

An EDHEC-Risk Climate Impact Institute Policy Contribution

Scope for Divergence

A review of the importance of value chain emissions, the state of disclosure, estimation and modelling issues, and recommendations for companies, investors, and standard setters

March 2024



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Executive Summary

Climate change action has reached a critical juncture. Whilst a significant majority of the global population appears to support such action (Andre et al., 2024), influential interest groups have launched extremely successful campaigns against climate-related regulation on both sides of the Atlantic.

Increased advocacy from investors for the disclosure of value chain emissions, coupled with debates on their incorporation into the reporting requirements for publicly traded companies by the U.S. Securities and Exchange Commission (SEC), has provoked a significant backlash. Despite overwhelming investor support and a strengthening global regulatory consensus on the necessity of value chain emissions disclosure for making informed investment decisions, the SEC chose to omit these disclosures from its March 2024 rules aimed at enhancing and standardising climate-related information for investors.

Opponents of mandatory disclosure argue that it could prove unfeasible or exorbitantly costly for reporting companies, and that the administrative burden would spill over to small businesses in the value chain. They contend that the current availability, quality, and verifiability of data sources, alongside the immaturity of estimation methodologies, could yield inherently inaccurate estimates with limited practical value or significance. While these criticisms may be biased, they highlight significant potential shortcomings in emissions estimation and reporting that companies, investors, and regulators must consider. This contribution delves into the significance of value chain emissions and identifies challenges in emissions accounting and their implications for current and future reporting landscapes. It explores the difficulties associated with third-party estimation of value chain emissions, and offers specific recommendations for companies, investors, and policymakers.

Thousands of organisations worldwide compile greenhouse gas emissions inventories adhering to the Corporate Standard established by the Greenhouse Gas Protocol at the beginning of the century. The Corporate Standard classifies an organisation's emissions into direct emissions from sources owned or controlled (Scope 1 emissions), indirect emissions from purchased electricity, steam, heat, and cooling (Scope 2 emissions), and other indirect emissions that occur throughout the organisation's value chain (Scope 3 emissions). Whilst large industrial firms may physically measure some direct emissions, emissions are typically estimated by combining activity data with emissions factors, estimates of emissions per unit of activity. The methodology for estimating emissions remains consistent across scopes; however, the precision and specificity of the input data can vary.

Considering value chain emissions is essential for both reporting entities and investors, as these emissions make up the majority of corporate emissions. Reporting entities often have considerable influence on these emissions through upstream and downstream supply chain decisions, including product design. Far from being a mere distraction, the mapping of value chain emissions enables companies to identify emissions hotspots, prioritise actions for emissions and cost reduction, and manage exposure to climate-related transition risks and opportunities. The potential benefits from this exercise should

be underlined. Considering value chain emissions provides investors with a holistic view of the climate impact, risks, and opportunities of investee companies and may support more informed capital allocation and investment stewardship decisions. However, investors need to be cognisant that the issue of double-counting emissions within the value chain reduces the comparability of disclosures across companies and makes aggregation of value chain emissions to the portfolio level perilous.

Mandatory reporting of greenhouse gas emissions was introduced in the second half of the 2000s and initially focused on the direct emissions of high-impact sectors. The Paris Agreement accelerated the voluntary uptake of the Corporate Standard, which requires disclosure of Scope 1 and 2 emissions, and ushered in the generalisation of mandated disclosure to listed and large companies in multiple jurisdictions. Disclosure of value chain emissions, standardised by the Greenhouse Gas Protocol 2011 Corporate Value Chain Standard, has long lagged.

Estimating emissions from a variety of activities across global value chains admittedly poses significant challenges. To help companies prepare true and fair inventories in a cost-effective manner, the Value Chain Standard allows reporting entities to select inventory boundaries, data, and computation options suited to their capabilities, resources, and experience. Over time, companies can improve the accuracy of their data, the specificity of their estimation models, and expand the scope of their reporting. These challenges do not diminish the relevance of the exercise or the data it produces just as long as the flexibility of the Standard is not repurposed to undermine its objective of a true and fair inventory. However, whilst there has been a marked increase in the number of companies reporting value chain emissions in the recent past, voluntary reporting appears to have been driven by corporate expediency or 'strategic' considerations. Reporting remains sparse, incomplete, and insufficiently focused on material sources. Compliance with the Value Chain Standard being the exception, the available disclosures have limited practical value. The high regard afforded to reported emissions by certain regulators and standard setters is thus misplaced. Nevertheless, opposing mandatory reporting based on these data limitations confuses the symptom for the cause. The introduction of mandatory reporting frameworks, starting in the European Union from 2024 and accelerating in the second half of the decade, will significantly enhance not only the quantity but also the relevance and quality of the data produced by companies and in turn, allow for better estimation and modelling of value chain emissions. However, the Value Chain Standard is intended to help companies assert control over their emissions inventories and not to produce data that would support cross-corporate comparisons. In addition, efforts to increase the quality of value chain emissions inventories over time introduce volatility in reported data at the individual-company level. Reported data should be handled with extreme care by investors and will remain irrelevant for certain usages.

The current state and inherent limitations of value chain emissions disclosures should naturally lead investors to explore emissions estimation or modelling to avail themselves of more comprehensive, representative, and standardised data that could support a wide range of uses. Commercial datasets may include reported values, use them to calibrate

and run emissions estimation models, or disregard them altogether. Differences in data sources, estimation approaches, assumptions, and model calibration produce highly divergent values and low correlations across datasets. The degree of divergence is such that even rankings of emissions performance can be dramatically altered by the choice of dataset. In addition, each provider may rely on multiple proprietary models and model calibrations to try and produce representative and specific estimates and may update or upgrade its methodologies. Users of a dataset lack the transparency to understand whether differences in emissions for seemingly comparable companies stem from modelling and calibration choices, from variances in underlying corporate data, or from errors or omissions. For the same reasons, making sense of changes in the emissions of a given company over time is equally challenging. And while the dispersion of emissions values across companies appears to be reduced by modelling, the volatility of values across time remains to be tamed. In addition, issues of data availability and quality, processing costs, and methodological limitations conspire to limit the due consideration of corporate circumstances in the modelling of value chain emissions. While preferable to reported emissions in their current state, modelled emissions remain insufficiently specific to support fine-grain comparisons across companies. Progress in artificial intelligence could alter this but has so far delivered only marginal improvements.

7 Successfully addressing the challenges of value chain emissions requires a collaborative approach, whereby companies, investors, and policymakers work in concert to enhance the quality, relevance, and cost-efficiency of disclosures. Value chain emissions disclosure is becoming a standard ask of trade partners as well as capital providers and insurance underwriters. Companies should embrace value chain emissions accounting and reporting in line with the Value Chain Standard, as part of their sustainability and risk management strategies, and participate in sectoral and value chain initiatives to expedite learning, reduce costs, and enhance the quality and comparability of disclosures over time. Investors should continue to advocate for disclosure and management of value chain emissions but also need to recognise that the quality of reported and modelled data imposes severe restrictions on usage and puts them at risk. Investors must pay particular attention to emissions data quality due diligence and ensure that any use of value chain emissions data, including by third-party asset managers, is fit for purpose. Raw value chain emissions data are typically not fit for the purpose of asset selection, and portfolio construction driven by total emissions is thus inconsistent with promoting investee company-level efforts to mitigate their climate impact and related risks. Investors interested in the integration of climate change impacts, risks, and opportunities into portfolio construction and investment stewardship should consider alternatives to value chain emissions and could take inspiration from approaches and metrics used in net-zero alignment frameworks. Lawmakers and other standard setters should be wary of abetting greenwashing by endorsing or encouraging inappropriate uses of value chain emissions data. They should neither require, endorse, nor encourage the steering of capital allocation by targets and metrics that directly derive from investee-level value chain emissions, and they should ensure that voluntary disclosures of such targets and metrics are accompanied by appropriate caveats about data limitations. The forthcoming review of the Benchmark Regulation is an opportunity to realign the minimum standards of the

EU Paris-aligned and Climate Transition Benchmarks with the regulation's objectives and put an end to illegitimate claims about the impact of investment products tracking these benchmarks. Policymakers committed to delivering their countries' commitments under the Paris Agreement should introduce and enforce regulation supporting decarbonisation across the economy. As part of the effort, they should require organisations, starting with large entities, to produce standardised disclosures of emissions across all scopes, set emissions reduction targets, and produce ongoing reports on progress achieved and actions taken. To enhance the potential contribution of disclosures to the transition, governments should support the production and adoption of sector-specific guidance for emissions accounting, reporting, target setting, and transition plans, promote initiatives aimed at fostering cooperation across supply chains, and share information and tools to accelerate the adoption of best practices, lower costs, and protect small businesses from unnecessary or unreasonable data demands.

1. Introduction

The number of companies disclosing estimates of greenhouse gas emissions in their value chains is set to increase rapidly in the second half of the decade as mandatory climate reporting ramps up in key jurisdictions and more companies are enticed or pressured by capital providers, business partners, and customers to produce such estimates.¹

Value chain emissions are widely regarded as critical to understanding an organisation's climate-related impact and transition risks and opportunities.² However, the increasing investor advocacy for voluntary disclosure along with the potential of their incorporation within a U.S. Securities and Exchange Commission (SEC) climate disclosure rule,³ have faced both overt⁴ and covert⁵ opposition. This resistance has led to unprecedented backlash against the integration of sustainability issues into financial management.

Orchestrated by powerful interest groups around the oil and gas industry, the campaign against the consideration of Environmental, Social and Governance (ESG) factors has garnered considerable support from Republican lawmakers and law enforcers, while also attracting significant media coverage. Anti-ESG legislation,⁶ subpoenas, and hearings have disrupted the operations of institutional asset managers, while litigation threats have either thinned the ranks of climate coalitions⁷ or compelled clarifications in favour of continued financing of fossil fuel projects.⁸ Caught in the eye of

1 - As the author was editing this publication, it was reported that the SEC no longer included value chain emissions in its long-awaited climate-related disclosures rules (Exclusive: US regulator drops some emissions disclosure requirements from draft climate rules, Prentice C., I. Binnie, J. Renshaw and D. Gillison, Reuters, 23 February 2024). The final version of this publication includes minor edits to reflect the final rules of the SEC that were adopted on 6 March 2024.

2 - Emissions reasonably capture the adverse climate change impact of organisations while emissions intensity continues to be used as a proxy for transition risk although it cannot capture an organisation's exposure to the diversity of transition risks or its resilience to such risks, i.e., its ability to mitigate or absorb these risks. TCFD (2017) explains that transition risks encompass not only policy risks, but also technology risks, market risks (e.g., shifts in supply and demand due to changes in consumer behaviour, changes in production costs, increased volatility of resources prices, asset repricing risks, etc.), and reputation risks (i.e., changes to customer or stakeholder preferences and perceptions of the company and its sector in relation to their contribution to climate change with impact on supply and demand of goods and services, human resources, funding and implementation of investments). Value chain emissions cover a variety of activities related to the organisation - the nature and severity of risks associated with each type of activity varies for a given organisation and across organisations. In 2021, the Taskforce on Climate-related Financial Disclosures (TCFD) surveyed and obtained feedback from 100 climate-disclosure users; 95% of these indicated that value chain emission disclosures were useful for decision-making (Metrics, Targets, and Transition Plans Consultation – Summary of Responses, TCFD, October 2021).

3 - In 2021, the SEC disclosed that it would review climate-related disclosures to ensure that investors have access to material information for decision making. Following enthusiastic investor response to its March 2021 call for input, it announced that it would develop a proposal to mandate such disclosures from companies which may include whole value chain greenhouse gas emissions. The March 2022 proposal (Release Nos. 33-11042; 34-94478) includes the requirement.

4 - The overt opposition focused on greenhouse gas emission disclosures and value chain emissions in particular: the Business Roundtable rejected their reporting as "unworkable" while the American Petroleum Institute and the U.S. Chamber of Commerce argued that it should be voluntary (the Chamber of Commerce is a longtime opponent of legislative and regulatory climate action, see inter alia: The US Chamber of Commerce and Lobbying on Climate Change Disclosure Regulations, InfluenceMap, November 2021 and Chamber of Obstruction: The U.S. Chamber of Commerce's Shifting Discourses on Climate Change, 1989-2009, Cole Triedman, Brown University Climate and Development Lab, 2021).

5 - Fossil-fuel interests seeded and fuelled a campaign designed to sweep ESG investing into the US culture war (see inter alia: The curious origins of the anti-ESG movement, Emily Atkin, Heated, 14 October 2022). Despite attempts to mobilise bigots by pressing hot-button issues and regularly resorting to racist dog whistles (by mischaracterising ESG investing as «woke investing»), the campaign largely failed to capture the interest of the public.

6 - 2023 saw record anti-ESG legislative activity with over a hundred proposals being introduced and several dozens of anti-ESG bills being passed by Republican state lawmakers. Anti-ESG legislation has taken the form of "boycott bills" prohibiting State entities from doing business with financial institutions presented as discriminating against fossil-fuel industries, and "no-ESG" bills requiring state pension schemes to divest from issuers and strategies incorporating ESG factors. 2023 also saw the Congress pass, and President Joe Biden veto, regulation that would have overturned a Department of Labor rule making it easier to integrate ESG issues into retirement plan investment management. The anti-ESG agitation persists despite legal challenges against ill-designed laws and protestations by finance officers from affected States, who underline the high potential costs to taxpayers and pensioners. A comedic low was reached in January 2024 when a no-ESG bill (New Hampshire House Bill 1267) proposed to make the consideration of ESG criteria "a felony punishable by not less than one year and not more than 20 years imprisonment".

7 - Anti-trust themed litigation threats made by State attorneys general (including a letter of May 2023 signed by 23 attorneys general) have led to a mass exodus of insurers from net-zero coalitions. Political pressure has also contributed to several asset manager defections from climate coalitions, notably the Net Zero Asset Managers initiative, with the exit of the world's second-largest asset manager, Vanguard, being the highest profile (An update on Vanguard's engagement with the Net Zero Asset Managers initiative (NZAM), Corporate Statement, Vanguard, 7 December 2022).

8 - In October 2022, a coalition of 19 attorneys general served six major American banks with civil investigative demands in relation to their involvement with the United Nations convened Net-Zero Banking Alliance (NZBA). Missouri Attorney General Eric Schmitt explained the banks were being investigated "for ceding authority to the U.N., which will only result in the killing of American companies that don't subscribe to the woke, climate agenda." However, some of these banks had reportedly warned that the June 2022 update of the minimum criteria of the Race to Zero campaign, an initiative to which the alliance

the political storm, the world's largest investment manager adjusted its integration approach and altered the format, tone, and language of its related communications. The backlash against ESG investing was so severe that the manager's emblematic chairman explained he was compelled to discontinue the use of the acronym, which he described as "politicised and weaponised".⁹ Subjected to pressure from law enforcement, large US asset managers scaled down their sustainability stewardship efforts. Support for climate-related shareholder proposals suffered dramatic declines in both 2022 and 2023.¹⁰

The oil and gas industry also supported an open and direct challenge to climate risk rulemaking by the SEC, particularly concerning value chain emissions. The draft SEC rule of March 2022 made history by generating more than 20,000 comment letters with value chain emissions disclosure facing strong opposition from trade associations.¹¹

This pressure caused the Commission to delay its final ruling multiple times, ultimately leading to the exclusion of value chain emissions from the rules adopted in March 2024.¹²

These offensives crossed the Atlantic resulting in the European Commission's scaling back the ambition of its first set of European Sustainability Reporting Standards (ESRS) over the first half of 2023, and the watered-down text being challenged in the European Parliament in October 2023, with the group behind the defeated motion arguing that the reporting of value chain emissions should be made voluntary.

