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Private sector adaptation reporting as a source of input to the Global Stocktake

Thomas William Dale, Jingjing Gao, Vidhee Kiran Avashia, Susanne Konrad and Amit Garg

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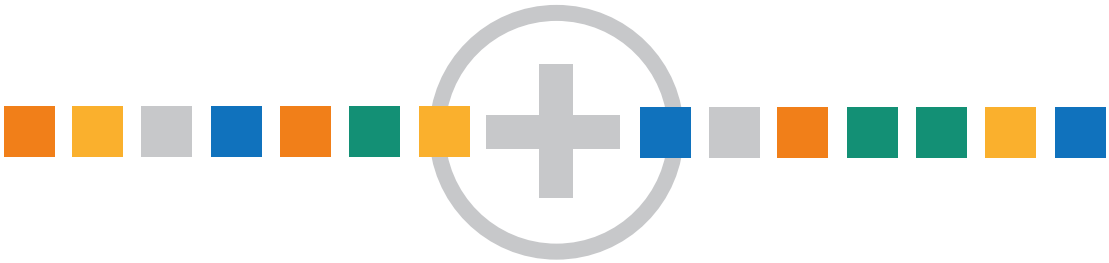
iGST
Independent Global Stocktake

Private sector adaptation reporting as a source of input to the Global Stocktake



Thomas William Dale, Jingjing Gao, Vidhee Kiran Avashia, Susanne Konrad and Amit Garg

December 2021

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iGST Independent Global Stocktake

About the independent Global Stocktake (iGST) and the Adaptation Working Group

The Independent Global Stocktake (iGST) is a consortium of civil society actors working together to support the Global Stocktake (GST), the formal process established under the Paris Agreement to periodically take stock of collective progress toward its long-term goals.

The iGST aligns the independent community — from modelers and analysts, to campaigners and advocates — so we can push together for a robust GST that empowers countries to take greater climate action. www.independentglobalstocktake.org

The **Adaptation Working Group (AWG)** of the iGST was created in 2019, with the objective to support the GST by providing a scientifically sound assessment of progress made on adaptation in relation to the Global Goal on Adaptation. The AWG 2021 program is co-chaired by UNEP DTU Partnership and Indian Institute of Management Ahmedabad

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List of abbreviations

AI	Artificial Intelligence
ARP	Adaptation Reporting Power
ASC	Adaptation Sub-Committee
AWG	Adaptation Working Group
BAU	Business As Usual
BTR	Biennial Transparency Report
CAMDA	Climate Action Methodologies Data and Analysis
CCC	UK's Climate Change Committee
C-CID	Climate Cooperative Initiatives Database
CCRA	UK's Climate Change Risk Assessment
CDP	Carbon Disclosure Project (former name of CDP)
CDSB	Climate Disclosure Standards Board and Sustainability Accounting Standards Board
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COP	Conference of the Parties
COO	Chief Operating Officer
CSR	Corporate Social Responsibility
DEFRA	Department for Environment, Food and Rural Affairs
ESG	Environmental, Social and Governance
EU	European Union
FSB	Financial Stability Board
GCA	Global Center on Adaptation
GCAP	Global Climate Action Portal
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
GST	Global Stocktake
IFRS	International Financial Reporting Standards
iGST	Independent Global Stocktake
IIMA	Indian Institute of Management Ahmedabad
IIRC	International Integrated Reporting Council
ISSB	International Sustainability Standards Board
MNC	Multinational Corporation
NAP	National Adaptation Plans
NAZCA	Non-State Actor Zone for Climate Action
NDC	Nationally Determined Contribution
PSI	Private Sector Initiative
SBSTA	Subsidiary Body for Scientific and Technological Advice
SASB	Sustainability Accounting Standards Board
SDG	Sustainable Development Goal
TCFD	Task Force on Climate-Related Financial Disclosures
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme

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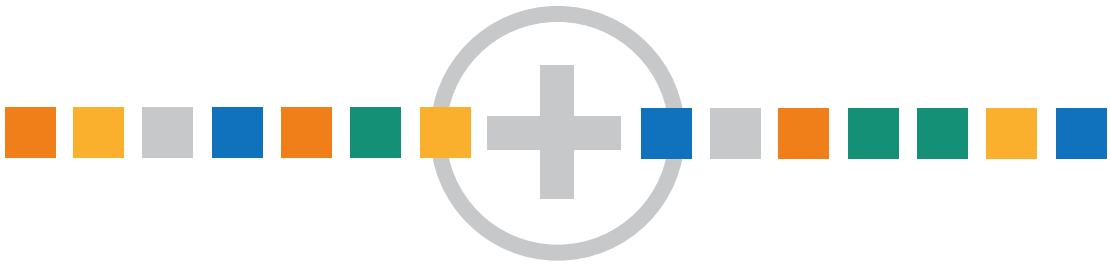


+ Executive Summary

The global stocktake process has been established by article 14 of the Paris Agreement to periodically track progress towards achieving the collective goals set out in the Paris Agreement, including the global goal on adaptation. Its outputs are intended to serve as input to negotiations under the UNFCCC and to support Parties in enhancing their climate policies. The inaugural global stocktake was commenced at the COP26 in November 2021 and will be carried out in 2021 - 2023. A proposed approach for implementing the first global stocktake process was outlined in a UNFCCC "non-paper" (and its revised version) earlier in 2021. However, as a global level assessment being conducted across multiple thematic areas and dimensions, the global stocktake represents a methodologically challenging endeavour. Consequently, the global stocktakes – at least initially – are unlikely to be able to generate a fully comprehensive picture of progress that meaningfully considers the contributions of all actors.

As a key member of the broad-based coalition of actors required to mitigate and adapt to climate change, it is important that the contributions and needs of the private sector are not overlooked by the global stocktake. Their omission would inevitably limit the global stocktake's ability to fully inform the Parties and the negotiations – potentially leading to the development and implementation of decisions and policies that are inadequate for seizing the potential of the private sector or meeting its growing adaptation needs. At present, however, information about adaptation by the private sector is largely absent from Party submissions to the UNFCCC, which represent a key source of input to the global stocktake. Equally, discussions relating to how to integrate private sector adaptation into the global stocktake are very limited, and little progress has been made so far in proposing, developing, and applying approaches to track and assess private sector adaptation at the global level.

In response, this report, co-led by UNEP DTU Partnership and The Indian Institute of Management Ahmedabad, explores whether emerging sources of data being generated by various types of private sector reporting can be used as inputs to assess private sector adaptation at aggregated levels. The overall aim of this work is to lay the groundwork for the utilization of this data in assessments of private sector adaptation at the global level, thereby eventually enabling it to be considered in future iterations of the global stocktake. To present the key findings, this summary is organised in four sections: the current landscape of private sector reporting; gaps, limitations and challenges; summary and way forward; and the recommendations for enabling such reporting to be considered by the global stocktake.

