods.” p. 32 - > piloting fall 2023				
	Cisco Systems, Inc.	“From fiscal 2017 through the end of fiscal 2022, we invested approximately US\$60 million to execute hundreds of energy-efficiency projects across our operations and achieved our previous goal to reduce Scope 1 and 2 emissions by 60 percent (compared to fiscal 2007 base year).” p. 49	“Sourced 89% renewable energy for our operations” p. 5	22% scope 3 emissions reductions	4	4

	Colgate Palmolive	"cut greenhouse gas emissions [in operations] by 38%"	energy reduction in operations by 37%	"about 80% of our environmental footprint occurs when people use and dispose of our products Our Save Water campaign encouraging people to turn off the tap when brushing has contributed to the avoidance of approximately 206 billion gallons of water since 2016, plus 10.8M metric tons of greenhouse gas emissions from the energy needed to treat, heat and pump water. " p. 3	4	not specifically mentioned whether progress was measured
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	Cushman & Wakefield	<p>“8.6% absolute reduction and 13% reduction per million square feet in scope 1 and 2 (market-based) emissions” p. 6; “13% reduction in total scope 1 and 2 (marketbased) emissions per million square feet of office space.” P. 71</p>		<p>so far only “Measurement of relevant scope 3 categories” p. 6</p>	4	4
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	CVS Health	<p>“From 2014 through 2020, we have reduced combined scope 1 and 2 emissions 33.7 percent”</p> <p>https://www.cvshhealth.com/impact/healthy-planet/climate-action/task-force-on-climate-related-financial-disclosures.html;</p> <p>“Between 2019 and 2020, market-based Scope 1 and 2 emissions decreased by 4.3 percent. The reasons for emissions reductions included reduced use of office space due to COVID-19,</p>	see above	not mentioned	4	not specifically mentioned whether progress was measured
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		<p>reduction in air travel, as well as our investment in emissions reduction initiatives, such as building operations (Building Management System and LED lighting projects)”</p> <p>https://www.cvshhealth.com/impact/healthy-planet/climate-action/task-force-on-climate-related-financial-disclosures.html</p>				
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	Etsy Inc.	<p>“In 2021, we reduced our Scope 1 and 2 emissions by 66%” p. 22</p>	<p>100% renewable electricity in operations in 2021; Change to google cloud services: “ We achieved a 27% reduction in total energy use from computing between 2018 and 2021, despite substantial growth in our business over the same time period.” p. 30; “In offices where Etsy.com maintains operational control, we achieved a 45% reduction in energy intensity (kWh per square foot) across our</p>	<p>“Scope 3 emissions increased by 252%, each from a 2019 baseline. The most significant drivers of our Scope 3 emissions are largely outside of our control, such as the shipping our sellers do directly to our buyers. That’s why our reduction levers for this goal are long-term and systemic in nature. While we begin to activate these levers, in the near-term we still expect to see an increase in emissions as our business grows” p. 22</p>	4	4
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			global operations based on a 2016 baseline” p. 23			
Hewlett Packard Enterprise Company	“Reduced our Scope 1 and 2 emissions by 16%” p. 7	“In 2021, 54% and 45% of our electricity in the Americas and in Europe, respectively, were renewable” p. 32	not started yet: “Progress on our Scope 3 target will be reported starting from FY2022 “ p. 7	4		3, have not started to report them yet
Illumina Inc.	“24% reduction of global carbon emissions from our direct operations (Scope 1 and 2)” under 2019 baseline year p. 4	In 2022 “59% of global electricity consumption came from renewable sources” p. 4	Reduced Scope 3 emissions by 36% (“purchased goods and services, capital goods, upstream transportation and distribution, business travel, employee commuting, and investments” p. 40)	4		4

	Jacobs	"reduced our carbon emissions by 45% since 2019" p. 3; Achieved Net Zero for operations	"100% low-carbon electricity" p. 4	Achieved Net Zero for business travel	4	only mentions having achieved net zero in business travel, which is focus area of Scope 3 emission reduction strategy (introduced internal carbon pricing scheme for this), other Scope 3 categories not mentioned
	JLL	Scope 1 emissions reduction of 9% "In 2021, emissions from our vehicle fleet decreased by 8% compared to our 2018 baseline. This reduction was mainly achieved through reduced operation of our fleet during the global pandemic." p. 35	Scope 2 emissions reduction of 35%, with a 2018 baseline year	Scope 3 emissions rose by 15% "over 96% of our emissions arise from the consumption in those buildings we manage on behalf of our clients." p. 33	4	4