Parties critical of mandated disclosure of value chain emissions represent that it would be unworkable or extremely expensive for in-scope entities; that the availability, quality, and verifiability of data sources and/or the immaturity of estimation methods would result in estimates of inherent inaccuracy and thus limited meaning or value; and that it would place an enormous burden on out-of-scope entities in the value chain, i.e., private and small businesses.

had committed, had put them at risk of a legal challenge from politicians defending fossil-fuel interests. Facing the risk of exits, the campaign updated its interpretive documents in September 2022 to stress that members were responsible for independently charting their own phase-out of "unabated" fossil fuels consistent with a "global, science-based, just transition" in compliance with all legal and professional obligations" (Race to Zero clarifications, Climate Champions, 16 September 2022). Over the course of 2023, multiple NZBA members announced they would not seek validation of their decarbonisation targets under the new sectoral process released of the Science Based Targets initiative (SBTi); several underlined their membership in the alliance praising its less prescriptive approach (Exclusive: Four banks quit initiative assessing climate targets, Tommy Wilkes, Reuters, 29 November 2023).

9 - BlackRock CEO Larry Fink says he no longer uses term 'ESG': 'It's been totally weaponized', *Cheyenne Ligon, P&G*, 26 June 2023.

10 - While they insisted this was owing to the inflation of low-quality proposals, the support from their European counterparts increased over the same period (see inter alia, *Voting Matters 2023: Are asset managers using their proxy votes for action on environmental and social issues?*, Sood A., C. Gray, F. Nagrawala, I. Monnickendam, J. Herbert, K. Stewart and M. Zorila, *ShareAction*, January 2024).

11 - Some trade associations had taken exception with the suggestion that the materiality assessment in respect of value chain emissions could be formulaic (e.g., these emissions would be considered material in relation to overall emissions), whereas the applicable standard would require the reporting entity to determine materiality in relation to the likelihood that a reasonable person would attach importance to the disclosure when making an investment decision (as per paragraph 230.405 of the Securities Act). To strengthen its rule against legal challenges, the SEC not only dropped the value chain emissions disclosure requirement, but also subjected all disclosure to materiality testing (SEC, 2024). More generally, opponents represent that the sweeping disclosures required by the SEC grossly exceed its statutory authority under the Securities Act and the Exchange Act; usurp congressional authority (by surreptitiously introducing greenhouse gas emissions regulation); and are unconstitutional (by compelling reporting entities to include information in mandated filings that would not be purely factual or uncontroversial and therefore would infringe on their freedom of expression).

12 - Irrespective of the SEC decision in respect of value chain emissions, there was little doubt the final rule would be challenged – multiple business groups had threatened to litigate, and the lawsuit brought against California over its climate disclosure laws had showed they meant business. The lawsuit against the state of California was filed by the US Chamber of Commerce, the American Farm Bureau Federation and various state business organisations at end January 2024; value chain emissions disclosure were the first issue identified in the Chamber of Commerce release accompanying the complaint (U.S. Chamber Sues California Over Climate Disclosure Laws, U.S. Chamber of Commerce, release of 30 January 2024). Hours after the 6 March adoption of the final rules on "The Enhancement and Standardization of Climate-Related Disclosures for Investors", ten Republican-led states had filed a petition to block it (Republican-led states sue US SEC over climate risk disclosure rules, Clark Mindock, Reuters, 6 March 2024). Within 10 days, this number had increased to twenty-five and an appeals court had suspended the rule upon the request of two fracking companies (US appeals court temporarily pauses SEC climate disclosure rules, Clark Mindock, Reuters, 15 March 2024). However, the watering down of the rules also led the Sierra Club, a major environmental group, to sue the SEC for falling short of its responsibility to protect investors (Sierra Club sues US SEC for weakening climate risk disclosure rules, Clark Mindock, 14 March 2024).

Public acknowledgement of concerns with value chain emissions by the chair of the SEC¹³ had fuelled speculations that their disclosure may be curtailed or made voluntary despite very broad investor support¹⁴ for the Commission's proposal.¹⁵ The renouncement of the SEC marks a departure from the strengthening global consensus amongst standard setters and regulators regarding the importance of value chain emissions disclosures for investors. Indeed, these disclosures are not only mandated by European Union (EU) law (ESRS E1 Climate Change) but are also integrated into the first set of sustainability-related financial disclosure standards (IFRS S2 Climate-related Disclosures) endorsed by the International Organisation of Securities Commissions (IOSCO).¹⁶

In the remainder of this contribution, we first define value chain emissions and elucidate why accounting for these emissions is crucial not only for understanding the full climate impact of organisations but also for aiding them in navigating the complexities of transition risks and opportunities. Subsequently, we assess the current state and future direction of value chain emissions reporting in relation to the Greenhouse Gas Protocol's Corporate Value Chain Standard (Value Chain Standard). Although voluntary disclosure has advanced significantly in quantitative terms, most of the reported data do not represent accurate and comprehensive inventories of corporate emissions. We recognise that the gradual introduction of mandatory reporting in various jurisdictions is expected to improve data quality, yet we caution against overly optimistic expectations regarding data comparability. We emphasise that the primary objective of the Value Chain Standard is to assist companies in prioritising and implementing emissions reduction efforts rather than generating highly standardised data for external analysis.

We then delve into the methodologies used for third-party estimation of value chain emissions, underscoring the challenges associated with both top-down and bottom-up approaches. We detail how the diversity in estimation methods results in considerable discrepancies in emissions data among providers, along with significant cross-sectional dispersion and inter-temporal volatility within these datasets. Moreover, we point out that the inadequate consideration of specific corporate contexts in modelling renders these data unsuitable for cross-corporate comparisons.

We conclude with targeted recommendations for companies, investors, and standard setters. We urge companies to adopt value chain emissions accounting and disclosure as integral components of their sustainability and risk management strategies and

13 - According to news report, the SEC chair had been wary of including value chain reporting requirements in the first place due to the heightened risk of lawsuits (SEC Sets Up Climate Clash with Rule on Indirect Emissions, Robert Schmidt, Bloomberg News, 18 March 2022). Commissioners identifying with the Republican party have opposed climate disclosures altogether and provided guidance for the legal challenge to the eventual rule (see inter alia, We are Not the Securities and Environment Commission - At Least Not Yet, Statement from Commissioner Hester Peirce, Securities and Exchange Commission, 21 March 2022).

14 - Ceres analysed the comment letters of 320 institutional investors collectively managing more than USD50 trillion in assets and found that 297 investors mentioned the topic of value chain emissions (or had done so in a collective statement addressed to the SEC) with 97% supporting the SEC proposal (Analysis shows that investors strongly support the SEC's proposed climate disclosure rule, Rothstein, CERES Blog Post, 11 October 2022).

15 - The SEC proposal called for mandatory disclosure when these emissions are material or included in targets or goals set by reporting entities. It included a safe harbour from certain forms of liability under securities laws, i.e., disclosure of value chain emissions would be deemed not to be a fraudulent statement unless made without a reasonable basis or not in good faith. Small reporting companies were exempted from the requirement to disclose value chain emissions and a phase-in period was afforded to all. Suggestions from parties critical of the proposal had ranged from making the disclosure voluntary to extending the liability protections and phase-in period provided.

16 - The lack of ambition in the SEC final rules will contribute to regulatory fragmentation. This is because most entities in the scope of these rules will also be subject to stricter reporting rules owing to their domestic and international operations and will not be able to claim regime equivalency. California has passed a much more ambitious rule requiring disclosure of value chain emissions (by US companies with more than USD1bn of revenues in the state) starting in 2027 (and assurance starting in 2030) and the phased application of the Corporate Sustainability Reporting Directive will require US companies with a net turnover of more than EUR150m in the EU to report material emissions (and provide assurance) in 2029. This could be mitigated by the SEC issuing an order to recognise disclosures prepared under a different set of rules "to avoid a patchwork of reporting obligations and potentially conflicting demands". (SEC should consider recognising 'alternative regimes' like ISSB, says commissioner, Paul Verney, Responsible Investing, 7 March 2024).

highlight the need for collaboration with supply chain partners. We point investors to their fiduciary responsibilities to perform due diligence on value chain data and ensure fitness for purpose of data usages; we invite them to consider alternatives to value chain emissions for incorporating climate change impact and risk considerations into portfolio construction and investment stewardship. Furthermore, we caution standard setters against facilitating greenwashing by endorsing or encouraging inappropriate uses of value chain emissions data. Finally, we appeal to policymakers to enact regulations that foster decarbonisation across the economy. This includes, but is not limited to, mandating disclosures of value chain emissions and supporting sector-level standardisation initiatives and the adoption of best practices.



2. Understanding the Dual Materiality of Value Chain Emissions

Originally published in 2001 by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), the Greenhouse Gas (GHG) Protocol Corporate Standard ("Corporate Standard") is strongly established as the world's most widely used GHG accounting and reporting framework.¹⁷

The Corporate Standard (WRI and WBCSD, 2004) requires that reporting entities first delineate their organisational boundaries, specifying the operations they own or control. The framework then mandates the establishment of operational boundaries, wherein emissions from operations are categorised as either direct or indirect, depending on the consolidation approach (equity share or control) applied to organisational boundaries. Direct emissions, referred to as Scope 1 emissions, emanate from sources owned or controlled by the company. Indirect emissions, on the other hand, are attributable to the entity's activities but arise from sources it does not own or control.

The Corporate Standard further subdivides these into: (i) Scope 2 emissions, stemming from purchased energy (e.g., electricity, steam, heating, or cooling) consumed in equipment or operations owned or controlled by the entity; and (ii) Scope 3 emissions, encompassing other indirect emissions from upstream and downstream activities within the value chain, including the product-use and product end-of-life stages.¹⁸

Compliance with the Corporate Standard requires reporting entities to measure both Scope 1 and Scope 2 emissions. The reporting of emissions beyond those from sources "owned or controlled" by the company has been justified on impact grounds by the fact that power generation is the largest source of CO₂ emissions globally and the assumption that industrial or commercial entities – which consume over half of the electricity produced – may exert significant influence on these emissions through energy conservation and efficiency efforts, as well as engagement or replacement of energy suppliers.

Similar logic has been applied to justify the consideration of Scope 3 emissions, whose accounting and reporting are detailed in the 2011 Corporate Value Chain Standard (WRI and WBCSD, 2011). In most sectors, value chain emissions dwarf direct and purchased energy emissions combined (see Figure 1 below) and reporting entities often have considerable influence on these emissions through upstream ("cradle-to-gate") and downstream (post-sale) supply chain decisions, including product design.

Taking stock of indirect emissions has also been justified on business grounds as it allows manufacturers and providers of services to identify opportunities for cost savings through higher environmental performance and management of climate-related transition risks, i.e., the risks associated with transitioning to a lower emitting economy, including notably policy/regulatory risks (such as the reduction of fossil fuel subsidies or the introduction of caps on or pricing of GHG emissions); and market and reputation risks).

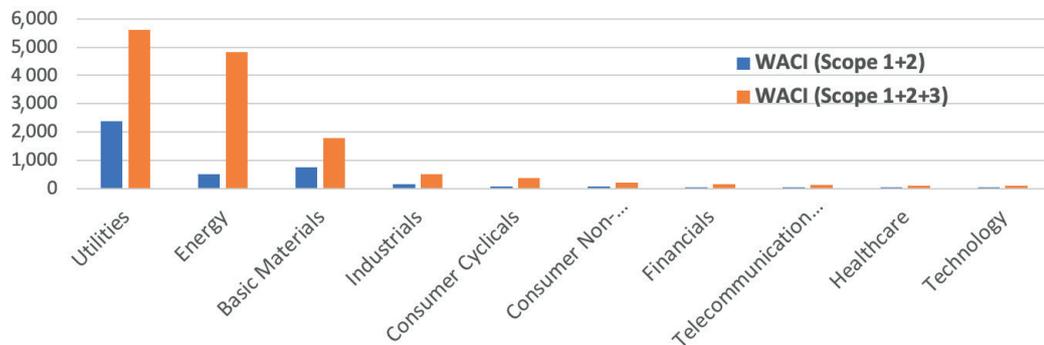
Mapping value chain emissions enables companies to gain a much better vision of their full climate change impact, risks and opportunities and support appropriate action.

17 - The 1997 Kyoto Protocol saw all industrialised countries (with the crippling exception of the United States, then the world's top emitter) and all European countries from the former Eastern bloc commit to emission targets over the medium term. The GHG Protocol Initiative was convened in 1998 by the WRI, a US based non-governmental organisation (established in 1982 with a founding grant from the MacArthur Foundation to carry policy research of environmental and development issues), and WBCSD, a coalition of international companies (created in 1995 by the merger of two associations established in relation to the Rio Earth Summit and efforts to bring businesses into the conversation on sustainability).

18 - In this respect it is important to underline that a company's Scope 3 emissions will capture the emissions from parties, notably retail consumers, which are not subjected to GHG accounting and reporting obligations.

Limiting analysis to Scope 1 and 2 emissions can lead to incorrect inferences about an entity's absolute or relative impact and the risks and opportunities it faces.

Figure 1: Carbon Intensity for Scope 1 and 2 emissions and Total Emissions



Source: Ducoulombier (2021)

Notes: The chart shows the average Carbon Intensity of companies across Thomson Reuters Business Classification (TRBC) high-level sectors in the developed markets universe of index provider Scientific Beta. Companies are capitalisation weighted. The Weighted Average Carbon Intensity (WACI) is expressed in tonnes of CO₂ equivalent scaled by USD million of revenues. Figures are 10-year averages as of June 2020. Emissions data underlying the calculations are provided by ISS ESG.

This also goes for investors. An investor analysing companies that have comparable businesses but different degrees of outsourcing of energy-intensive activities may well draw the wrong conclusions on their environmental footprints or transition risks. Ducoulombier (2021) observes that Apple's carbon intensity, measured as the ratio of Scope 1 and 2 emissions to revenues, is about 200 times lower than that of rival Samsung Electronics. This does not indicate better efficiency however as, at the time of observation, Apple was fully outsourcing manufacturing whereas Samsung had not yet embarked on large-scale outsourcing.¹⁹ When Scope 3 emissions were included, the difference in carbon intensities fell to a low two-digit percentage.

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The consideration of indirect emissions however considerably increases the risk that the same emissions will be counted multiple times. The Scope 2 emissions of an entity are the Scope 1 emissions of energy generating entities. In a portfolio context, aggregating Scope 1 and Scope 2 emissions across entities results in double counting when the same emissions are counted by electricity consumers and their suppliers. Guidance is available to avoid double counting. The problem is more significant with Scope 3 as the same emissions may be counted multiple times in any value chain,²⁰ and the problem cannot be neatly unpacked by considering scopes in isolation.