Landscape of private sector reporting with relevance to adaptation

Companies are increasingly reporting on climate-related issues to a wide variety of different stakeholders. This paper distinguishes between three broad types of reporting, determined by to whom companies are reporting to:

1. Reporting to external stakeholders via climate-related corporate disclosure

Refers to climate-related corporate disclosure refers to the business practice of disclosing climate-related information to stakeholders. The publication of the TCFD

recommendations in 2017 has led to a significant increase in companies reporting on their exposure and management of risks posed by climate change (including its physical impacts). While disclosure practice is increasing year-on-year, the comprehensiveness and quality of disclosures is still limited, and practice varies significantly across different regions, business sizes, and sectors.

2. Reporting to databases documenting non-state climate action

Refers to platforms that document climate action being implemented by non-state actors (including the private sector). Databases hosted by these platforms represent a data source for tracking and assessing non-state climate action, with some – e.g., the Global Climate Action Platform – having official status under the Marrakech Partnership as a tracking vehicle. However, adaptation – particularly related to the private sector – is very poorly represented in these databases. Further, entries that are relevant to private sector adaptation generally lack comparability limiting the extent to which information can be analysed at aggregated levels.

3. Reporting to national governments

Refers to processes in which companies are asked by national governments to provide them with information concerning how they are adapting to climate change, typically for the purposes of informing policy. Governments can either collect information through establishing bespoke reporting systems or utilise corporate disclosures as a secondary source of data. Presently there are limited examples of governments doing either, however, the increasing number of governments mandating climate-related corporate disclosures in accordance with the TCFD requirements represents an opportunity for governments to collect and analyse large quantities of information related to private sector adaptation.

Gaps, limitations and challenges:

To be considered by the global stocktake, information generated by private sector reporting would need to be aggregated from the company-level to the global-level, where it can then be considered as a "source of input" in the global stocktake's technical assessment. At present, the potential for the information being reported by companies to be considered by the global stocktake is found to be limited due to barriers in major key areas.

The first area concerns the quantity and quality of data being generated by private sector reporting processes, which may lead to methodological difficulties in meaningfully aggregating and analysing the data reported. In particular, questions are raised about the level of comparability, consistency, comprehensiveness, and coherence across the datasets generated by each of the three types of reporting, and the extent to which this will inhibit meaningful aggregation. These questions are especially pertinent to the reported information related to the outcomes and impacts of adaptation action, which will inevitably be highly context specific.

Furthermore, this report finds that existing private sector reporting only captures certain facets of private sector adaptation, thereby limiting its potential to provide a comprehensive picture of private sector adaptation. All types of adaptation reporting were found to be predominantly conducted by large or multinational corporations, predominantly based in the Global North. As a result, their ability to provide the basis for

generating insights related to adaptation in Micro, Small and Medium sized Enterprises and companies based in the Global South is limited.

The second area relates to whether it is possible for reported data to be put in a position where it could be considered by the global stocktake. For example, as the specific modalities of the global stocktake are yet to be decided, it is currently unclear to what extent private sector adaptation as a thematic area will be prioritized under the global stocktake. More pertinently, however, there is an absence of existing mechanisms specifically assessing this data to generate a picture of private sector adaptation at the global level. The emergence of mechanisms – e.g., periodic assessment reports focusing on private sector adaptation – will be vital in ensuring that information about private sector adaptation at the global level is available to the global stocktake.

Summary and way forward:

Unlike other types of reporting, climate-related corporate disclosures already generate large quantities of data with global coverage (albeit geographically imbalanced), and hence represent the most promising source of input for assessing private sector adaptation.

Further, due to alignment behind the TCFD recommendations, and increasing collective experience in preparing climate-related corporate disclosure, the data generated through this process is becoming increasingly comprehensive and comparable – meaning that their potential to be meaningfully aggregable is also set to increase over time. However, certain limitations, such as inherent reporting bias caused by the realities of preparing climate-related corporate disclosure – e.g., towards large companies and companies based in certain regions – are unlikely to be fully overcome.

In light of their limitations, initial approaches for using climate-related corporate disclosures as input for assessing private sector adaptation could focus on tracking process indicators associated with implementing adaptation best practices.[1] While this approach would not enable assessments to determine if companies are reducing their vulnerability to climate change, it would provide an indication of whether companies are establishing the necessary processes and governance structures to increase their capacity to adapt.

Recommendations:

In order to enhance the availability and quality of adaptation-relevant information being reported on by companies, this report makes the following recommendations:

1. Climate-related disclosure initiatives and other relevant business organizations need to place greater focus on building capacity for companies to report on physical risks and their management within corporate disclosures.
2. The Global Climate Action Portal should seek to increase the extent to which it captures adaptation being implemented by the private sector.

[1] Such actions could be based on the TCFD recommendations, e.g., integration of physical climate risks into broader risk assessment processes, or establishment of governance structures explicitly related to decision-making concerning climate-related risks.

3. National governments can play a role in increasing the quantity and quality of corporate disclosures by mandating corporate disclosure in alignment with the TCFD recommendations.

And to bridge gap between the outputs of private sector reporting and the global stocktake, this report makes the following recommendations:

4. The research community needs to develop and execute approaches for tracking and assessing progress in private sector adaptation at the global level.
5. National governments can track and assess adaptation in their domestic private sectors through establishing bespoke reporting systems.
6. The global stocktake should ensure it remains open to including information about progress in private sector adaptation.

+ 1. Introduction

Heavy rains, increased cyclonic activities and extreme heat are increasingly becoming the new normal. In 2021 alone the world has witnessed a myriad of climate related disasters. In July this year, parts of Germany, Belgium, the Netherlands, and Luxembourg were impacted by extreme flooding induced by record breaking rainfall. Central China and Maharashtra (India) experienced severe flash flooding, and a typhoon in Shanghai brought with it the region's heaviest rainfall in the last 1000 years. In the same month, record breaking heatwaves in the US and Canada saw temperatures reach 49°C, and heat-induced wildfires broke out across Southern Europe, Siberia, Brazil and the US, engulfing large swathes and destroying villages, towns and tourist resorts. The impacts of climate change are occurring in the here and now, and they are being felt irrespective of the geography and development levels of nations worldwide.

It is well documented that climate change poses a wide array of risks to natural and human systems, and the private sector is no exception. To greater and lesser extents, climate change is already affecting the operations of businesses, including their ability to generate profits (Tsitsiragos, 2016). Over the past decade the private sector has increasingly become aware of the additional risks posed by climate change, resulting in the notion that climate risks need to be incorporated into wider business risk management gaining significant traction.