		<p>“In 2021, emissions from our office portfolio decreased by 26% compared to our 2018 baseline.” p. 35</p>				
	Kearney	<p>70% overall emissions reduction in 2021, with a 2019 baseline year; “Carbon neutral since 2010” p. 10; Scope 1 emissions rose 22% in 2021.</p>	<p>“85% renewable energy usage in offices” p. 10; Scope 2 emissions rose by 130% in 2021 “driven largely by improved data collection and extrapolation in the categories of office heating and cooling” p. 43</p>	<p>In 2021 Scope 3 emissions had decreased by 13% since 2020 due to a reduction in business travel</p>	4	4

	Milliken & Company	Scope 1 emissions reduction by 13% with 2018 baseline year	Scope 2 emissions reduction by 32% with 2018 baseline year; The goal of increasing renewable energy use to 100.000 MWH has been achieved by 98% in 2021	scope 3 emissions: 1,624,473 MT CO2e, thereof 19,512 MT were offset	4	4
	Moody's Corporation	92% reduction in Scope 1&2 emissions in 2021, with 2019 baseline year	100% renewable electricity achieved in 2020	95% Scope 3 emissions reduction "from fuel and energy-related activities, business travel and employee commuting" p. 30; "implement an Internal Carbon Fee of USD \$50 per metric ton (mtCO2e) on business travel emissions" p. 31	4	4

	MSCI Inc.	75% Scope 1 and 2 market emissions reductions from 2019 to 2021, 17% emissions reductions from locations	see above	2% Scope 3 emissions reduction from 2019 to 2021	4	4
	Nasdaq, Inc.	“achieved carbon neutrality for the fourth year in a row” p. 4; “63% of office space within a Green-certified building and 19% of office spaces certified as Green” p. 13	86% of renewable energy use in 2021	“Scope 3 GHG related to travel decreased nearly 53% in 2021” p. 28	4	4

	Philip Morris International	“Reduced total value chain CO2 e emissions (scope 1+2+3) by 11% and emissions from direct operations (scope 1+2) by 39% versus 2019” p. 23	87 “percent of electricity used and purchased in our factories derived from renewable sources” p. 140	“Our 2022 data reflect an 8 percent decrease in our overall scope 3 GHG emissions versus our 2019 baseline” p. 144; 86% of IQOS devices are being returned to the company’s recycling hubs	4	4
	T-Mobile USA, Inc.	“By the end of 2021, combined absolute scope 1 and 2 GHG emissions decreased by 97.1% since 2016” p. 54	“By the end of 2021, we sourced 100% of our electricity from renewable energy” p. 54	“16% reduction in scope 3 emissions per customer from 2016 levels” p. 53	4	4
share of category fulfillment	fulfilled				level 4 for Scope 1,2,3: 17 -> 81%	
	partly fulfilled					

share of companies that state a clear Scope 1,2 or 3 emissions reductions achievement					86%	48%
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8.2 Appendix 2: Results for the comparison of results for RQ1 with elements of the corporate climate action typology

Appendix 2. Results for the comparison of results for RQ1 with elements of the corporate climate action typology (own creation, based on the climate action typology that I created from this thesis is based on (Nielsen et al., 2021; Project Drawdown, 2023b)). Table 3 was adjusted to only show the 3 levels of the typology with their respective categories, and 2 columns were added to include the ‘results for RQ1 that correspond to categories of the business climate action typology’ and the ‘corresponding role for business climate action from results for RQ1’. To provide a better resolution, the orientation of the page is ‘landscape’ and the table is split into 3 parts, horizontally divided, but should be considered as a whole.