How problematic this is depends on how the data are used and for what purpose.

From an impact standpoint, it is generally considered that multiple counting indicates the existence of co-responsibility for emissions and/or of multiple levers to tackle them. For example, the Greenhouse Gas Protocol (2022) explains that "allowing for GHG accounting of direct and indirect emissions by multiple companies in a value chain (...) facilitates the simultaneous action of multiple entities to reduce emissions throughout society."

However, multiple counting contributes to reducing the comparability of disclosures – other things equal a more integrated value chain will result in fewer instances of

19 - Currently the companies vying for the top smartphone manufacturing spot are Samsung and Foxconn, Apple's biggest assembler.

20 - Note that the problem is already present before any portfolio aggregation, e.g., downstream when a manufacturer considers the Scope 3 emissions of third-party delivery of its products and the emissions of retailers, and a retailer also includes these emissions in its inventory.

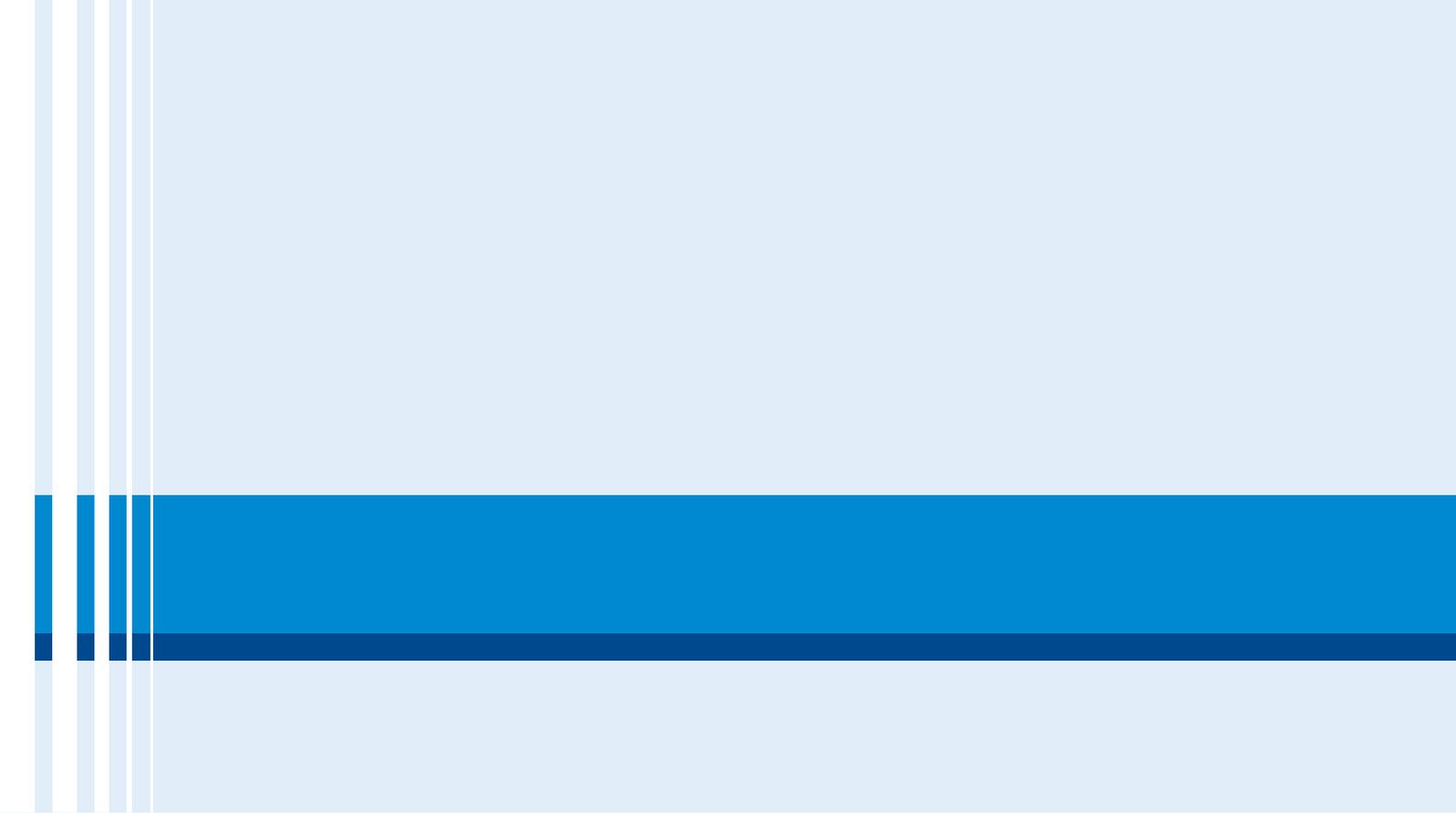
double counting and therefore lower reported value chain emissions. It also makes direct aggregation of value chain emissions perilous, which has led multiple standard setters to advise against this practice²¹ (which was passed into EU law despite the author's repeated warnings to the European Commission).²² In the context of investment portfolios, and even if investee-level data were complete, accurate, and comparable, direct aggregation of data marred by multiple counting would lead to an investor's portfolio-level metric that could lack relevance and lead to perverse outcomes, particularly if used for steering asset allocation and portfolio construction. Ducoulombier (2022) notes that the two main net-zero investment frameworks for asset owners include top-level emissions targets that do not include value chain emissions as investor coalitions "are well aware of the severe availability, quality and consistency issues affecting Scope 3 data and of the problem of multiple counting affecting Scope 3 aggregation".²³

This, notwithstanding the consideration of value chain emissions, is crucial for reporting entities and investors alike as they represent a material source of emissions to manage from the dual point of view of climate impact and transition risk and opportunities. Recent analysis of disclosures by companies from high-impact sectors found that value chain emissions accounted for three-quarters of their total emissions on average (CDP, 2023).

21 - Inter alia, the Greenhouse Gas Protocol (2022) notes: "Because of this type of double counting, scope 3 emissions should not be aggregated across companies to determine total emissions in a given region."

22 - Refer to Ducoulombier (2020) for a record of engagement.

23 - For the UN-convened Net Zero Asset Owner Alliance (NZAOA), it is premature to set Scope 3 emissions targets at the (sub-) portfolio level, but these emissions should nonetheless be tracked. The Paris Aligned Asset Owners (PAAO) Net Zero Investment Framework (NZIF) recommends phasing in the direct consideration of value chain emissions in line with the EU Sustainable Finance Disclosure Regulation but underlines that targets and reporting should be done separately given measurement and aggregation challenges (Ducoulombier, 2022). Recent work by the Institutional Investors Group on Climate Change, a PAAO partner and the main architect of the NZIF, indicates a sounder understanding of value chain emissions: "Whilst (...) aggregation of scope 3 emissions at portfolio level leads to perverse outcomes, it is clear that asset-level engagement is an important lever that investors can use to understand and address these emissions within their portfolios. By understanding the value chain emissions of portfolio companies, investors can better identify and prioritise engagement on decarbonisation" (IIGCC, 2024).



3. The State and Future of Scope 3 Emissions Reporting

Voluntary Reporting: Quantitative Strides Against Deep Seated Qualitative Shortcomings

Mandatory GHG reporting programs have long been effective in countries responsible for the majority of global emissions but were focused on direct emissions in heavy industry and the energy sector. The scope of mandatory reporting has expanded over time to listed and large companies and Scope 1 and 2 in multiple jurisdictions, and voluntary reporting against the Corporate Standard has also progressed markedly in recent years. For instance, the number of entities providing climate change data to CDP, the organisation collecting environmental disclosures globally, has ballooned by 10,000 since 2021 (CDP, 2024).

However, value chain emissions reporting up to fiscal year 2023 was (except for certain large and listed companies in France), and reporting companies lagged in terms of Scope 3 emissions disclosure. Two thirds of the 23,000+ entities contributing data to CDP in 2023 reported direct emissions, but only 37% disclosed emissions across all three scopes (CDP, 2024). Nevertheless, there has been a dramatic rise in the number of companies voluntarily reporting value chain emissions, not least thanks to the success of the science-based target initiative (as companies with validated decarbonisation²⁴ targets near 5,000 at the beginning of 2024).²⁵

Progress in the number of companies voluntarily reporting value chain emissions however has not been accompanied by an improvement in the quality of the data provided. For illustration, in 2023, a major data provider applied basic plausibility checks and rejected nearly three-quarters of the corporate reports it had collected.²⁶

The Corporate Value Chain Standard breaks down Scope 3 emissions into eight upstream and seven downstream categories (detailed in Table 1). Disclosure however is on a comply or explain basis and companies can exclude activities or even categories of emissions if these exclusions are disclosed and justified. In any case, companies are expected to follow the principles of relevance, completeness, accuracy, consistency, and transparency when deciding upon exclusions. The respect of the completeness principle forbids any exclusion that would compromise the relevance of the reported emissions inventory and the Value Chain Standard prohibits the exclusion of any activity that is expected to contribute significantly to that inventory.

24 - Decarbonisation in this document should be understood as reduction of GHG emissions; ditto for expressions such as "carbon intensive" or "low carbon". The Corporate Standard covers seven gases – the six gases identified in the 1997 Kyoto Protocol, i.e., carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆) – and nitrogen trifluoride (NF₃), as added by the 2013 Doha Amendment 2013 amendment to the Kyoto Protocol. For aggregation, the global warming potential of gases other than CO₂ is expressed relative to that of CO₂, hence the expression CO₂ equivalent or 'CO₂e'.

25 - The initiative offers independent validation of targets set according to its standards. It requires large entities to set near-term targets for Scope 3 emissions when they are estimated to represent 40% or more of total emissions and, under its 2021 net-zero standard, imposes Scope 3 compression to all companies seeking to validate (long-term) net-zero targets.

26 - While ISS ESG collected close to 500 new value chain emissions reports for its 2023 release, the number of reports it accepted did not change significantly: circa 1,500 values were accepted and circa 4,000 were rejected (Scope 3 Data Quality – Time to Step Up, Harshpreet Singh, Amitkumar Vyawahare, and Sam Schrager, ISS ESG ISS ESG Blogpost, 31 March 2023).

Table 1: Emissions categories in the GHG Protocol Value Chain Standard

Upstream Scope 3 emissions	
1. Purchased goods and services	Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Cat. 2 – 8
2. Capital goods	Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year
3. Fuel- and energy- related activities	Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year (not already accounted for in Scopes 1 or 2)
4. Upstream transportation and distribution	<ul style="list-style-type: none"> • Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) • Transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company)
5. Waste generated in operations	Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company)
6. Business travel	Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)
7. Employee commuting	Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)
8. Upstream leased assets	Operation of assets leased by the reporting company (lessee) in the reporting year and not included in Scopes 1 and 2 – reported by lessee
Downstream Scope 3 emissions	
9. Downstream transportation and distribution	Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)
10. Processing of sold products	Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)
11. Use of sold products	End use of goods and services sold by the reporting company in the reporting year
12. End-of-life treatment of sold products	Waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life
13. Downstream leased assets	Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in Scopes 1 and 2 – reported by lessor
14. Franchises	Operation of franchises in the reporting year, not included in Scopes 1 and 2 – reported by franchisor
15. Investments	Operation of investments (including equity and debt investments and project finance) in the reporting year, not included in Scope 1 or 2

Source: WRI and WBCSD (2013)

In practice, however, the average reporting company only discloses data for just over a third of the categories, and most reporting entities omit the most material categories. This is not due to a lack of guidance on how to identify relevant emissions sources. Indeed, the Standard itself provides criteria to identify activities (see Table 2) and sectoral regularities point to the categories that are the most likely to be material or relevant for most companies in each sector.²⁷ In cases when regulators, standard setters, or sectoral trade bodies have yet to produce guidance, relevant analysis is available from parties collecting, modelling, or processing emissions.

27 - Idiosyncratic differences in business models and operations could naturally make other categories relevant, but the usual suspects will be known to companies and auditors, e.g. leased assets, franchises, or investments.

Table 2: Criteria for identifying relevant Scope 3 activities

Criteria	Description of activities
Size	They contribute significantly to the company's total anticipated Scope 3 emissions
Influence	There are potential emissions reductions that could be undertaken or influenced by the company
Risk	They contribute to the company's risk exposure (e.g., climate change related risks such as financial, regulatory, supply chain, product and technology, compliance/litigation, and reputational risks)
Stakeholders	They are deemed critical by key stakeholders (e.g., customers, suppliers, investors or civil society)
Outsourcing	They are outsourced activities previously performed in-house or activities outsourced by the reporting company that are typically performed in-house by other companies in the reporting company's sector
Sector guidance	They have been identified as significant by sector-specific guidance
Spending or revenue analysis	They are areas that require a high level of spending or generate a high level of revenue (and are sometimes correlated with high GHG emissions)
Other	They meet any additional criteria developed by the company or industry sector

Source: WRI and WBCSD (2013)

Typically, a single category accounts for the majority of emissions, another category has very high significance and it takes at most three categories to capture the bulk of emissions.²⁸ Overall, the most important upstream category is Purchased Goods and Services (Category 1) and the most important downstream category is Use of Sold Products (Category 11) for non-financial companies. The footprint of the financial sector corresponds to Investments (Category 15), which is also the dominant downstream category for listed real estate. However, value chain emissions disclosure appears to prioritise 'convenience' over materiality. As illustration, easy-to-track Business travel (Category 6) is the most frequently disclosed category although its contribution to inventories is anecdotal²⁹ while material categories are under-reported. The consequence is under-reporting of value chain emissions (as documented in Klaaßen and Stoll, 2021 and Nguyen et al., 2023, inter alia).

The reporting of value chain emissions has thus far been sparse, incomplete, and insufficiently focused on material sources. This not only limits the relevance of these data and metrics naively derived from these data for decision-making but also constrains the quality of any estimation or modelling that can be derived from these disclosures.

Nevertheless, opposing mandatory reporting based on these data limitations confuses the symptom with the cause. Standard-compliant mandated reporting would significantly enhance not only the quantity but also the relevance and quality of the data produced by companies and allow better estimation and modelling.

Mandatory Reporting to the Rescue?

The number of companies disclosing value chain emissions is set to increase dramatically by 2030, as mandatory reporting is now effective in the EU and was signed into law in California in October 2023.³⁰

28 - Refer, inter alia, to the analysis of the relevance and significance of categories for high impact sectors by CDP (2023).

29 - Nguyen et al. (2023) look at the Bloomberg dataset between 2010 and 2019 and find that Business Travel is disclosed over four times more often than Use of Sold Products.

30 - Under the EU Corporate Sustainability Reporting Directive (CSRD), over 11,000 European companies will need to report material emissions (whether from a financial or an impact point of view), including value chain emissions, from fiscal year 2024 (certain entities benefit from a one-year phase-in for value chain emissions). The number of in-scope entities will increase over fivefold to fiscal year 2028 when close to 50,000 EU companies and over 10,000 other companies with significant European presence will need to file. California's Climate Corporate Data Accountability Act (SB 253) introduces mandatory greenhouse gas emissions reporting for large companies doing business in California; reporting will be required from 2026 and from 2027 for value chain emissions; it is estimated over 5,300 companies will be in scope. Implementation could be delayed by an announced funding cut affecting the California Air and Resources Board (California Budget Cuts Pause Landmark Climate Laws, Vibeka Mair, ESG Investor, 23 January 2024) and a legal challenge led by the American Chamber of Commerce.