As the private sector is an important provider of jobs and key services (e.g., utilities, transport and communications infrastructure), as well as a driver of economic growth, the resilience of the private sector is recognized as being inherently important to the resilience of wider society (Federal Emergency Management Agency, 2011; McKnight and Linnenluecke, 2016, 2019; Schaer, 2018; Schaer et al., 2019 and Pauw et al., 2021). In addition to enhancing its own resilience to climate impacts, the private sector is being increasingly acknowledged for its important role in addressing the adaptation needs of wider society, for example, as a provider of adaptation finance or a developer and provider of resilience-enhancing products or services that are able to make impact at scale (Agrawala et al., 2011; Frey et al., 2015; Averchenkova et al., 2016; Schaer, 2018; Schaer et al., 2019).

This growing recognition of the private sector's role in the global adaptation process has led to the emergence of different private sector reporting initiatives related to adaptation and climate risk, through which companies are being encouraged – and in some cases mandated – to report on information related to their exposure to, and management of, climate risks, and/or how they are contributing to wider adaptation needs. Such reporting initiatives are being driven by a variety of stakeholders with different objectives and informational demands. For example, over the last decade, the notion of including information about climate-related risks within corporate disclosures has emerged, gaining significant momentum following the publication of the Task Force on Climate-Related Financial Disclosures (TCFD) recommendations in 2017. Over a similar timeframe, a number of initiatives have been established– for example, by the United Nations Framework Convention on Climate Change (UNFCCC) – in order to document adaptation, or climate action more broadly, implemented by non-state actors – including the private sector – to track implementation and/or enable knowledge sharing.

Given the private sector's important role in the broad-based coalition to tackle climate change and the rapid expansion of private sector reporting, tracking and assessing how the private sector is contributing to collective adaptation goals, for example the global goal on adaptation (GGA) established under the Paris Agreement,[2] is of increasing importance to enable effective interventions by the UNFCCC and its country Parties.

1.1. Background and Rationale

The Adaptation Working Group (AWG) of the independent Global Stocktake (iGST) was created as part of the wider iGST process in 2019. The overall objective of the AWG is to increase the effectiveness of the global stocktake in providing a scientifically sound assessment of progress made on adaptation in relation to the global goal on adaptation, and to increase the level of ambition in adaptation commitments and plans, in particular those submitted under the UNFCCC – i.e., Adaptation Communications, Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs) and related climate policies for adaptation. This in turn would lead to greater consistency between national and international adaptation actions and the long-term goal of the Paris Agreement.

In a previous study, UNEP DTU Partnership analysed the formally identified the adaptation-related information sources of the global stocktake and the degree to which gaps can be expected in terms of methodologies and the quality of data sources. Based on this preliminary analysis, a few critical areas were identified where the iGST could add value to adaptation under the global stocktake. One such critical area, proposed as the focus of the second phase of the AWG, is to support the global stocktake to consider progress being made in private sector adaptation. The rationale for focusing on private sector adaptation is that among the many challenges that the global stocktake faces, the adaptation actions by non-state actors – in particular the private sector – is an important segment that likely will be overlooked.[3] [4]

Although government-driven adaptation is recognised to only represent a fraction of the overall adaptation action required, in its present guise, the global stocktake will be reliant on information generated through reporting by country Parties to the UNFCCC – i.e., information contained within reporting instruments such as Adaptation Communications, National Communications, Biennial Transparency Reports (BTR) and NDCs (Christiansen et al., 2019; UNFCCC, 2021a). These state-led processes are known to under-report or miss altogether a significant share of adaptation progress and efforts by non-state actors, especially the private sector (Lesnikowski et al., 2015; Goldstein et al., 2018). Tracking efforts by these actors however will be crucial if the global stocktake is to comprehensively and accurately capture broad progress being made in adaptation at the global level, beyond what national governments themselves are doing.

[2] The global goal on adaptation is established by article 7 of the Paris Agreement and is to "enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal" (UNFCCC, 2015a).
[3] According to the 2018 edition of the Emissions Gap Report (UNEP, 2018), non-state actors include companies, cities, subnational regions, and investors that take or commit to climate action.
[4] According to UNEP's Strategy for Private Sector Engagement (UNEP, 2019), private sector is the part of the economy that is run by individuals and companies and is not state controlled.

1.2. Objectives and Scope

The objective of this work is to explore the potential for assessing private sector adaptation at aggregated levels using data generated by existing private sector reporting processes as an input. This paper aims to achieve this by investigating the emerging sources of data being driven by the various forms of private sector reporting that have relevance to adaptation, namely: reporting via climate-related corporate disclosures, (ii) reporting to databases documenting non-state climate action, and (iii) reporting to national governments. The overall aim is to lay the groundwork for the utilization of this data in assessments of private sector adaptation at the global level, thereby eventually enabling it to be considered by future iterations of the global stocktake.

The paper is structured as the following:

Section 2 reviews the different forms of private sector reporting that have relevance to adaptation. Specifically, Section 2 assesses how each of these types of reporting generate adaptation-relevant data, reviews the current state of this data and explores how ongoing developments in reporting practices are potentially enhancing the quality of the data being reported.

Section 3 then discusses how adaptation-relevant data generated by private sector reporting could be considered by the global stocktake. To do this, the paper first proposes a simplified model that outlines the different pathways that could facilitate the aggregation of this data to the global level. The section then provides an overview of the extent to which adaptation-relevant data from the three types of private sector reporting is already being aggregated and analysed. Finally, the section then explores and discusses potential gaps and limitations in the adaptation-relevant data being generated by private sector reporting processes, and the gaps in the existing linkages required to aggregate this data upwards to the extent where it could feasibly be considered in the global stocktake.

Section 4 summaries the key findings from across sections 2 and 3 and proposes a potential way forward for using corporate disclosures to assess private sector adaptation.

To close, **section 5** provides a series of recommendations that could be implemented to (i) enhance the potential of data being generated by private sector reporting processes to be used as a robust input to assessments of progress in private sector adaptation at the global-level, and (ii) strengthen the likelihood that information concerning private sector adaptation would be considered by the global stocktake.