level 1	level 2: from Nielsen et al. 2021	level 3: inspired by the Drawdown-aligned business framework	results for RQ1 that correspond to categories of the business climate action typology	corresponding role for business climate action from results for RQ1
MITIGATION	role model	function as role model in creating new norms		
	citizen	use influence to advocate for climate policy at all levels of government	engagement in government policy negotiations (Woerd et al., 2005)	Political advocacy (see chapter 4.1.1)
	<i>lobbying and engaging with governments on climate concerns through applying their influence</i>	align political contributions	engagement in government policy negotiations (Woerd et al., 2005)	Political advocacy (see chapter 4.1.1)
		focus lobbying dollars on just climate solutions		
		push trade associations to align	Trade associations play a significant role in shaping the perception of the corporate role in addressing climate change (Woerd et al., 2005)	Political advocacy (see chapter 4.1.1)
		pioneer work for climate action		

	consumer	stated climate goals		
	<i>how companies incentivize green consumption</i>			
		overall goal		
		scope 1 and 2 (reducing own emissions)		
		scope 3 (work with supply chain)		
		ensure products and partnerships don't serve bad climate actors	"development of sustainable products [and] business models" (Global Compact Network Germany, 2017, p. 71)	Reduction measures for Scope 3 emissions (see chapter 4.1.6)
		require suppliers to adopt science based emissions reductions targets		
		achieved emission reductions		
		scope 1	"[the] use of alternative packaging materials" (Global Compact Network Germany, 2017, p. 71)	Reduction measures for Scope 3 emissions (see chapter 4.1.6)
		scope 2		
		scope 3	upstream measures for Scope 3 emissions include "travel guidelines, emissions reduction projects with suppliers" (Global Compact Network Germany, 2017, p. 71)	Reduction measures for Scope 3 emissions (see chapter 4.1.6)
		phase out use of offsets		
		use carbon removal technology as a last resort and only for unavoidable emissions	offsetting to only be used as a last resort for emissions that cannot be reduced otherwise (Global Compact Network Germany, 2017)	Offsetting (see chapter 4.1.5)
		institutionalize emissions reduction efforts	create business models that are aligned with emission reductions (Global Compact Network Germany, 2017)	Institutionalize emission reduction efforts (see chapter 4.1.3)
		embed climate justice		

	investor	climate-friendly retirement plans and investment opportunities for employees		
	<i>how companies provide green investment opportunities and use their influence towards divestment from fossil fuels</i>	push banks and asset managers to align investments with the Paris Agreement	align their external investments with climate change considerations (Woerd et al., 2005)	Investments (see chapter 4.1.2)
		pressure insurance companies to stop underwriting and investing in carbon-intensive projects		
		stated goal/specific plan to divest from fossil fuels	align their external investments with climate change considerations (Woerd et al., 2005)	Investments (see chapter 4.1.2)

	professional/orgs ("organizational participant")	publicly disclose climate-related risk and support mandatory disclosure standards		
	<i>people participating in organizations "as owner, manager, board member, employee and consultant" (Nielsen et al., 2021, p. 1014), is what enables businesses to engage their stakeholders in climate action</i>	engage employees on climate action	internal emissions reduction targets (Woerd et al., 2005); develop sustainability skills through employee training, create incentives, point out employee benefits for green behavior and include sustainability in performance assessments (Zacher et al., 2023)	Institutionalize emission reduction efforts (see chapter 4.1.3) and Employee engagement (see chapter 4.1.4)
		create pathways for every job to be a climate job	look for sustainability skills when hiring (Zacher et al., 2023)	Employee engagement (see chapter 4.1.4)
		ensure the board is climate- competent		
		embed climate considerations into every part of the business	adapt its corporate culture and values (Global Compact Network Germany, 2017)	Institutionalize emission reduction efforts (see chapter 4.1.3)
		phase out part of the business that are incompatible with climate action	adapt its corporate culture and values (Global Compact Network Germany, 2017)	Institutionalize emission reduction efforts (see chapter 4.1.3)
		value long-term thinking	In order to ensure their long-term competitiveness, sustainability considerations have to be incorporated into all technology innovations (Bollinger & Neukam, 2021; Neukam & Bollinger, 2022)	Institutionalize emission reduction efforts (see chapter 4.1.3)
ADAPTATION		increase resilience	engage and support local communities	
	recover from disasters	donate money or resources to disaster areas		