Other jurisdictions have started to align with the recommendations of the Taskforce for Climate-related Financial Disclosures (TCFD), whose 2017 version calls for disclosure of value chain emissions "if appropriate" and 2021 update requires it when material (TCFD, 2017 and 2021).³¹ Further impetus³² has been provided by the June 2023 release of financial disclosures standards by the International Sustainability Standards Board (ISSB). The first topical ISSB standard pertain to climate-related disclosures, incorporate TCFD recommendations³³ and require disclosure of material emissions, including within the value chain.³⁴ In July 2023, the International Organisation of Securities Commissions called on its 130 member jurisdictions (which cover over 95% of the world's financial markets) to "consider ways in which they might adopt, apply or otherwise be informed by the ISSB Standards (...) in a way that promotes consistent and comparable (...) disclosures for investors" (IOSCO, 2023).

With the introduction of mandated reporting and assurance,³⁵ the availability and reliability of reported data will improve markedly. However, due to specificities of value chain accounting and reporting, the data will remain irrelevant for certain usages and should be handled with extreme care by investors.

Indeed, while the Value Chain Standard is intended to promote consistency in accounting and reporting, it affords companies significant leeway in the selection of the inventory methodologies that are appropriate to their circumstances (options are available across the 15 categories). Likewise, while minimum boundaries are identified for each category, the reporting of certain emissions is flagged as optional.³⁶

By way of illustration, companies may use either primary data, i.e., data from specific activities within a company's value chain, e.g., as provided by suppliers or employees, or secondary data, which may include industry-average-data, financial data, proxy data, and other generic data (refer to the Appendix for an introduction of calculation of value chain emissions by companies).

31 - companies are also expected to disclose climate impacts irrespective of financial materiality). The UK has vowed to apply require 2017 TCFD disclosures across its economy by 2025 (from 2021, the UK required premium-listed companies to indicate in their annual financial report whether they had made TCFD-consistent disclosures; in 2022, the UK imposed TCFD-inspired disclosures on more public companies; on banks, insurance companies and large private companies; and on large limited liability partnerships; the disclosure of value chain emissions however has remained voluntary).

32 - The UK plans to introduce ISSB-aligned rules by July 2024 (UK Sustainability Disclosure Standards, Department for Business and Trade, Guidance of 2 August 2023). Proposed regulations on climate disclosures for investors were released in October 2021 by the Canadian Securities Administrators (Proposed National Instrument 51-107), further consultations have been announced to promote alignment with ISSB standards. In March 2024, the Canadian Sustainability Standards Board (CSSB) put forward a proposal (CSDS 1 and 2) that is largely aligned with the IFRS sustainability standards but delays implementation to reporting periods beginning on or after 1 January 2025 and includes extended relief from one to two years for value chain emissions disclosure and "disclosures beyond climate-related risks and opportunities". The Canadian Securities Administrators will update their proposal once the CSSB consultation is complete and the standards are finalised. The Sustainability Standards Board of Japan is expected adapt ISSB standards by March 2025 so that reporting based on prior fiscal year data may start by (March) 2026. Looking beyond G7 countries, Turkey published its version of the ISSB standards in December 2023 while Australia released draft legislation aligning with ISSB standards in January 2024 (the first consultation paper on climate-related disclosures had been released in December 2022). China has released its first draft «Guidance on Sustainability Reports» for comments in February 2024. The project would impose mandatory sustainability reporting upon listed companies starting from the 2025 fiscal year and embraces ISSB standards with local variations.

33 - The creator of the TCFD, the Financial Stability Board (FSB) regards the ISSB standards "as a culmination of the work of the TCFD" (FSB Plenary meets in Frankfurt, FSB Press release, 6 July 2023) and has passed on the monitoring of the progress on companies' climate-related disclosures to the IFRS Foundation (under which the ISSB is established).

34 - While the ISSB approaches materiality only in a financial sense, the materiality of the sustainability statement is not the same as the materiality of financial statements. This is because sustainability reporting requires disclosures of the potential financial impacts of all material risks and opportunities and that these may not be recognised in financial reports or not fully captured in these reports by application of basic accounting principles and financial reporting boundaries. The financial materiality of sustainability reporting extends beyond the time-horizon considered in preparing general purpose financial statements, goes beyond the assets and liabilities of the reporting entity, and embraces issues that are beyond the control of the reporting entity itself.

35 - Limited assurance will initially be required for ESRs disclosures; companies disclosing under the Californian law may be required to obtain a similar level of assurance for their value chain emissions starting in 2030.

36 - For a quick visualisation of these options, refer to the Technical Guidance for Calculating Scope 3 Emissions (WRI and WBCSD, 2013), pp.7-10.

Calculations should rely on high quality and highly specific data to the largest extent, in particular for activities deemed to be high priority for impact, risks, or other reasons. However, such data may be difficult to obtain. It is understood that the accuracy and completeness of the inventory will improve over time as more and better data become available and the reporting entity transitions towards more specific calculation methods. Investment in internal resources and processes and long-term engagement of stakeholders across the value chain should improve the quantity, quality, and specificity of data as well as their usage.

The leeway afforded to reporting entities derives from the primary purpose of the Value Chain Standard, which is to help companies track and reduce their emissions over time. This of course may be an issue for parties that approach the data with different objectives and notably cross-corporate comparisons. For such usages, the flexibility of the Value Chain Standard is particularly problematic when it is applied to activities or categories that have material importance. CDP (2017) gives a stark illustration of the problem by comparing the reporting of Johnson Controls (JC) and United Technologies Corporation (UTC), both manufacturers of electrical equipment and engines. While JC collects the emissions data from its direct suppliers ("Tier 1 Suppliers") to compute Scope 3 emissions from the goods and services procured, UTC uses an Economic Input-Output Life Cycle Assessment (EIO-LCA) model to estimate the cradle-to-gate emissions of all products purchased. Unsurprisingly, Scope 3 emissions for 'Purchased Goods and Services' are 11 times greater for UTC than for JC (or seven times after reweighting to control for differences in revenues between the two companies). Table 3 below lists key comparability issues identified by CDP across the 15 categories.

The standard setters have explicitly stated that the work is not intended to support comparisons between companies and that additional consistency produced by adherence to sector-specific guidance would be required to make such comparisons meaningful.³⁷

It must be underlined that lack of comparability is not limited to the cross section: change of accounting choices over time, in respect of boundaries or methodology inter alia, may generate considerable volatility in the data reported by the same company. While such changes may correspond to progress towards more comprehensive and accurate reporting, they make value chain emissions data very volatile. The volatility of reported data is indeed found to be dramatically higher for Scope 3 than for Scope 1 and 2 (even when measured with volatility-dampening indicators such as the median).³⁸ As data challenges become better understood and appropriate responses are phased in,

37 - One should acknowledge that different approaches to greenhouse gas accounting have developed to serve distinct usages. One useful dichotomy opposes internal and external uses. Environmental management accounting (EMA) is intended to help managers identify opportunities for cost savings, risk reduction, and value creation through improved environmental management practices. Applied to greenhouse gases, it helps organisations identify and prioritise emissions reduction opportunities. Such sustainability management tools should be adapted to organisational specificities and give priority to strategic relevance, facilitation of internal adoption, and actionability. On the other hand, environmental reporting is expected to communicate the organisation's environmental performance to external stakeholders in a manner that is relevant to their decision-making needs and credible. Key characteristics include reliability, accuracy, completeness, standardisation aiming to support comparisons not only across time (consistency) but also entities (comparability). Delivering on these expectations and protecting entities against risks and liabilities that may arise from misreporting requires the set up and maintenance of internal control and compliance systems. Given the diverse objectives and distinctive quality attributes of environmental management accounting vs. reporting, the adoption of a dual-purpose approach is liable to create dissatisfaction from both internal and external users. While the primary goal of the Value Chain Standard is to help companies reduce emissions (through better understanding of their value chain emissions built on a true and fair inventory), it has also been explicitly designed with reporting in mind. Indeed, its authors explain that one of its objectives is to support "consistent and transparent public reporting" of value chain emissions "according to a standardised set of reporting requirements" (WRI and WBCSD, 2011). Such language can naturally feed investor expectations of standardisation that would be inconsistent with the standard's focus on tailoring inventory making and reporting to the realities of activities.

38 - For example, Fouret et al. (2024) document that within the FTSE All-World 2021 universe and for the period 2018-2021, the median year-on-year change for Scope 1+2 is 9% vs. 20% for Scope 3.

the quality and comparability of reported emissions will increase. However, as newcomers gain experience in value chain emissions accounting and experienced preparers transition to the evolving best practices, volatility will continue to be generated. While the journey may be painful, increased comparability and relevance of data is the destination.

As things stand, the respect afforded currently to reported emissions by certain regulators and standard setters is misplaced.

Table 3: Comparability issues in reported Scope 3 data

Scope 3 Category	Common issues with data reported to CDP.
Business travel	Best responded category, calculations are very sensitive to different emission factors and assumptions.
Capital goods	Companies' capital investments are not necessarily consistent year on year because companies do not make consistent capital investments. Many companies choose to account for these emissions by depreciation, but many do not.
Downstream transportation and distribution	Calculations are very sensitive to the assumptions about mode of transport and so similar calculation methodologies may result in different values.
Downstream leased assets	The decision to lease or purchase assets depends on the company's business strategy more than on size or activity and so any data reported in this category is not well explained by the variables used.
Employee commuting	Different assumptions about employee behaviour and emission factors from public transport can lead to different results. Variables used are often site specific.
End of life treatment of sold products	Calculations depend on assumptions about behaviour of users or clients, which can affect the calculations.
Franchises	Depends on the company's reporting boundary and business model.
Fuel-and-energy related activities	This Scope 3 category often confusion amongst companies and the calculation methodologies vary considerably.
Investments	Dependent on Scope 1 and 2 reporting boundary, if a company excludes Scope 1 and 2 emissions from assets that it does not operate because it is reporting on an Operational Control boundary then the emissions from these assets should be included in their Scope 3 'Investments'. The emissions from these assets would be included in Scope 1 and 2 if the company reported on an Equity Share basis.
Processing of sold products	Companies often differ on which parts of their value chain constitutes 'Processing' and which parts constitute 'Use'.
Purchased goods and services	Companies either use Life Cycle Analysis, which considers the emissions of the emissions from the full value chain, whereas other companies only consider the emissions of their direct suppliers, ignoring the rest of the value chain. Companies may not include all raw materials, goods, or services they purchase; many only account for paper or water purchases.
Upstream leased assets	The decision to lease or purchase assets depends on the company's business strategy more than on size or activity and so any data reported in this category is inconsistent.
Upstream transportation and distribution	Calculations are very sensitive to the assumptions about mode of transport and so similar calculation methodologies may result in different values.
Use of sold products	Calculations are sensitive to behavioural assumptions made about end users
Waste generated in operations	Calculation methodologies vary and emissions from waste depend on method of disposal, which may have a much stronger regional variation due to differences in regulations.

Source: CDP (2017).

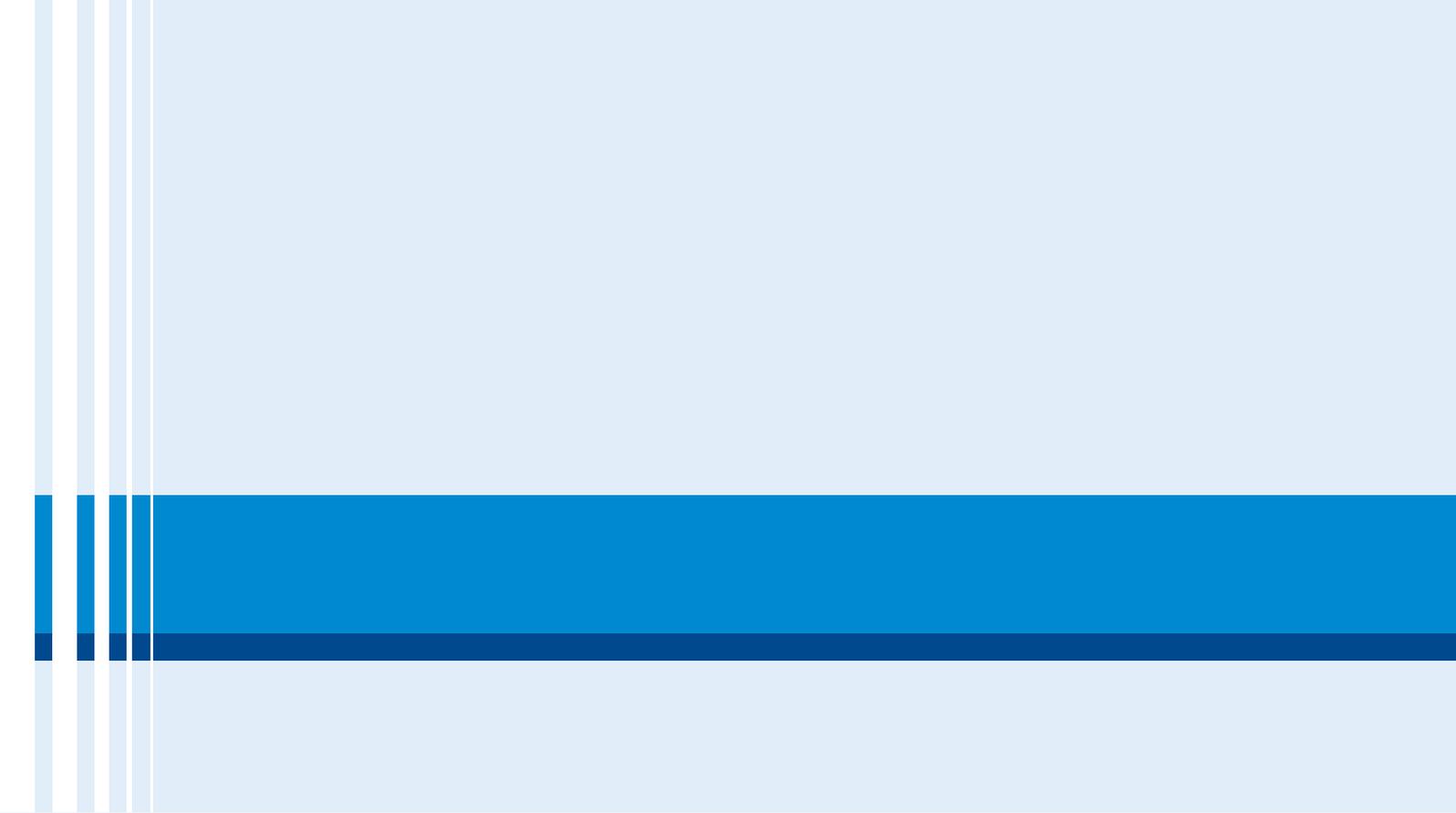
For illustration, the Partnership for Carbon Accounting Financials (PCAF, 2022) recommends that investors compute their financed emissions using the highest quality data available and provides a data hierarchy that puts corporate-reported emissions at the top (lower scores go to physical activity based estimates and the lowest scores go to economic activity based estimates).³⁹ While PCAF is aware of the particular quality

39 - The Financed Emissions Standard itself is a sectoral Scope 3 computation guidance for financial institutions focused on the most material category, i.e., Investments.

issues with Scope 3 data,⁴⁰ it does not adapt its data quality hierarchy to the specificities of Scope 3. Citing the issue of multiple counting, PCAF avoids mixing Scope3 with Scope 1 and 2 data, but it does not warn against the specific risks of steering portfolio decarbonisation by metrics derived from value chain emissions and adopts the fast-track Scope 3 phase-in period for reporting found in the EU Benchmark Regulation (leading to inclusion of all sectors from 2025).⁴¹

40 - See PCAF (2022) page 50: "PCAF acknowledges that, to date, the comparability, coverage, transparency, and reliability of Scope 3 data still varies greatly per sector and data source."