1.3. Methodology

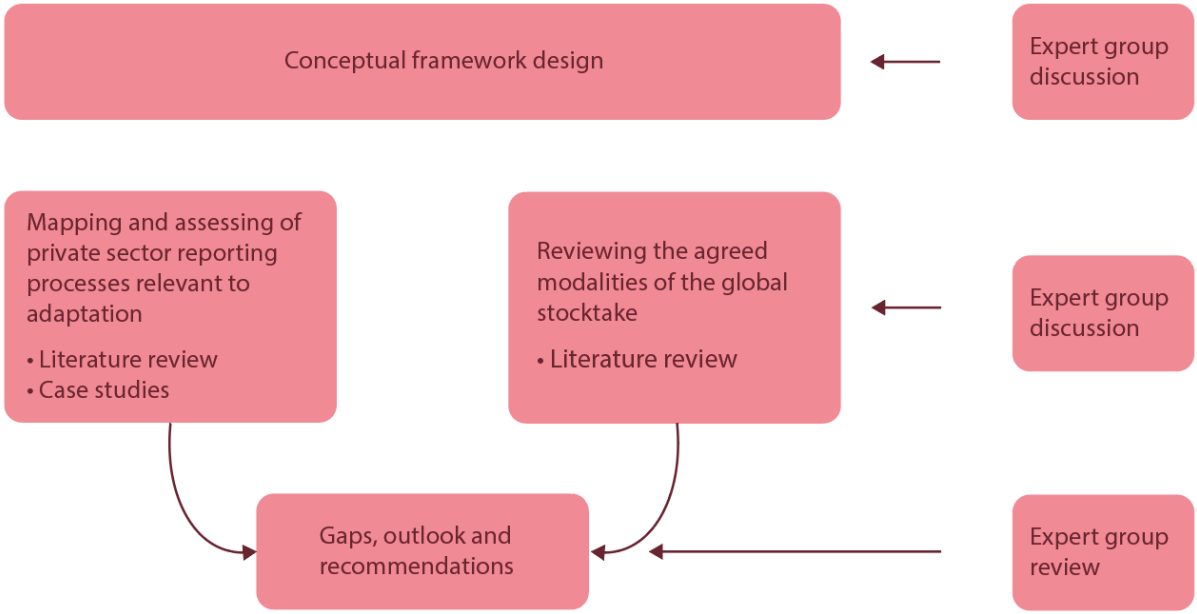
This paper was prepared utilising three methodological approaches: discussions with an expert working group, an exploratory review of academic and grey literature, and the preparation of case studies.

Led by UNEP DTU Partnership and the Indian Institute of Management Ahmedabad (IIMA) – the two chairs of the iGST AWG – the expert working group was composed of twelve experts chosen based on their particular interest and expertise in either private sector adaptation, climate-related corporate disclosure, or the UNFCCC's global stocktake. The

expert group played a key role in the initial conceptual design of the paper and in reviewing the paper's outputs at various stages in its development.[5]

The analysis in the paper takes two points of departure. The first point of departure is assessing the private sector reporting processes and how – and to what extent – these processes generate adaptation-relevant information. The second point of departure is the modalities of the global stocktake, specifically assessing entry points through which it would be able to consider information about private sector adaptation. For both points of departure, grey and academic literature were used as the basis for analysis. For the reporting pathway 'reporting to national governments', analysis was supplemented by two case studies of national-level reporting systems. Using the analysis of private sector reporting processes and the modalities of the global stocktake as a basis, gaps and recommendations were identified and discussed.

Figure 1 Methodological overview of this study



Limitations

As the subjects of 'adaptation reporting by the private sector' and 'the integration of information about private sector adaptation into the global stocktake' have – at the time of writing – received very limited coverage in existing literature, an exploratory approach has been taken when preparing this paper. While this has allowed the investigation to be flexible and dynamic, it has also meant accepting compromises within the methodology that may have impacted robustness of the findings. When reflecting on the findings of this report, key considerations are:

- The review of literature conducted during the preparation was not exhaustive. As mentioned in the paragraph above, work to prepare this report adopted an exploratory approach. As part of this, reviews of literature were primarily guided by recommendations from members of the expert group, key terms searches using academic and non-academic search engines, and snowballing. A consequence of this

[5] Throughout this study, two expert group discussions were held and one review.

approach is that this report cannot claim to have considered all available literature on this topic.

- A systematic review of corporate disclosures has not been conducted as part of preparing this report. While a potentially useful exercise for assessing the quality of data generated through climate-related corporate disclosure, due to the volume of corporate disclosures a systematic review of this data was beyond the scope of this work. Instead, analysis provided about the quality of data generated by climate-related corporate disclosure is based on the findings of existing reviews of corporate disclosures, which are utilized by this report as a secondary source of data.

+ 2. Private sector adaptation reporting

To get an overview of the existing practice of private sector's reporting on adaptation, Section 2 identifies and reviews three types of adaptation reporting currently undertaken by the private sector: (1) reporting via climate-related corporate disclosures, (2) reporting to databases documenting non-state climate action, and (3) reporting to national governments. This section summarizes the present state of and practice within each of the three types of reporting and assesses the relevance of information being generated by these processes for assessing progress in private sector adaptation at aggregated levels.

2.1. Climate-related corporate disclosures

The term "climate-related corporate disclosure" refers to the business practice of disclosing climate-related information to their stakeholders (e.g., investors, civil society groups, regulators and employees). In these disclosures, companies provide information under two broad and closely related areas: (i) the impact they are having on climate change (i.e., GHG emissions), and (ii) how the impacts of climate change pose a risk to their operations, and how they are managing these risks.

The notion of climate-related disclosures originates as a subcomponent of Environmental, Social and Governance (ESG) reporting, which began gaining momentum at the start of the 21st century. ESG – and its climate change subcomponent – factored into the "responsible investment" realm which was traditionally not a part of the financial assessments (Boffo and Patalano, 2020). To support ESG-related disclosures and to develop necessary metrics and establish best practices, several frameworks and regulations have developed over time. Within these disclosures, climate action was generally viewed through the lens of corporate social responsibility (CSR), which frames corporate climate action as a means of reducing or compensating the company's negative impact on society and the environment (ibid.).

In 2015, the Financial Stability Board (FSB), an international body monitoring and providing recommendations about the global financial system, formulated the Task Force on Climate-Related Financial Disclosures (TCFD) with the objective of developing voluntary climate-related financial disclosure guidelines that enable investors to assess and 'price in' climate-related risks into their decision-making using corporate disclosures. The release of the TCFD recommendations in 2017 marked a significant change in climate-related corporate disclosure as it emphasized the need for companies, investors and financial markets to frame climate change as a business risk, and not *just* as a sub-component of ESG or CSR.

Box 1 What do climate-related corporate disclosures look like in practice?

While strictly speaking there are no rules that determine how climate-related information should be disclosed, in practice companies predominantly disclose climate-related information in three ways (EY, 2018; TCFD, 2020):

- within their periodic reports and filings − i.e., as a sub-component of their annual reports, director's reports, operating and financial reviews;
- as standalone sustainability reports;
- as response to CDP's Climate Questionnaire (see section 2.1.1 below).

Information reported via corporate disclosures is used by a multitude of external stakeholders to inform their engagement with the company. A primary end-user of corporate disclosures are investors, who use corporate disclosures as basis for making investment decisions (Fung, 2014; Amel-Zadeh and Serafeim, 2018; CDP et al., 2020a), typically as a means of ensuring that their investments are aligned with their various investment policies (e.g., policies relating to financial risk and corporate social responsibility). Other end-users include civil society organizations, ESG rating and ranking agencies, companies at the head of long supply chains and regulators, among others. Such end-users would typically use corporate disclosures to understand a company's situation, to hold companies accountable, and/or as a starting point for engagement (BSR, 2020; CDP et al., 2020a; Agustin, Maharani and Effendi, 2021).

From the company's perspective, comprehensive and high-quality disclosures can be utilized as a useful tool for enhancing their market reputation (Castilla-Polo and Sánchez-Hernández, 2020), and for securing a competitive advantage when – for example – securing external finance or attracting new customers (Coff et al., 2008). In addition, regular data collection on climate risk parameters is understood to support businesses in identifying and benchmarking climate risks, as well as tracking the effectiveness of their risk management policies and actions (TCFD, 2017; CDP et al., 2020a).

The Box 2 brings forth a discussion on how company driven disclosures on adaptation are influenced by the company's interpretation of adaptation. The case in focus here is of Indian Railways.

Box 2 What is being disclosed, and how is risk classified? Insights from disclosures by Indian Railways

India has the fifth largest and most densely used rail network in the world. On an average day, Indian Railways transports 23 million passengers and 3 million tons of freight (Indian Railways Statistical Summary, 2020).

Climate change, in particular extreme weather events, poses various types of risks for infrastructure assets that represent a potential for loss (Garg et al., 2015). The Indian Railways is no exception and is highly vulnerable to the impacts of climate change, with major accident and damage risks posed by extreme events such as cyclones and floods. Any disruptions to the Railways due to climate change impacts will cause not just economic loss and loss of productivity but also create issues for wider society, e.g., by disrupting the distribution of basic commodities. A lack of understanding of the adverse impacts of climate change and the vulnerability of infrastructure assets is a challenge for risk management (Sharma and Tomar, 2010).

The Indian Railways undertakes financial and non-financial disclosures through its annual reports. Climate-related information, including its climate actions, are reported in a separate section called 'Managing the Environment'. Disclosures between 2015 and 2019 indicate that the dominant share of reporting focuses on the company's mitigation activities, with only one action explicitly linked to adaptation – afforestation on railway-owned land – found to be reported on in these disclosures.

While this is the case, Indian Railways did report on the implementation of other actions that have clear relevance to managing and reducing physical climate risks, e.g., strengthening, rehabilitating, or rebuilding the railway network's most vulnerable structures or deploying track recording cars for electronic monitoring of track parameters. However, these efforts are not formally recognized as adaptation actions, instead being classified as business-as-usual risk management. Furthermore, Indian Railways does not assess and report on the costs of the physical climate risks. Important decisions taken by different organizational levels at Indian Railway regarding whether adaptation measures should be implemented, are likely to depend on the availability of estimations of the future costs of climate impacts to enable decision-makers to understand the net benefits of climate-proofing infrastructure.

This case gives an illustration that interpretations of adaptation influence the perceptions of risk classification that a company considers, especially whether a risk should be considered as business-as-usual risk or climate risk. A clearly rendered definition of risk classification is rather important for a company as it would have an effect on the ability to define return on investment on the risk management actions.

2.1.1 Climate-related corporate disclosures

As the momentum behind climate-related disclosures has gathered pace, a number of initiatives have been established to enhance the usability of corporate disclosures and promote improved and more consistent reporting overtime. The following sub-section provides an overview of the major frameworks and platforms operating in this arena.

Task Force on Climate-related Financial Disclosures (TCFD)

Although only one of the several prominent initiatives in the climate- or ESG-related disclosure arena, the Task Force on Climate-related Financial Disclosures (TCFD) can be considered as the primary driver for enhancements in quality of, and increased consistency between, risk-focused climate-related disclosures by private sector actors.

The TCFD was created in 2015 and is composed of representatives from large financial institutions and companies. Its objective is to increase and improve climate-related financial reporting and to ensure that investors have better access to the information about climate risks required to make informed investment decisions (see the official remit of the TCFD in

Box 3 below). In turn, it is anticipated that reducing the market asymmetry surrounding climate risks will provide companies with a strong incentive to better manage climate related risks, thus rendering them more resilient to the direct and indirect impacts of climate change.

Box 3 The remit of the TCFD

In April 2015, the Group of 20 (G20) Finance Ministers and Central Bank Governors asked the Financial Stability Board (FSB) to convene public and private-sector participants to review how the financial sector can take account of climate-related issues. As part of its review, the FSB identified the need for better information to support informed investment, lending, and insurance underwriting decisions and improve understanding of climate-related risks. To help identify the information needed to assess and price climate-related risks, the FSB established an industry-led task force — the TCFD. The FSB asked the TCFD to develop voluntary climate-related financial disclosures that would be useful to investors and others in understanding material risks related to climate change.

Source: TCFD (2020)

In 2017, the TCFD published eleven recommendations (presented in Box 4) that form the basis of a framework designed to facilitate the disclosure of climate-related risks and opportunities through existing reporting processes. The recommendations themselves are structured across four thematic areas – (i) governance, (ii) strategy, (iii) risk management and (iv) metrics and targets – that represent the core elements of how organizations operate. As such, under the framework that the TCFD recommendations establishes, companies are urged to disclose information relating to how climate change is impacting and is anticipated to impact their operations, and how climate-related risks are being managed. Specifically, companies are urged to disclose information about:

- How climate-related risks and opportunities are governed within a company
- How climate change is impacting, or anticipated to impact, a company's business operations and how climate risk is incorporated into its overarching strategy
- How a company procedurally manages climate-related risks (and opportunities)
- The climate-related targets a company has set, progress against these targets, and the metrics it uses to measure the progress

Box 4 The TCFD recommendations

Governance:

1. Describe the board's oversight of climate-related risks and opportunities.
2. Describe management's role in assessing and managing climate-related risks and opportunities.

Strategy:

3. Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.
4. Describe the impact of climate related risks and opportunities on the organization's businesses, strategy, and financial planning.
5. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.

Risk Management:

6. Describe the organization's processes for identifying and assessing climate-related risks.
7. Describe the organization's processes for managing climate-related risks.
8. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.

Metrics and Targets:

9. Disclose the metrics used by the organization to assess climate related risks and opportunities in line with its strategy and risk management process.
10. Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.
11. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

Source: TCFD (2017)

Adoption of the TCFD recommendations

Since their release, the TCFD recommendations have gained significant momentum among private sector and public sector actors, in particular national governments and financial regulators. As per the latest TCFD Status Report (2021), over 2600 organizations, including financial institutions and companies, spanning 89 countries and nearly all sectors of the economy support the TCFD recommendations. This is an increase of 73% from 2020 and an increase of 410% from 2018. Several jurisdictions are taking steps to either encourage or mandate TCFD-aligned disclosure, (TCFD 2021a). Brazil, the European Union, Hong Kong, Japan, New Zealand, Singapore, Switzerland and the United Kingdom are ,first movers in that regard, having all announced requirements for certain domestic companies to disclose according to the TCFD recommendations (either directly, or against national standards that are in line with the TCFD recommendations), generally publicly listed companies or large banks, insurers and other financial institutions (TCFD, 2021a; Government of the United Kingdom, 2020; Government of New Zealand, 2021; Swiss Federal Council, 2021; European Commission, 2021a; European Commission, 2021b). Similarly, different major climate- and ESG-related disclosure framework initiatives and standard setters that pre-date the TCFD have amended their frameworks and standards to align with the TCFD recommendations.