41 - It may be argued that the regulation makes the use of estimated value chain emissions more onerous through its article laying down transparency requirements for estimations (Article 13 of Commission Delegated Regulation (EU) 2020/1818). However, this is at most a venial sin in a Regulation that includes several capital sins, notably the conflagration of all emissions scopes in the carbon intensity metric steering index construction (see Ducoulombier, 2020 and 2021).



4. Estimation of Value Chain Emissions

The consideration of value chain emissions is key to understanding the climate impact of economic activities and to assessing climate-related transition risk and opportunities. However, corporate disclosures are sparse, incomplete, volatile across time and essentially unfit for cross-sectional comparisons. It is thus natural to explore the potential of emissions modelling to produce more comprehensive, representative, and standardised data to support a wide range of uses.

Corporate-level value chain emissions are available from multiple data providers. Commercial datasets may be comprised of reported data and/or modelled data. Providers including reported emissions in their datasets may choose to redistribute the numbers as sourced; include only those reported figures that pass their quality checks;⁴² or adjust reported numbers where needed to increase plausibility or comparability (capping and flooring based on peer group is standard practice). Providers may opt to include only modelled emissions in their datasets and either disregard reported emissions (e.g., by generated estimates from business or financial data) or use these to calibrate and run their estimation models. Differences in data sources⁴³ and processing (e.g., update cycle, quality controls) will lead to different redistributed values across providers (Nguyen and al, 2023, find identical values for only 68% of reporting firms across two major datasets that use reported values without adjustments; divergence is above 20% for 16% of the data). Differences in estimation approaches, assumptions and model calibration, and input data produce highly divergent values and low correlations across modelled datasets (Busch et al., 2022). Studies comparing reported and modelled datasets document low correlations and wide divergence. The degree of divergence is high enough to dramatically alter sorts: comparing a modelled dataset to reported datasets, Nguyen et al. (2023) find that little over one of five observations fall in the same ranking decile and less than a third fall in adjacent deciles (and most of the divergence happens with firms in top or bottom decile by emissions and revenues). Against this backdrop, it is surprising to find datasets that mix reported and modelled emissions and particularly unfortunate that some providers deny clients access to modelled emissions when reported emissions are made available.

While it is natural to expect that modelling by a data provider will inherently yield more consistent data compared to independent calculations performed by thousands of companies, it should be underlined that a provider may rely on multiple models and model calibrations to produce more representative and specific estimates. This includes attempts to capture regularities and specificities arising from nature of activities, technologies, business models, corporate and value chain demographics. Data providers often employ proprietary approaches to model value chain emissions and may be hesitant to disclose the specifics of their models and calibrations, or how they pair companies with particular models and calibrations,⁴⁴ as well as the input data they use. Consequently, users face challenges in understanding whether differences in modelled emissions for companies they consider comparable stem from modelling and calibration choices, from variances in underlying corporate data, or from errors or omissions.⁴⁵

42 - These quality checks may be limited to checking whether the company reports for the categories that the provider considers material given its activities, which would still lead to rejecting a large share of the data that can be collected at this stage.

43 - Companies may report emissions for different purposes (e.g., compliance with environmental regulation, mandatory financial and/or sustainability reporting, participation in voluntary initiatives) and through different channels. The two main source for data providers currently are CDP questionnaires and corporate sustainability reports. Depoers, Jeanjean and Jérôme (2016) find that French companies disclose lower figures in their corporate reports, which are under public scrutiny, than to CDP.

44 - A data provider may have produced a granular taxonomy of activities for the purpose of emissions modelling and classified companies accordingly. The development of high-quality public domain taxonomies by legislators should lead to reduced reliance on proprietary classifications.

45 -This points towards a system-wide issue with the lack of transparency of ESG data methodologies. Providers are extremely

It should also be stressed that to increase the quality of their estimates over time, providers may change their models, calibrations, pairings, and the datapoints they rely upon. This may result in considerable variations for the affected companies.⁴⁶ Significant modelling updates may generate material changes to portfolio-level emissions metrics.⁴⁷

By way of illustration, Fouret et al. (2024) document that within the FTSE All-World 2021 universe and for the period 2018-2021, the median year-on-year change of estimated Scope 3 data is not any lower than that of reported Scope 3 data (the distribution of modelled Scope 3 data however is not as fat-tailed).⁴⁸

Table 4 gives a high-level view of value emissions modelling approaches. The simplest approaches multiply the non-reporting company's revenues by the representative carbon intensity (measured as the ratio of emissions to revenues) of a reference group; they ignore differences in business models, and how they may impact total emissions and their breakdown into scopes. Sector-specific multivariate models follow the same logic but allow for consideration of corporate fundamentals beyond revenues. The practicality and the output of such approaches is constrained by the availability, granularity, and quality of reported emissions. Various approaches may be combined to improve estimation by using more specific data when available (including simply extrapolating from past reported data). Multiple models may be run in parallel and combined to produce more stable output. Modelling categories separately should be expected to improve accuracy (as documented in Nguyen and al., 2023), but this remains difficult given current limitations of reported data.

28

Table 4: Approaches Used for the Modelling of Scope 3 Emissions

Approach	Description
Application of sector statistic	A statistic of normalised emissions is computed from reported data at the industry group/sub-sector/sector level and used to estimate emissions for non-reporting companies.
Sector-specific regression analyses	Non-reported emissions are estimated as output of sector-specific multilinear models using key financial metrics and possibly other fundamentals (e.g., number of employees).
Bottom-up modelling	Life Cycle Analysis (LCA)-type methodologies are used to estimate emissions from the bottom-up, as much as possible by combining corporate-specific physical information with the appropriate emissions factors. Granularity, specificity and quality of data may vary.
Top-down EEIO modelling	Emissions are produced by application of EEIO models, which requires mapping of company revenues to EEIO structure.
Top-down EEIO modelling and Life Cycle Analysis	EEIO approach is hybridised with generic product-based (LCA) data (typically for product-use phase emissions).

Source: Based on Ducoulombier (2021).

Environmental Extended Input-Output (EEIO) modelling sidesteps the issue of sparse corporate emissions reporting as it relies on country/industry-level emissions – however, the granularity and precision of EEIO estimates is limited by the availability of corporate

reluctant to provide users with the information that would be necessary to perform due diligence consistent with the intended uses of the data. This is despite the data being offered on an "as is" basis according to standard industry practices (contracts will include a disclaimer of warranties and limitation of liability clause along the lines of: "There is no representation or warranty as to the current accuracy, reliability or completeness of the information provided, nor liability for, decisions based on such information")

46 - For providers that mix modelled and reported and data, switches from one type to the other are another source of data volatility.

47 - In January 2024, a major provider introduced a new estimation approach for Category 15 emissions for a subset of financial companies. The objective was to bring modelled emissions closer to emissions that had been reported by financials. The update affected hundreds of regional banks, diversified banks and insurance companies that saw their modelled emissions jump year-on-year by a factor ranging from 3 to 7.

48 - They compute that the median year-on-year change for estimated Scope 3 data is 21% vs. 20% for reported data; however, the interquartile range is 33.8 for estimated data vs. 69.1 for reported data. Interestingly, Scope 1 and 2 estimated figures are almost twice as volatile as reported data (17% vs. 9% using the same metric) and twice as spread out (interquartile range of 28.4 vs. 15).

revenues breakdown and the definition of the basic modelling unit, and by nature do not incorporate corporate specificities beyond revenues breakdown.

Life-cycle analysis (LCA) extensions of EEIO models typically rely on representative products per industry and as such cannot incorporate corporate specificities beyond product portfolio composition. Furthermore, certain data provider implementations fail to recognise product differences that have been documented to materially impact value chain emissions. For illustration, up to a recent methodology update, a major data provider was estimating the value chain emissions of automotive manufacturers without considering the shares of electric, conventional, and hybrid vehicles in their outputs.

Bottom-up modelling using LCA principles theoretically has the potential to produce highly corporate-specific emissions, but the dearth of standardised corporate reporting of physical information on outputs and processes makes the approach particularly research intensive, promotes reliance on high-level indicators and sector figures, and introduces subjectivity owing to the need for expert judgment.

Nevertheless, providers that have traditionally relied primarily on regression- or EEIO-based estimation models are increasingly using bottom-up modelling for high-stake sectors for which some physical data can be collected, e.g., energy and automotive sectors. Bottom-up modelling offers promise but realising its true potential requires meeting the challenges of acquiring reasonably objective, corporate-specific data on both activities and processes, at reasonable cost.

Progress in artificial intelligence seems to pave the way for improving the specificity of emissions estimation at reasonable cost, e.g., by complementing EEIO with machine learning approaches trained to capture the impact on emissions (categories) of differences in business activities, geographies, or financials and fundamentals. This is a relatively new avenue for research and early results do not deliver dramatic changes. Nguyen et al. (2023) find that the use of 'out of the box' machine learning models trained on aggregate and category level emissions only produces small improvements in prediction relative to straightforward and traditional approaches (computing emissions from peer-group emissions intensity and revenues, or using a linear model combining revenues, number of employees, and dummy industry indicators).⁴⁹

Altogether, there is insufficient consideration of corporate circumstances, including of business model considerations, in the modelling of value chain emissions. Hence modelled Scope 3 emissions, while preferable to reported emissions in many ways, are also unfit for the purpose of intra-sector comparisons.

49 -The use of artificial intelligence combined with new sources of data, including satellite monitoring of activity and greenhouse gas releases, is transforming the ability to independently track asset-level emissions. Climate TRACE mobilises satellite data and other forms of remote sensing, and public and commercial data to track emissions facilities and other emitting activities, including fertiliser application, land-use changes, and wildfires. The allocation of these emissions to entities and supply chains however is not something that may be done by remote sensing. The task is easier for highly concentrated infrastructure companies. Nugier, Marcelo and Blanc-Brude (2022) use detailed geospatial and traffic data to predict scope 1 and 2 emissions for several thousands of airports and derive scope 3 emissions from highly granular cruise and landing and take-off data.



5. Implications for Companies, Investors, and Standard Setters

Companies: Embrace Value Chain Emissions Accounting and Disclosure

Mapping value chain emissions enables companies to identify emissions hotspots, prioritise actions for emissions and cost reduction, and effectively manage exposure to climate-related transition risks and opportunities. Value chain emissions disclosure is becoming a standard ask of trade partners as well as capital providers and insurance underwriters.

Admittedly, estimating emissions from a variety of activities across complex value chains poses significant challenges. The complexities and uncertainties associated with collecting appropriate activity data and emissions factors can hinder precise quantification (see Appendix). However, the flexibility of the value chain standard allows reporting entities to choose boundary, data, and computation options that align with their current capabilities, resources, and experience. Companies can improve and expand their reporting over time through learning, process improvement, and engagement with value chain partners. These aspects do not diminish the relevance of the exercise or the data it produces, just as long as the standard is respected.

Voluntary reporting, however, appears to be driven by corporate expediency or strategic considerations rather than emissions materiality. This considerably reduces the informational value of disclosures. Adherence to the standard will be required for disclosures to become truly informative of material impacts, risks, and opportunities.

Companies should anticipate continued pressure from commercial and financial partners to set targets and disclose inventories in regarding value chain emissions. Proactive preparation for the introduction of mandatory reporting calls for internal capacity building, improvements in data collection and management systems, and stakeholder engagement efforts. Participation in sectoral and supply chain initiatives can expedite the learning process, reduce implementation costs, and increase access to data. Sectoral guidance on boundaries, methodologies, and sources of data provides directions and benchmarks for individual companies; aligning accounting and reporting with these guidelines also enhances the comparability and therefore the value of disclosures.

Investors: Ensure Value Chain data and Usages are Fit for Purpose; Explore Alternative to Value Chain Emissions

Ensuring fit-for-purpose uses of value chain emissions

Investors need to accept that while the consideration of value chain issues is key from both impact and financial perspectives, the limitations of reported and modelled value chain emissions put severe restrictions on usages.

The quantity and quality of reported data should be expected to make great progress in the second half of this decade; this will pave the way for improvements in the quality and convergence of modelled data.

However, in the current state of value chain emissions reporting and modelling, integration of Scope 3 emissions into investment management decisions must proceed with extreme care.⁵⁰

Fiduciary duties (and professional standards) call for taking reasonable steps to diligently assess the quality of data and ensure that it is fit for the intended purpose; and to transparently disclose the limitations, risks, or uncertainties associated with its use or production. Fiduciaries should detail the steps taken to mitigate these concerns, where relevant. Similarly, fiduciaries allocating to strategies that incorporate value chain emissions data should take reasonable steps to assess whether the quality of the data and the way they are used are adapted to the strategy's objectives and constraints and ensure the strategy is managed in accordance with the investor's financial and non-financial objectives.

Raw value chain emissions data are typically not fit for the purpose of asset selection. Scope 3 emissions being larger than cumulated Scope 1 and 2 emissions by an order of magnitude in most sectors, basing intra-sector stock-selection decisions on total emissions would drown any corporate-level signals present in reported Scope 1 and 2 emissions in a sea of product- and activity-based Scope 3 noise.⁵¹ Doing so would lead to disregarding the efforts made by companies in the mitigation of their greenhouse gas emissions and must be forcefully opposed (Ducoulombier, 2020 and 2021). Scope 3 emissions data need to be considered separately, if at all.

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Metrics and indicators derived from value chain emissions without proper considerations of data limitations should be assumed to have inherited these limitations until established otherwise. Scaling emissions by revenues or enterprise value to produce intensity metrics leaves the problem unaddressed. Portfolio alignment metrics may also be tainted by naïve use of Scope 3 data.

Scope 3 emissions modelling should aim for the highest level of granularity for which sufficient corporate data can be obtained or reliably estimated. For over a decade already, properly modelled value chain emissions have been providing relevant order of magnitude information at the levels of sectors or segments to:

1. Assist in defining priority areas for action;
2. Implement sector allocation;
3. Initiate engagement with companies; and
4. Meet investors' reporting needs (Raynaud et al. 2015).

When disclosing the emissions of their portfolios and derivative metrics, investors should report the Scope 1 and 2 emissions and metrics linked to their investments separately from their Scope 3 counterparts where information about the latter is required.⁵² The disclosure of datapoints incorporating the Scope 3 emissions of underlying investments should be accompanied with mentions of data limitations.