Furthermore, the International Financial Reporting Standards (IFRS) Foundation is implementing a work program to develop a baseline global reporting standard under robust governance and public oversight, building upon the framework established by the TCFD recommendations, as well as the work of sustainability standard-setters (G20, 2021). With its experience in developing standards for financial reporting, IFRS has been tasked by governments, financial regulators, and other organizations to establish a new body, an International Sustainability Standards Board (ISSB), for developing standards for companies to use when disclosing on climate-related risks. On 3 November 2021, IFRS announced the creation of the ISSB, with the overall objective of developing a single globally accepted corporate reporting standard that comprehensively integrates financial reporting and sustainability disclosure and overcomes the issues relating to consistency and comparability caused by having different sometimes competing disclosure frameworks and standards (IFRS, 2021). To achieve this, IFRS aims to establish voluntary minimum global standards, which countries could adopt and apply based on their specific contexts and needs. The first standard will build on the TCFD recommendations and is expected to be ready by mid-2022 (Jones, 2021).

How do the TCFD recommendations facilitate the generation of adaptation relevant information?

The TCFD's objective of closing the information gap related to the exposure of companies to climate-related risks and opportunities is enhancing the potential for corporate disclosures to act as a relevant source of data for assessing how the private sector is adapting to climate change. However, when framing climate-related risk, the TCFD distinguishes between two types of risk: physical risk and transition risk (see Box 5). While both transition risks and physical risks can have implications on the ability of companies to operate and generate value, when discussing the question "how is the private sector adapting to climate change?" it is only physical risks that are of relevance, as these relate to the direct impacts of climate change.

Box 5 Transition risk and physical risk

Physical risks are associated with the physical impacts of climate change, which in the context of the private sector will amount to losses of assets and income stemming from extreme weather events and longer-term climatic trends (e.g., a reduced availability of water), or losses income caused by increased frequency of disruptions to supply chains.

Transition risks are those associated with the implications on the business environment caused by society's transition to a climate resilient, low carbon economy. Such risks can stem from the various climate-related changes within domestic legal and policy environments, and within market demand that may lead to a loss of competitive advantage, stranded assets, and possible risk of litigation.

Source: Adapted from TCFD (2017)

The fact that physical risks are incorporated into the TCFD's understanding of climate-related risks means that companies disclosing in line with the TCFD recommendations should include information on how they are managing the present and future physical impacts of climate change, i.e., how they are adapting to climate change. As per the TCFD

recommendations and its supplementary guidance,6 companies should provide descriptive information about:

- **Their exposure and vulnerability to the physical impacts of climate change, and potential opportunities arising from the physical impacts of climate change.** This should include identifying: (a) the specific physical risks and opportunities (recommendation 3.), (b) how the specific physical risks and opportunities are affecting their businesses, strategy, and financial planning, (recommendation 4.), and (c) how resilient their overarching strategy is, considering the identified risks (recommendation 5.).
- **Their internal governance structures and processes for monitoring and managing the physical risks of climate change**. This should include outlining how climate-related issues are governed within the company (recommendations 1. and 2.) and (b) describing how physical risks and opportunities are identified, assessed, and managed at the strategic/policy level – including disclosing any adaptation plans7 and how physical risks are mainstreamed into existing risk management processes (recommendations 6., 7., and 8.).
- **Targets that they have established relating to reducing the physical risks posed by climate change**, and any metrics that they are using to measure and manage physical risks posed by climate change (recommendations 9. and 11.).

Based on the TCFD recommendations and its supplementary guidance, it is unclear whether the TCFD advocates reporting on discrete 'on-the-ground' adaptation actions implemented to address specific climate risks across single or multiple locations. On the one hand, such actions do not explicitly feature in the 11 recommendations, suggesting that they are not a priority. However, the TCFD's supplementary guidance for implementing the TCFD recommendations (2021b) stipulates that companies should consider disclosing on "adaptation and mitigation activities",8 while their guidance on metrics, targets and transition plans advocates the use of adaptation-related metrics relating to capital deployment, including the example metric “investment in climate adaptation measures (e.g., soil health, irrigation, technology)” (TCFD, 2021b, p. 17). All of this suggests that companies should consider disclosing on adaptation action, however guidance on the extent to which they should do this is presently missing.

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[6] Supplementary guidance by the TCFD include Guidance on Metrics, Targets, and Transition Plans (2021); Guidance on Risk Management Integration and Disclosure (2020); and Guidance on Scenario Analysis for Non-Financial Companies (2020). All of which can be found at: https://www.fsb-tcfd.org/publications/

[7] The TCFD defines such an adaptation plan as a document “laying out how an organization aims to minimize risks and capture opportunities associated with physical climate changes” (TCFD, 2021c p.39). However, the TCFD does not provide any guidance on developing such an adaptation plan – which contrasts starkly with transition plans, for which it provides guidance on their development and disclosure – and instead “encourages other frameworks and standard setters to consider developing guidance on designing and disclosing adaptation plans" (ibid).

[8] The suggestion that companies should consider disclosing on “adaptation and mitigation activities” is provided in the supplementary guidance document Implementing the Recommendations of the TCFD (TCFD, 2021b, p.18). However, the suggestion is made in relation to recommendation 4. "describe the impact of climate-related risks and opportunities on an organisations businesses, strategy, and financial planning", belonging to the recommendation's strategy element. It is therefore unclear as to whether such activities referred to are those at the strategic/policy level only, or whether it is also applicable to activities implemented 'on the ground'.

Climate- and ESG-related disclosure framework initiatives and standard setters

In addition to TCFD, there are other prominent initiatives operating in the climate and/or ESG reporting arena – namely, the Sustainability Accounting Standards Board (SASB), the Climate Disclosure Standards Board (CDSB), the Global Reporting Initiative (GRI), and the International Integrated Reporting Council (IIRC), commonly known as the "group of five" (TCFD, 2021a).

While the functions of these initiatives overlap to some extent, they can be broadly categorized as either: (a) climate- or ESG-related disclosure framework providers, or (b) sustainability disclosure standard setting organizations; defined in Box 6 below.

Box 6 Different types of disclosure initiative

Climate- or ESG-related disclosure framework providers: Initiatives that establish a set of general principles and guidance for what climate- or broader ESG-related reports should include and how should it be structured (e.g., TCFD, CDSB, IIRC).

Sustainability disclosure standard setting organizations: Initiatives that develop specific, replicable, and detailed requirements for what specific information should be reported for individual sustainability topics (e.g., SASB, GRI).

Source: Adapted from CDP et al. (2021b)

How do climate- or ESG-related disclosure frameworks and standard setters facilitate the generation of adaptation relevant information?

Climate- or ESG-related reporting frameworks and standard setters are enhancing the quality and comparability of climate- and ESG-related disclosures through their work in developing resources (i.e., disclosure frameworks, reporting guidelines and metrics) that either advance the field of ESG-related disclosure or build the capacity of companies to report on environmental, social and governance issues. As a sub-component of climate change, and corporate sustainability more broadly, providing resources to support companies in disclosing on issues relating to physical climate risk (i.e., exposure to) and adaptation comes under the mandate of each of these initiatives.

The scope of adaptation action that is captured by these disclosure frameworks and standards depends on the how they apply the concept of materiality. For example, certain disclosure initiatives (e.g., TCFD, SASB, and CDSB) focus solely on sustainability issues that are material to the value of the company (i.e., sustainability issues that pose a risk to the value of the company and its ability to generate revenue). Meanwhile, others (e.g., GRI and CDP) extend their understanding of materiality to include sustainability issues that are material to stakeholders or systems external to the company (i.e., the environment, people, or wider economy). As such, companies using certain frameworks and standards to generate their ESG and climate-related disclosures would only be encouraged to disclose on adaptation-related activities when they address issues that represents a risk to, or opportunity for, the reporting company. Companies using other frameworks and standards however would be encouraged to disclose adaptation-related activities that are of no material benefit to their ability to generate profit (e.g., activities that benefit other stakeholders), as well as those that address issues that represent a risk or opportunity. Table 1 provides an overview of the key characteristics of these initiatives.

Increasing alignment amongst initiatives in the climate and ESG disclosure landscape

In an effort to harmonize existing ESG standards and framework the “group of five” GRI, CDSB, IIRC, SASB and CDP, released a statement in September 2020 indicating their intention to collaborate in developing a standardized approach to standard-setting that results in a globally agreed set of defined subject areas under the ESG banner which would each possess their own agreed disclosure requirements (CDP et al., 2020a). Following this statement, a joint paper was released containing a prototype for the climate-related financial disclosure standard for reporting on enterprise value in December 2020 (CDP et al., 2020b). While only a proposal at this stage, the paper states that – due to their widespread uptake – the climate aspects of any potential globally accepted corporate reporting system would be structured around the TCFD's recommendations (ibid.). It also outlines why the recommendations, in combination with content from the group of five, can be utilized as a basis for the development of a global standard (ibid).

Table 1 Overview of prominent climate and ESG-related disclosure initiatives

	International Integrated Reporting Council (IIRC)	**Sustainability Accounting Standards Board (SASB)**	**Climate Disclosure Standards Board (CDSB)**	**Global Reporting Initiative (GRI)**
Initiative type	Framework	Standard	Framework	Standard
Disclosure domain	ESG / Sustainability	ESG / Sustainability	Climate Change	ESG / Sustainability
Primary objective	To connect sustainability reporting to financial disclosures	To provide disclosure standards across ESG topics that facilitate communication between companies and investors	To provide disclosure standards that enable climate change-related information to be integrated into mainstream financial reporting	To help companies identify, gather and report ESG information
Materiality concept	Issues are considered material if they are material to ability of the company to generate value	Issues are considered material if they are material to ability of the company to generate value	Issues are considered material if they are material to ability of the company to generate value	Issues are considered material if they have a significant impact on the economy, environment, and people, or they are material to the ability of the company to generate value

Sector specificity	Non-sector specific	Sector specific	Sector specific	Non-sector specific
TCFD alignment	Good alignment in case a firm considers climate as a material risk. However, does not specifically require disclosure of the resilience of organizational strategy considering different climate scenarios (TCFD rec. 5), does not require specific climate related indicators or targets (TCFD rec. 9, 10, 11).	Well-aligned with the TCFD recommendations under the Metrics and Targets theme (TCFD rec. 9, 10, 11)	Almost full alignment across the TCFD's 11 recommendations for disclosure	TCFD's recommended disclosures are not fully covered. There is a lack of alignment on resilience of the organizational strategy to different plausible futures considering climate scenarios (TCFD rec. 5), integration of climate-related risk management (TCFD rec. 6, 7, 8)

CDP (formerly the Carbon Disclosure Project)

Unlike the initiatives described above, the primary focus of CDP is neither to provide an ESG- or climate-related disclosure framework nor to provide a sustainability disclosure standard. Instead, CDP provides a global disclosure system that supports companies, cities, states and regions with their reporting process. It provides thematic questionnaires that enable organizations to comprehensively report on their exposure to environment-related risks and their impacts on natural systems.

CDP's global disclosure system is used by over 14,100 non-state actors (including over 13,000 companies) to report on climate related issues on an annual basis, and is the only system for facilitating climate-related disclosures by private sector actors that operates globally at this order of magnitude (CPD, 2021a).[9] It provides non-state actors with a structured platform through which they are able to voluntarily report on issues related to the themes of climate change, water security, and forestry. Non-state actors can report via CDP annually, by completing detailed and structured questionnaires, with one questionnaire being provided for each of the mentioned themes (CDP, 2021b).

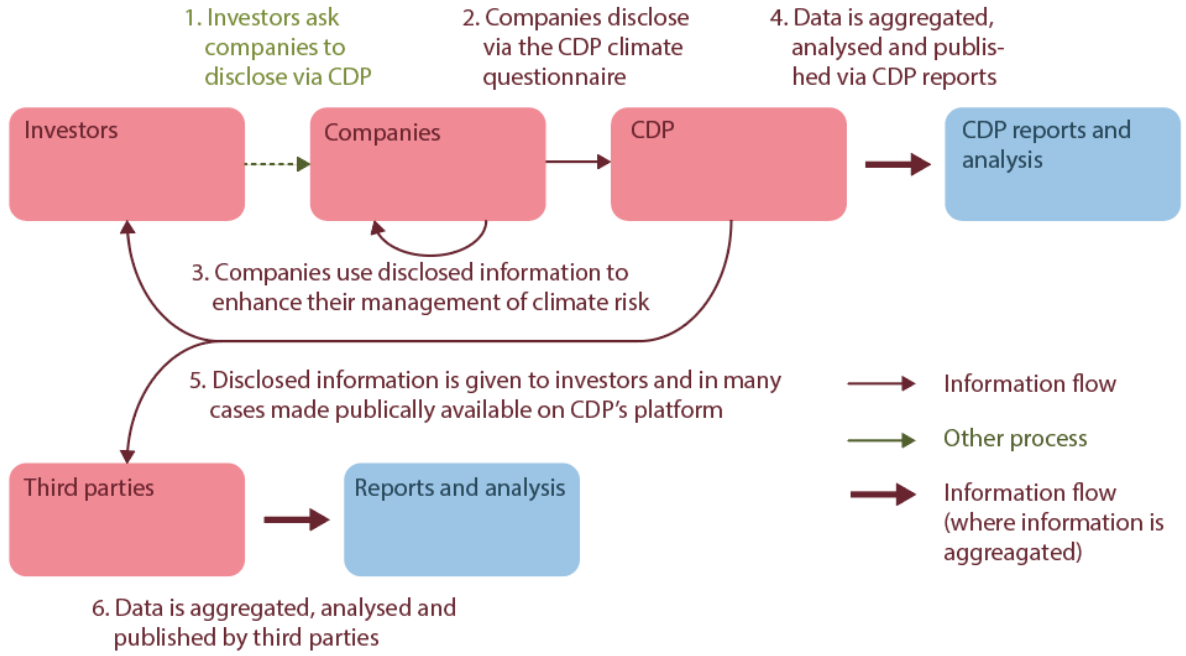
[9] Other initiatives provide certain aspects of CDP's service offering, for example GRI provide a database of ESG reports, which – at time of writing – contains over 63,000 reports from 15,000 organisations. However, reports uploaded to this database are built via an interactive portal, as they are in CDP's platform. Instead, reports are prepared internally by the company and then either uploaded to the database by the company in question or uploaded by one of the database's "data partners". (GRI, n.d.).