50 - It is a source of comfort that the two main asset-owner oriented net-zero initiatives have put forward alignment frameworks in which top-level emissions targets only cover the Scope 1 and 2 emissions associated with assets (Ducoulombier, 2022).

51 - This is assuming modelled emissions are used to introduce a degree of comparability across value chain emissions.

52 - This is consistent with the Financed Emissions Standard issued by PCAF (2022).

Beyond and besides value chain emissions

Value chain considerations still may be included indirectly into portfolio construction and stewardship to incentivise companies to decarbonise throughout their value chains and/or to manage exposure to associated transition risks. This may rely on value chain emissions-related metrics that can support security-level analysis such as: financial and/or physical measures of involvement in targeted high impact activities, e.g., fossil fuel involvement, or at the other end of the spectrum, involvement in climate change solutions as identified in sustainable finance taxonomies; sector-specific key climate performance indicators, e.g., energy efficiency of products; metrics of upstream and downstream value chain climate-risk exposure, e.g., in the spirit of Hall et al. (2023), etc.

This integration may be pursued through the identification of issuers that take credible steps to address value chain emissions challenges, e.g., produce high-quality inventories, set credible emissions reductions targets and transition action plans, deliver according to targets and plans. Assessment of issuers against such criteria could inform capital allocation and stewardship actions. Such approaches are mandated under voluntary net-zero investment frameworks (Ducoulombier, 2022).

Finally, concerned investors also should include value chain considerations in their policy and issuer engagements, directly and/or through their participation in industry initiatives, to advocate for:

1. Scope 3 accounting and reporting to ensure the challenges and opportunities of value-chain decarbonisation are fully appreciated by companies, notably those in high impact sectors;
2. Standardisation of Scope 3 accounting at sector level and support of supply chain initiatives to further contribute to data improvement; and
3. Adoption of value chain decarbonisation targets by issuers.

Standard setters: avoid abetting greenwashing, support disclosure and standardisation

Standard setters should heed Hippocrates' advice and first "do no harm" by ensuring they neither require nor encourage unsuitable usages of value chain emissions. This means ensuring that they:

- avoid mandating portfolio construction on the basis of targets or metrics significantly influenced by the value chain emissions of underlying investments;
- avoid implicitly endorsing the steering of capital allocation by such targets and metrics through mandated disclosures; and
- ensure that voluntary disclosures of such targets and metrics be accompanied by appropriate caveats about data limitations.

Standard setters should be aware of the risks of heightened adverse selection and moral hazard inherent in explicit and implicit endorsement of unsuitable usages of data.

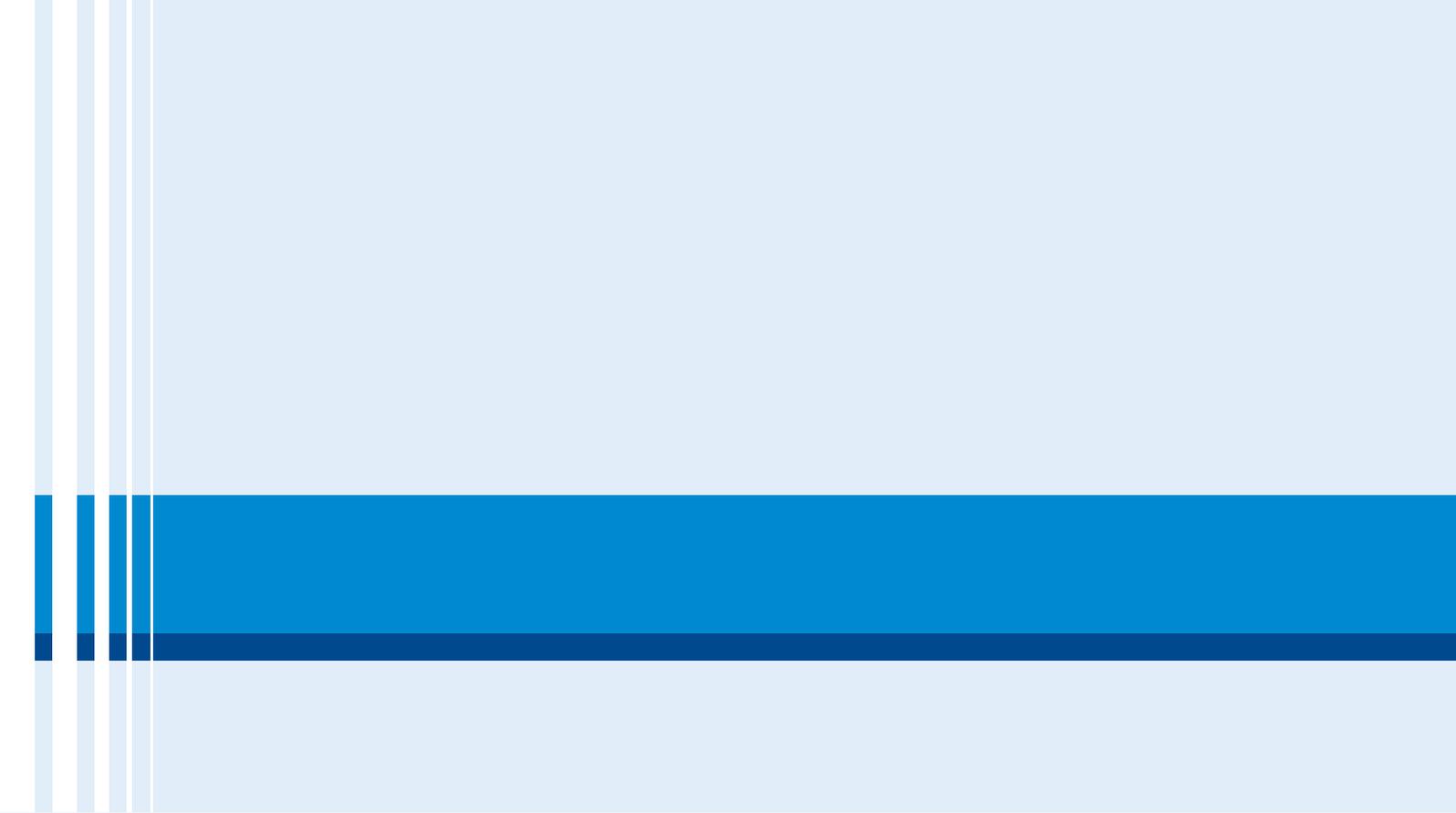
In this regard, the European Commission's decision to steer the construction of its Paris-aligned and Climate Transition Benchmarks upon scaled total emissions was particularly

detrimental. The choice of metric for what has since become a highly successful investment label contradicts the bloc's ambitions to redirect capital flows toward the transition to a low-carbon economy and institutionalises illegitimate claims about the impact of these benchmarks. Four years later, with a better understanding of the challenges of value chain reporting and the risks posed by greenwashing, it would be appropriate to realign the Regulation with its stated objectives.⁵³

Policy makers committed to the transition should introduce and enforce regulation supporting decarbonisation across the economy. As part of the effort, they should require administrations and firms, starting with large entities, to produce standardised disclosures of emissions and, where relevant, set emissions reductions targets and produce ongoing reports on progress achieved and actions taken to remain on track.

To enhance the effectiveness of these measures, governments should support the production and adoption of sector-specific guidance for emissions accounting, reporting, target setting, and transition plans. By assisting in the identification of key emissions sources, data, and emissions factors, and prescribing or curtailing accounting options, sector-specific guidance could go a long way towards reducing reporting costs, increasing the quality and comparability of disclosures; regulators should phase in interoperable sector-specific standards. Furthermore, governments should promote initiatives aimed at fostering cooperation across supply chains and proactively and share information and tools to accelerate the adoption of best practices, lower costs, and protect small businesses from unreasonable data demands.

53 - This would also require questioning the denominator of the metric as the use of enterprise value injects considerable capital market volatility into carbon intensity (Ducoulombier, 2020 and Ducoulombier and Liu, 2021).



Appendix: Calculation of Value Chain Emissions

Corporate emissions are linked to the combustion of fossil fuels (in stationary equipment or vehicles), to physical or chemical production processes, and to intentional and unintentional releases of greenhouse gases in the environment that do not contribute to the production process, e.g., flaring or venting of natural gas, leaks and other fugitive emissions during the production, processing, transportation, storage, or handling of materials or waste products.

Direct measurement of emissions (continuously or by period sampling), known as monitoring, has remained relatively rare owing to availability, practicality, and cost. Similarly, inferring emissions from highly specific data about process inputs and outputs is unusual. Instead, the most common approach for measuring emissions is calculation and involves multiplying (a proxy of) activity data by emission factors. The former measure the level of activity producing emissions, e.g., tonnes of steel purchased, and the latter converts the activity data into GHG emissions, e.g., tons of CO₂e emitted per ton of steel produced and delivered. Source- or facility- specific emission factors normally produce higher accuracy estimates and, if available, should typically be preferred to generic emission factors. Reporting companies should aim for the most specific data and describe the types of activity data and emissions factors used.

For most companies, direct emissions are calculated from fuel use data and using public emission factors – the use of specific emission factors derived from periodic fuel sampling is typically not relevant. Emissions from acquired electricity, heat, steam, or cooling are calculated from consumption data and supplier-specific emission factors or market data, or location-based average emission factors, e.g., average greenhouse gas intensity of the electricity grid. Emissions in most categories of the value chain inventory are calculated from activity data and value-chain partner data or generic industry data. Therefore, in most cases, there is no fundamental difference in how direct emissions and value chain emissions are estimated; rather, the variation lies in the precision and specificity of the input data.

Two types of emission factors are acceptable for value chain inventories:

- i) Life cycle or "cradle-to-grave" emission factors, which include emissions that occur at every stage of a product's life, from raw material extraction to manufacturing, product use, and recycling/disposal at the end of life;
- ii) "Upstream" or "cradle-to-gate" emission factors, which include all emissions that occur in the life cycle of a material/product up to the producer's factory gate.

Typically, the latter should be used for categories 1-2.⁵⁴

To calculate Scope 3 emissions, companies may use either primary data, i.e., data from specific activities within a company's value chain primary, e.g., as provided by suppliers or employees, or secondary data, which may include industry-average-data (e.g., from published databases, government statistics, literature reviews, and industry associations), financial data, proxy data, and other generic data. As an illustration, primary data in respect of category 7, i.e., Employee commuting, would require collecting from employees the distance travelled and mode of transports used, while estimates of distance travelled and

⁵⁴ - Life-cycle emission factors should be used for converting fuels and energy consumed throughout the value chain into emissions except in respect of category 3 for which emissions from combustion need to be excluded to avoid double counting of emissions covered by Scope 1 or 2 – the emission factors used in the latter respect are called "upstream emission factors."

mix of transport modes derived from government statistics would qualify as secondary data.

The collection of Scope 3 data includes distinctive challenges, including reliance on value chain partners; lesser degree of influence over data collection and management; lesser degree of knowledge about data types, sources, and quality; broader need for secondary data and for assumptions and modelling (WRI and WBCSD, 2011). These specific data issues increase the uncertainty around Scope 3 emissions accounting.

Calculations should rely on high quality and highly specific data to the largest extent and in particular for activities that contribute materially to the inventory or are deemed high priority for other reasons, e.g., owing to their material contribution to transition risk exposure.

When selecting data sources, companies should consider the quality indicators in Table 5, which address both representativeness of data and quality of data measurement.⁵⁵⁻⁵⁶

Table 5: Data quality indicators

Indicator	Description
Technological representativeness	The degree to which the data set reflects the actual technology(ies) used
Temporal representativeness	The degree to which the data set reflects the actual time (e.g., year) or age of the activity
Geographical representativeness	The degree to which the data set reflects the actual geographic location of the activity (e.g., country or site)
Completeness	The degree to which the data is statistically representative of the relevant activity. Completeness includes the percentage of locations for which data is available and used out of the total number that relate to a specific activity. Completeness also addresses seasonal and other normal fluctuations in data
Reliability	The degree to which the sources, data collection methods and verification procedures used to obtain the data are dependable

Source: WRI and WBCSD (2011).

The data should also be as specific as possible. In general, companies should seek primary activity or emissions data from suppliers that are as specific as possible to the product/service purchased as per the hierarchy described in Table 6 below.

Table 6: Hierarchy of data (by level of specificity)

Data type	Description
Product-level data	Cradle-to-gate GHG emissions for the product of interest
Activity-, process-, or production line-level data	GHG emissions and/or activity data for the activities, processes, or production lines that produce the product of interest
Facility-level data	GHG emissions and/or activity data for the facilities or operations that produce the product of interest
Business-unit-level data	GHG emissions and/or activity data for the business units that produce the product of interest
Corporate-level data	GHG emissions and/or activity data for the entire corporation

Source: WRI and WBCSD (2011).

Where possible, companies should collect primary data from suppliers and other value chain partners to obtain the most specific data possible for priority Scope 3 categories and activities. Direct ("Tier 1") suppliers that are significant should be approached first

55 - To assess reliability, one may look at the respect of international standards and/or the existence of independent review or test.
 56 - When data of sufficient quality are unavailable, companies may rely on proxies obtained from similar activities and may use extrapolation, scaling and other customisation approaches to increase proxy representativeness.

(direct contractual relationships provide leverage to request data). Data requests will vary by Scope 3 category and may entail product life cycle emissions, supplier Scope 1 and 2 emissions for the reporting year, supplier upstream Scope 3 emissions, etc.

The use of primary data will typically require the allocation of a system's emissions (e.g., activity, vehicle, production line, business unit, etc.) to its various outputs.⁵⁷ For consistency's sake, it is preferable that this allocation be performed by the reporting company rather than its suppliers, but the latter may be reluctant to share business-sensitive information. When product-level data cannot be collected, the reporting company should select the allocation approach that best reflects the "causal relationship" between the production of the outputs and the resulting emissions (WRI and WBCSD, 2011). This typically requires physical allocation, but economic allocation is relevant when a physical relationship cannot be established (including for investments naturally) or when economic allocation can best represent the aforementioned causal relationship (e.g., when the product of interest is a by-product of the process). Economic allocation is to be approached with caution as it can produce misleading emissions estimates, notably when:

- (i) prices show significant volatility;
- (ii) different companies pay significantly different prices for the same product; or
- (iii) prices are not well-correlated with underlying physical properties and emissions (e.g., luxury goods, products with high brand value, products whose prices incorporate high costs other than production such as research and development or marketing).

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When supplier-specific data cannot be collected or are incomplete, secondary data should be used. When using secondary data, preference should go to sources that are internationally recognised, provided by national governments, or peer reviewed.

Secondary data derives from two primary methods: (bottom-up, process-based) LCA and (top-down) environmentally extended input-output (EEIO) analyses. The former requires itemising the inputs and outputs at all steps of product's production process (and performing the same tasks recursively for all these inputs and outputs) and are used to assess the cradle-to-grave environmental impacts of products (the same type of approach can be applied to unique processes). The latter allocates national emissions based on economic flows between industry sectors to estimate the emissions resulting from the production and upstream supply chain activities of different sectors and product categories in an economy and as such are thus relevant for cradle-to-gate analyses. It follows that process-based / LCA data can be highly specific but that data generation may be very expensive or impractical (notably for large-scale, multi-product analyses); the specific nature of the calculation methodology/assumptions may also make comparisons with data produced by other reporting companies difficult. EEIO modelling enables comprehensive coverage across the entire economy with high cost efficiency but the data so produced necessarily lack specificity⁵⁸ – sector averages, e.g., emissions per dollar of revenues at the sector level, may be of limited use for heterogeneous sectors and heterogeneous products (differences in margins and pricing strategies) within sectors; geographic gaps in EEIO databases may also limit application of the approach or create

57 - Naturally this will not be necessary when there is only one output or if emissions per type of output are readily available.

58 - EEIO models may be more or less granular depending on the number of sectors and products included; they may also be more or less often updated. Many countries produce national EEIO models.

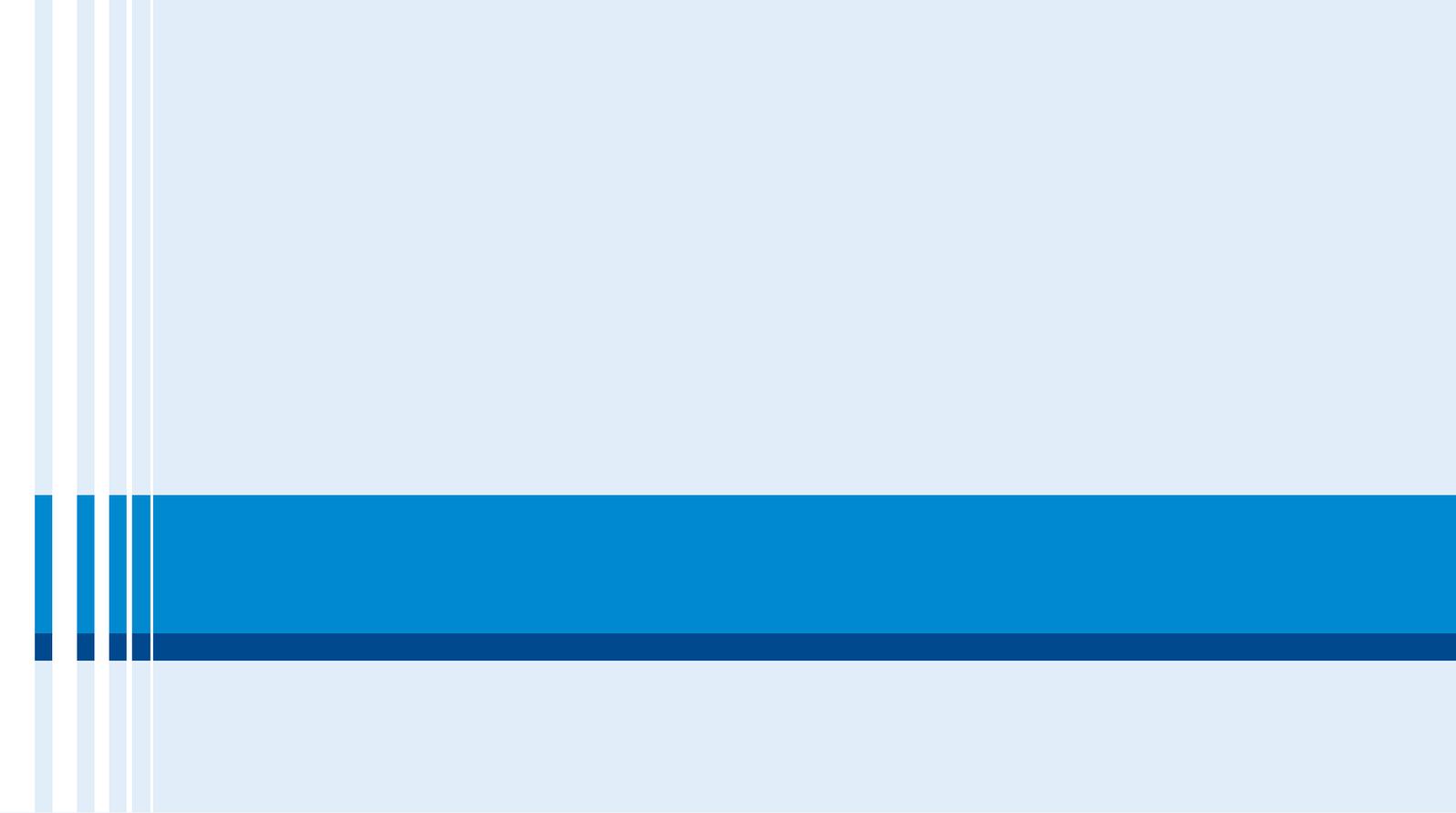
issues of geographical representativeness; temporal representativeness may also be an issue (some models being well over a decade old).

Reporting companies can combine LCA and EEIO, e.g., by using EEIO for upstream emissions and LCA for downstream and end-of-life emissions.

Note that while EEIO modelling produces cradle-to-gate estimates, the integration of consumption activities and postconsumer waste management does not present theoretical challenges. These and some of the other issues associated with EEIO can be addressed by hybridisation as discussed in Suh and Huppes (2005).⁵⁹

Regulators are aware of the practical challenges associated with estimating value chain emissions and have provided scheduled implementation and/or relief from certain forms of liability in case of (non-fraudulent) misstatement and/or clarified, as in the case of the ISSB (2023) that “the entity shall use all reasonable and supportable information that is available to the entity at the reporting date without undue cost or effort”.

59 - Further work by Huppes et al. (2006) paved the way for the E3IOT database, a high resolution, EEIO table for Europe that covers production (circa 500 sectors), consumption (including automobile driving, cooking and heating) and postconsumer waste management.



Appendix: From Ignition to Containment—BlackRock and the ESG Fossil Fuel Fire

In his 2020 Letter to Chief Executive Officers (CEOs),⁶⁰ the Chairman of the world's largest asset manager identifies climate change as a significant factor affecting companies' long-term prospects, underlines investor concerns about the proper consideration of climate risk in investment management, commits to placing sustainability at the centre of the company's investment approach ("including: making sustainability integral to portfolio construction and risk management; exiting investments that present a high sustainability-related risk, such as thermal coal producers; launching new investment products that screen fossil fuels; and strengthening our commitment to sustainability and transparency in our investment stewardship activities"), and ask investee companies to disclose by year-end both climate-related risks – as per the recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD) – and industry-specific financially material sustainability factors.). The letter to clients penned by the executive committee in 2020⁶¹ boldly affirms the belief that sustainability should be the company's new standard for investing.

The 2021 Letter to CEOs⁶² chronicles the progress of sustainable investment, calls on companies to transition towards net-zero emissions, reiterates disclosure demands, and affirms the company's net-zero commitments, which are detailed in the Letter to Clients.⁶³ The latter represents that the company is "committed to supporting the goal of net zero greenhouse gas emissions by 2050 or sooner".

A clear shift is observed in 2022 after the company becomes a primary target of conservatives for its climate-related proxy voting activity. In 2021, the company expanded its climate focus universe from 440 to over a thousand companies, reported nearly 2,300 engagements about environmental issues and failed to support the management of 341 companies and the election of 281 directors due to climate-related concerns.⁶⁴ In particular, the company supported the election of independent directors to the board of ExxonMobil against the will of the company's management.⁶⁵ In response to this boardroom battle, conservative tabloid New York Post runs an op-ed by FOX Business Network Charles Gasparino titled "BlackRock's 'No. 1' goal in 'woke' investing: Huge ESG-funds haul" on 5 June. The article comes with a picture of the company's chairman reading he: "has "woken" up to the fact that boarding the environmental-activism train can be immensely profitable, if he's the one creating the ESG funds that are all the rage among lefty investors." The oil and gas counteroffensive enters a new phase.⁶⁶

60 - A Fundamental Reshaping of Finance, Laurence Fink, BlackRock, January 2020.

61 - Sustainability as BlackRock's New Standard for Investing, Annual Letter to Clients, Global Executive Committee, January 2020.

62 - Larry Fink's 2021 letter to CEOs, Laurence Fink, BlackRock, January 2021.

63 - Net zero: a fiduciary approach, Annual Letter to Clients, Global Executive Committee, 2021.

64 - Investment Stewardship Annual Report, BlackRock, 2022.

65 - BlackRock explained it was concerned by the company's lack of a climate-change strategy and that its board would benefit from diversifying its energy experience; it voted in favour of three candidates put forward by activist hedge fund Engine No. 1, which was pushing for higher decarbonisation ambitions.

66 - Freedom of Information Act documents obtained by InfluenceMap (2023) show that in February 2021, the West Virginia Coal Association provided a state lawmaker with a draft anti-ESG bill which he proceeded to introduce. Further documents have a coal lobbyist representing to the head of West Virginia Pensions and Retirement Committee that the bill (HB 3084) is «part of a multi-state initiative to counter back against corporate cancel culture specifically ESG». The lobbyist attaches a pamphlet to his email explaining that ESG is "at the heart" of "an emerging 'energy discrimination' movement" that "may actually be the greatest threat to capitalism, property rights, and even human flourishing". This "new trend in finance" is "pushed by the United Nations and wealthy investment firms like BlackRock" (Bud Brigham, 2021, Energy Discrimination – A threat to capitalism, prosperity and flourishing, Life:Powered, Texas Public Policy Foundation). May 2021 emails obtained from the West Virginia Treasurer by InfluenceMap show involvement of the State Financial Officers Foundation (SFOF) in the anti-ESG movement. While the West Virginia bill was defeated, the movement continued with the SFOF and its close ally the American Legislative Exchange Council (ALEC) working jointly (and running their national meetings in tandem in July 2021). A proposed model legislation titled "Energy Discrimination Elimination Act" prepared by a member of the American Legislative Exchange Council (ALEC) in July 2021 (Setting the Record Straight: The Energy Discrimination Elimination Act, Joe Trotter, ALEC, 17 February 2022) and its revision, known as the "Eliminate Political Boycotts Act" draft policy would inspire anti-ESG boycott bills passed in several states (ironically, the ALEC board was forced to send this successful project to the drawing board after bank associations remarked it was inconsistent with the organisation's professed commitment to free markets and limited government).

The 2022 Letter to CEOs attempts to recentre the discussion around stakeholder capitalism and its defence. The chairman explains that stakeholder capitalism "is not a social or ideological agenda" but simply capitalism that protects the mutually beneficial relationships amongst stakeholders that allow companies to prosper and deliver long-term value for their shareholders. Lamenting the growing polarisation of society, he warns CEOs against "political activists, or the media" attempting to "hijack" corporate brands to "advance their own agendas". He presents corporate purpose as the best guide and protection in this treacherous environment and calls on corporate leaders to act as "trusted, competent, and ethical" voices. The letter includes a single section on sustainability, which is used to underline that the company does not have a progressive agenda or an oil and gas divestment policy but is only motivated by economic and fiduciary interests. The chairman clarifies that while net-zero requires collaboration between governments and the private sector, responsibilities are distinct: businesses "cannot be the climate police" as it is the role of governments to design pathways for a just transition (which should ensure continued access "to reliable and affordable energy sources"). The letter concludes with a section titled "Empowering clients with choice on ESG votes," which does not discuss any ESG issue but sees the company explain that its engagement goes beyond proxy voting and that it is intent on giving each of its clients the control of proxy votes if they so wish (at the time, the option had already been offered to certain institutional clients, but the option has now been made available to clients making up half of the company's equity index assets). While the commitment to investor empowerment is laudable, devolving the rights that the company was exercising as a fiduciary to its clients reduces the risks that its proxy voting activity trigger retaliatory action by disgruntled corporate interests.

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The 2022 letter to clients no longer bears the signature of the executive committee and is presented as a response to those who expressed interest in the net zero transition.⁶⁷

Despite these efforts at placating the oil and gas industry and managing conservative sensitivities, the backlash against the company and its chairman intensified in 2022.

Considering that the support for the net-zero transition expressed in the Letter to CEOs is inconsistent with BlackRock's assurance that it is supporting the oil and gas industry, the Texas Lieutenant Governor asks the State Comptroller of Public Accounts to place BlackRock at the top of the list of financial companies to be shunned for "boycotting" energy companies.⁶⁸ Other states followed suit. The claim of inconsistency was reprised in an August 2022 letter from 19 Republican state attorneys general to Mr Fink, which also alleges that the net-zero policy of the company conflicts with its fiduciary duty and that it is raising antitrust concerns by acting in concert with other financial institutions.

2022 also saw senior Republican figures enter the fray. Introducing antisemitic tropes into a discourse that already had racist undertones former Vice President Mike Pence warned that "a handful of very large and powerful Wall Street financiers" were "manufacturing" a shift towards "woke capitalism" and that ESG was empowering "an unelected cabal of

67 - A framework for our clients - How to invest in the net zero transition, BlackRock, 2022.

68 - The Lieutenant Governor draws from the 2020 letters and the 2021 proxy votes in respect of ExxonMobil to represent that BlackRock is using the investor stewardship and allocation channels to pressure investee companies to adhere to a transition pathway that is not required by law, which, in the sense of Senate Bill 13 (the Oil & Gas Investment Protection Act) constitutes boycott (Lt. Gov. Dan Patrick: Letter to Comptroller Hegar to Place BlackRock at the Top of the List of Financial Companies that Boycott the Texas Oil & Gas Industry, Office of Lieutenant Governor, 19 January 2022). In August 2022, the Comptroller concluded that BlackRock and nine European firms were boycotting the energy industry (participation in Climate Action 100+, the Net Zero Banking Alliance, or the Net Zero Asset Managers initiative triggered investigation and companies reportedly found to have opted for high-ambition implementation were blacklisted).

bureaucrats, regulators and activist investors to rate companies based on their adherence to left-wing values". The target of this unholy alliance: the fossil fuel industry. Indeed, Mr Pence explained that the financial system was being weaponised to "shut down economic growth in the energy industry in the name of environmental extremism".⁶⁹ Other future contestants for the Republican presidential nomination also started agitating against ESG, including biotech billionaire Vivek Ramaswamy and Florida Governor Ron de Santis. At the beginning of 2023, both Mike Pence and former President Donald Trump released ads opposing ESG.⁷⁰

Anti-ESG ads did not stop with presidential hopefuls. Explaining it had not been fooled by the backtracking in the 2022 Letter to CEOs, Consumers' Research, a non-profit organisation with links to oil money,⁷¹ launched a multi-million-dollar campaign "targeting BlackRock's bad business practices and Larry Fink's hypocritical woke principles". The campaign included a video explaining that the company and its chair were "crushing America from within" (by restricting funding to the fossil fuel industry) and a website WholsLarryFink.com outlining "some of the most troubling Fink facts" (while this site is no longer accessible, you may still visit BlackRockLovesChina.com courtesy of the same backers).

The intensifying, rolling fire from the oil and gas industry and its political affiliates would force the asset manager into making even more significant changes to the format, focus, tone, and language of its high-profile annual dispatches.

In 2023, in an act of contrition, the company discontinued both the Chairman's Letter to CEOs and the Letter to those troublesome clients interested in the net-zero transition. The company explained that the new Chairman's Letter to Investors, which it did not release until March, could be used by all stakeholders.⁷² The letter opens with a reminder that the company is a fiduciary serving a diversity of clients with diverging opinions: the company's role is to offer choices to help clients reach investment goals and invest assets according to their objectives and guidelines and respect their choices on proxy voting. Running over 20 single-space pages, the letter makes no mention of ESG. The only mention of the environment is a cop-out. The humbled chairman no longer demands TCFD-aligned disclosures (which include Scope 3 emissions when material in an impact sense); instead, he observes that most S&P 500 companies "voluntarily report Scope 1 and Scope 2 emissions" (our emphasis). He further underlines that "it is for governments to make policy and enact legislation, and not for companies, including asset managers, to be the environmental police". This paragraph follows the clarification that past disclosure advocacy was on behalf of the company's clients since "As minority shareholders, it's not our place to be telling companies what to do." This also echoes the assertion, made just before, that «It is not the role of an asset manager like BlackRock to engineer a particular outcome in the economy". The letter includes as many mentions of sustainability as there are mentions of energy companies. As for the latter, the chairman explains that "oil and gas will play a vital role in meeting global energy demands" during the transition toward lower carbon emissions; that "Many of our clients (...) recognize the vital role energy companies will play in ensuring energy security and a successful

69 - Republicans Can Stop ESG Political Bias - The progressive left is using it to advance goals it could never hope to achieve at the ballot box, Mike Pence, Wall Street Journal, 26 May 2022.

70 - Pence's nonprofit rolls out digital ad campaign to take on ESG - Effort comes as Pence picking up activity amid 2024 speculation, Aaron Kliegman, Fox News, 22 February 2023; Trump Adds His Voice to Republicans Condemning ESG Investing, Mark Niquette, Bloomberg, 25 February 2023.

71 - Consumers' Research was acknowledged as a diamond sponsor by SFOF in 2021 and 2022.

72 - Larry Fink's Annual Chairman's Letter to Investors, Laurence Fink, BlackRock, March 2023.

energy transition"; and that the company is "working with energy companies globally that are essential in meeting societies' energy needs"; and that fossil fuels "will remain important sources of energy for many years ahead."

After the company was named, shamed, investigated, blacklisted, and boycotted for integrating ESG considerations into investment, its chairman admitted to removing the acronym from his annual letter due to it having been "politicised and weaponised" and said he would no longer use a term that "has been misused by the far left and the far right," and even felt ashamed to having been drawn into a political conversation.⁷³ As we have documented here, the adjustments made by the company go well beyond that.⁷⁴

However, the anti-ESG backlash showed no sign of abating in 2023 – Republican states passed dozens of new anti-ESG laws, had their attorney generals warn participants in net-zero coalitions that this activity raised consumer protection and antitrust concerns and put asset managers⁷⁵ on notice ahead of the proxy season (i.e. to advise them to vote in alignment with "their legal duties to focus on financial return" and not "the policy goals of ESG activists"). The year started with BlackRock being added to the Kentucky boycott list⁷⁶ and ended with the House Judiciary Committee subpoenaing BlackRock for documents related to its investigation of "collusive agreements to promote and adopt left-wing environmental, social, and governance (ESG) goals"⁷⁷ and Tennessee Attorney General filing a consumer protection lawsuit against BlackRock.⁷⁸

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Adjustments beyond words continue in 2024. A truce appears possible in Texas where the company hosted a conference early in February to encourage power grid investments⁷⁹ with the Chairman and the Lieutenant Governor exchanging niceties.⁸⁰ And the company has dialled down its commitment to the Climate Action 100+.⁸¹

73 - BlackRock CEO Larry Fink says he no longer uses term 'ESG': 'It's been totally weaponized', *Cheyenne Ligon, P&I*, 26 June 2023.

74 - As we were editing this paper, we learned that BlackRock had downscaled its participation in the Climate Action 100+ coalition by transferring it to BlackRock International; JP Morgan Asset Management, State Street Global Advisors, and PIMCO withdrew (Climate Action 100+ reaction to recent departures, *Climate Action 100+*, 26 February 2024).

75 - Dear Asset Manager Letter of 30 March 2023, signed by 21 Republican Attorneys General.

76 - BlackRock, Citigroup Among Firms Named Fossil-Fuel Boycotters by Kentucky, *Nic Querolo, Bloomberg*, 3 January 2023.

77 - Chairman Jordan Subpoenas BlackRock and State Street in ESG Investigation, *Press Release, The Committee on the Judiciary, House of Representative*, 15 December 2023.

78 - BlackRock is accused of confusing consumers by advertising two allegedly inconsistent positions, i.e., return maximisation and environmental impact consideration, of deceiving consumers about the true extent of its commitment to fulfilling ESG aims (as demonstrated by its participation in net-zero coalitions, which cuts across all of its assets, including those not identified as sustainable investments), and of deceiving consumers by overstating the extent to which ESG considerations can affect investment performance (*State of Tennessee vs. BlackRock, Inc., No. 23-cv-618, Williamson County Circuit Court*, 18 December 2023).

79 - Lt. Governor Dan Patrick: Statement on the Upcoming Texas Power Grid Investment Summit, *Office of the Lieutenant Governor*, 29 January 2024.

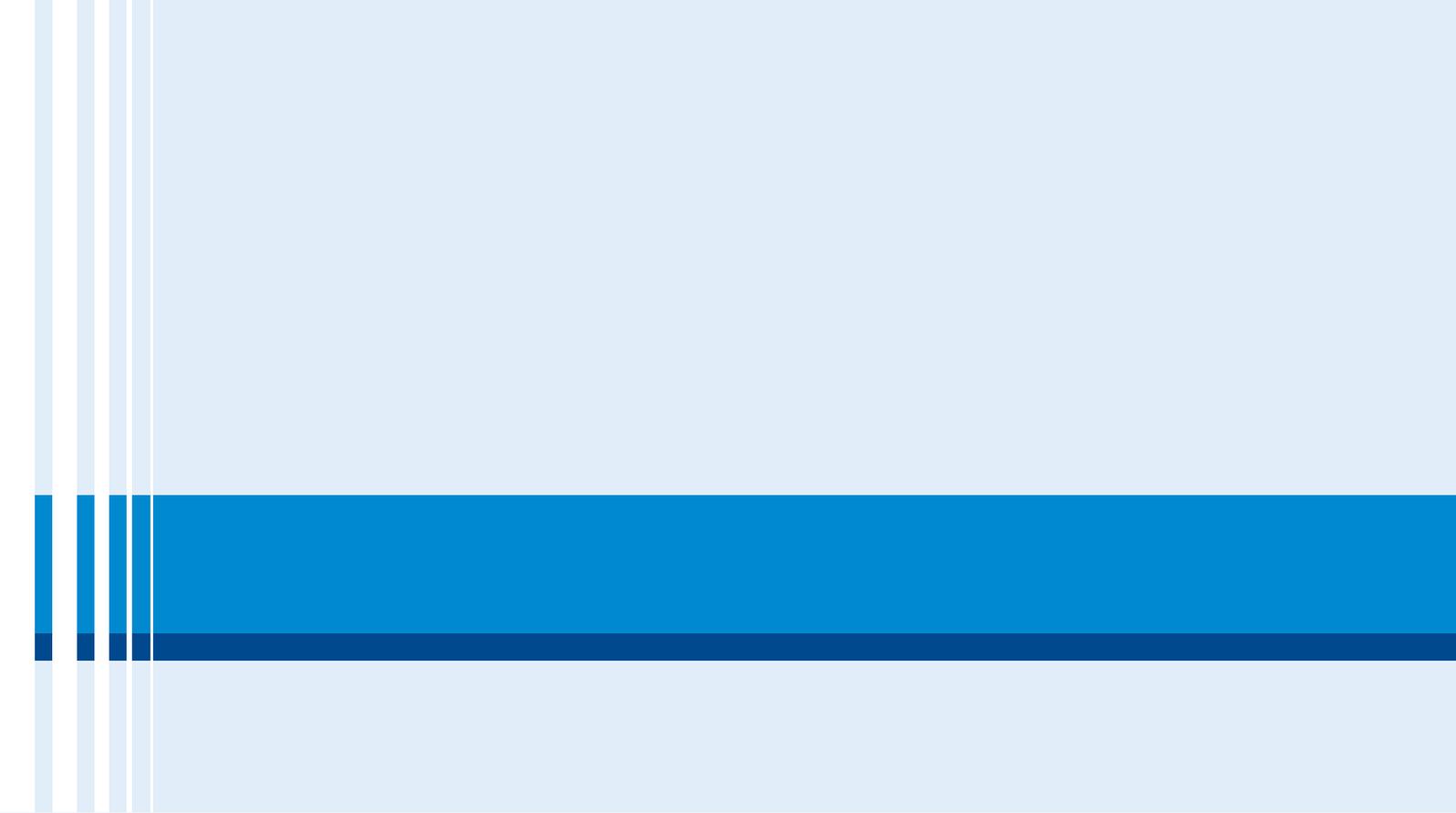
80 - BlackRock's Fink Strikes Truce with Texas, *Larry Light, Chief Investment Officer*, 13 February 2024.

81 - Climate Action 100+ reaction to recent departures, *Climate Action 100+*, 26 February 2024.

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About EDHEC-Risk
Climate Impact Institute

Exploring double materiality – studying the impact of climate-change related risks on finance and the effects of finance on climate change mitigation and adaptation

Institutional Context

Established in France in 1906, EDHEC Business School now operates from campuses in Lille, Nice, Paris, London, and Singapore. With more than 110 nationalities represented in its student body, some 50,000 alumni in 130 countries, and learning partnerships with 290 institutions worldwide, it truly is international. The school has a reputation for excellence and is ranked in the top 10 of European business schools (Financial Times, 2021).

For more than 20 years, EDHEC Business School has been pursuing an ambitious research policy that combines academic excellence with practical relevance. Spearheaded by EDHEC-Risk Institute, its aim is to make EDHEC Business School a key academic institution of reference for decision makers in those areas where it excels in expertise and research results. This goal has been delivered by expanding academic research in these areas and highlighting their practical implications and applications to decision makers. This approach has been complemented by strategic partnerships and business ventures to accelerate the transfer of scientific innovation to the industry and generate financial benefits for the School and its constituencies.

In the Fall of 2022, EDHEC-Risk Institute became EDHEC-Risk Climate Impact Institute (EDHEC-Risk Climate). This transition reflects the importance assigned by the School to sustainability issues and builds on the foundations laid by EDHEC-Risk Institute research programmes exploring the relationships between climate change and finance.

Mission and Ambitions

EDHEC-Risk Climate's mission is to help private and public decision makers manage climate-related financial risks and make the best use of financial tools to support the transition to low-emission and climate-resilient economies.

Building upon the expertise and industry reputation developed by EDHEC-Risk Institute, EDHEC-Risk Climate's central ambition is to become the leading academic reference point helping long-term investors manage the risk and investment implications of climate change and adaptation and mitigation policies.

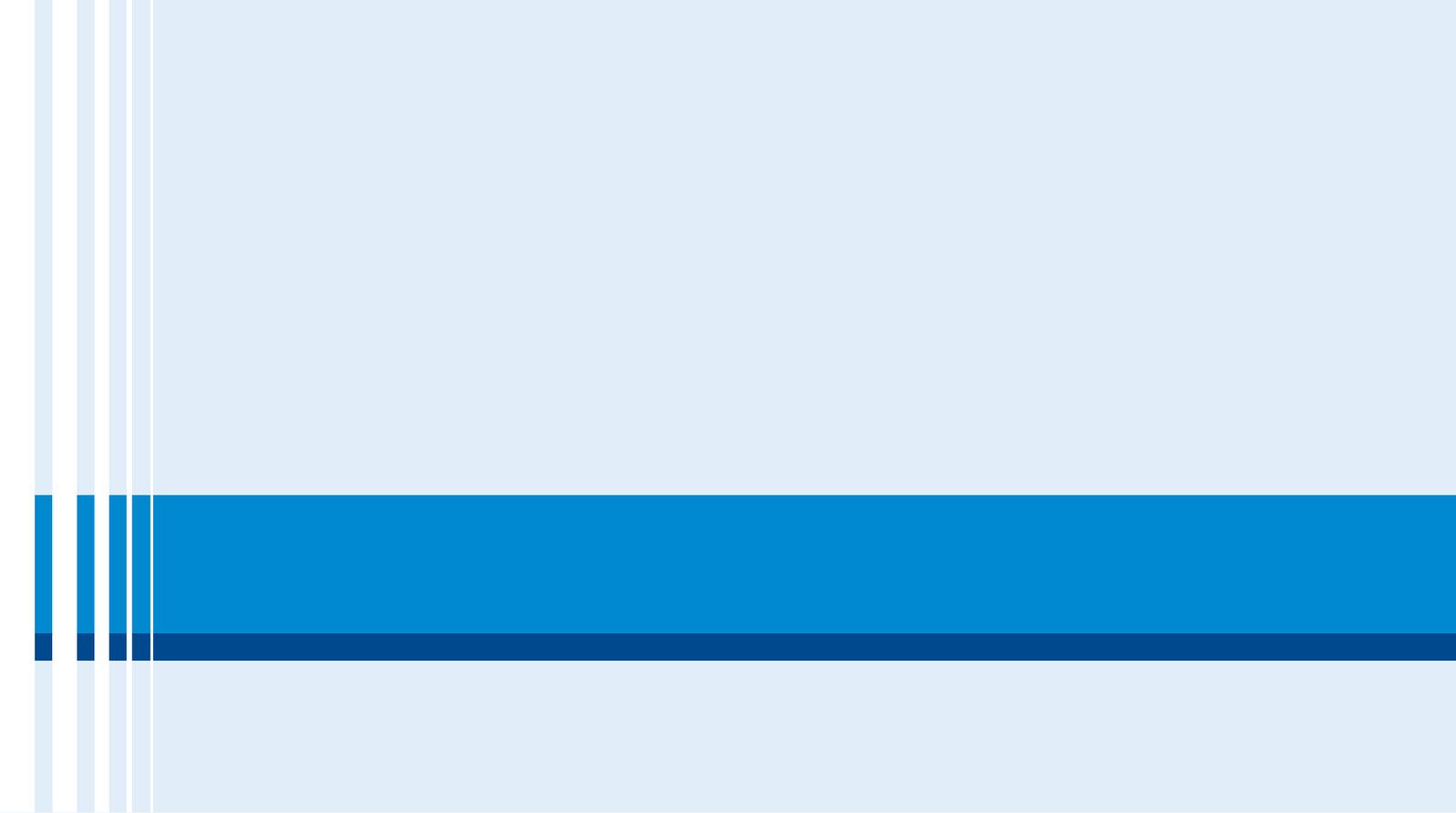
EDHEC-Risk Climate also aims to play a central role in helping financial supervisors and policy makers assess climate-related risks in the financial system and provide them with financial tools to mitigate those risks and optimise the contribution of finance to climate change mitigation and adaptation.

The delivery of these ambitions is centred around two long-term research programmes and a policy advocacy function.

The research programmes respectively look at the Implications of Climate Change on Asset Pricing and Investment Management and the Impact of Finance on Climate Change Mitigation and Adaptation.

The Institute also supports the integration of climate issues into the research agenda of the School's other financial research centres and into the product offering of the School's business ventures. In particular, it helps leading infrastructure research centre EDHECinfra build capacity on sectoral alignment and transition plans.





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