Private sector actors specifically are asked to report via CDP by their investors and customers, which they do by completing CDP's questionnaire(s) before June each year.[10] Information generated through this questionnaire is then made available by CDP to investors enabling them to make investment decisions with enhanced transparency regarding a company's exposure and management of climate risks. Most companies also choose to allow their disclosures to be made publicly available in full on CDP's website.[11] Following each annual reporting cycle, CDP and their partners analyse the data on an aggregated level to produce and publish insights and trends based on what companies (and other actors) are disclosing via CDP's platform. (ibid).

How does CDP's Climate Questionnaire generate adaptation relevant information?

Since 2018, CDP's Climate Questionnaire has been aligned with the TCFD recommendations, meaning that, where relevant, questions within the questionnaire are designed to solicit responses that are in line with the TCFD recommendations (CDP, 2021e). The content and format of CDP's Climate Questionnaire can be found in Annex 1: Format and structure of CDP's Climate Questionnaire.

Figure 2 Schematic of information flows within CDP's disclosure system



Disclosures made via CDP's structured questionnaire are both more comprehensive than disclosures made via other vehicles (i.e., company reports and filings) and more comparable (Kouloukoui et al., 2019; EY, 2018; ECB, 2020; TCFD, 2020; Vigeo Eiris and

[10] Companies are only asked to complete questionnaires that are judged to be material to their sector. For example, a company will not be asked to complete the forestry questionnaire if issues relating to sustainable forestry are not deemed to be relevant to their business operations (CDP, 2021c).
[11] Data is only made publicly available if companies choose to allow it to be made publicly available. Non-public responses are only made available to CDP's signatory investors and a few other partners. Companies are also incentivized to make the results of their questionnaires publicly available by CDP's scoring system which allocates reporting organisations with a score based on the completeness and quality of company disclosures (CDP, 2021d).

Four Twenty Seven, 2020). The comprehensiveness of disclosures made via CDP is strengthened by the fact that CDP's Climate Questionnaire is strongly aligned with the climate-relevant aspects of frameworks, principles, and standards of the major disclosure initiatives (i.e., TCFD, CDSB, SASB, GRI, and IIRC). Furthermore, unlike disclosures made in company reports and filings, the questionnaire format itself means that reporting parties are actively prompted to cover all different informational areas covered by the questionnaire (i.e., it is harder for personnel responsible for reporting to inadvertently miss anything). The fact that respondents are using the same core questionnaire also strengthens comparability between disclosures.[12] This comparability is further enhanced by the questionnaire's use of standardized responses to some questions when such categorization is possible. Standardization in this manner ensures that respondents are applying the same terminology (e.g., categories of risk) and units of measurement (e.g., ratings applied to quantify "likelihood of risks" or "magnitude of impact") within their disclosures.

Current state of climate-related corporate disclosure

There are a number of studies and reports summarizing the current state of climate-related disclosures, however with different foci and objectives (CDP, 2020 and 2021b; CDSB, 2020; ECB, 2020; EY, 2018, 2019 and 2021; TCFD, 2018, 2019, 2020 and 2021a; Vigeo Eiris and Four Twenty Seven, 2020; Moody's, 2021). While these assessments do not distinguish between disclosures related to physical risk and transition risk – thus making specific commentary on the state of adaptation-relevant reporting not possible – they can provide robust insights into the comprehensiveness of reporting via climate-related corporate disclosures (against the TCFD recommendations) and how practice varies across key dimensions of the private sector – namely, companies of different sizes, geographic regions, and sectors.

Comprehensiveness of climate-related disclosures

Overall, companies are increasingly making climate-related disclosures, with the rate of increase found to be increasing year on year (TCFD, 2021). However, the comprehensiveness of disclosures is still limited, with most companies failing to come close to disclosing against all eleven TCFD recommendations (EY, 2021; TCFD, 2021a); TCFD (2021a) for example finds that only 50% of reviewed companies disclose in alignment with three or more recommendations. Alignment across the recommendations is uneven, with some thematic areas proving significantly more popular than others (TCFD, 2021a; EY, 2021) – an overview of TCFD alignment is provided in Box 7. Additionally, questions have been raised about the quality of climate-related disclosures (CDSB, 2020; EY, 2021). A recent assessment by EY (2021) finds that whilst alignment to the TCFD recommendations was increasing, the quality of the actual disclosures remains limited.

[12] The CDP questionnaire allows for the varying disclosure needs of different sectors through providing sector-orientated iterations of its questionnaire. For each sector, the core of the questionnaire remains the same, however, certain questions are added or removed depending on whether they are relevant to the operational model of the sector in question.

Box 7 Alignment across the TCFD recommendations

As the one of the most comprehensive and prominent reports, information below is drawn from the 2021 TCFD Status Report, released on 14 October 2021. The Task Force has analysed the development and states of climate-related financial disclosures since 2018 using artificial intelligence (AI) to review companies' reports. For the 2021 status report, the reports of 1,652 companies for the 2018, 2019 and 2020 fiscal year reporting periods were reviewed.

Companies disclose most often information on climate-related risks and opportunities (covered by recommendations 3–5), with over half of the companies including this information in the 2020 reports. While the TCFD status report – and other assessment reports – are silent on the number of companies reporting on adaptation actions taken to manage physical risks specifically, this disclosure on risks and opportunities represents a promising trend. The use of metrics and, to a lesser extent, targets (recommendations 9 and 11) is also relatively high among the climate-related disclosures reviewed (44% and 34% respectively).

However, information relating to climate risk management (covered by recommendations 6–8) and governance of climate risks (covered by recommendations 1–2) are less commonly disclosed. For instance, information about climate-related risk management is only provided by less than one third of the reviewed companies. Meanwhile, only 25% of companies are providing information on the board's oversight of climate-related risks and opportunities. The recommended disclosure with the lowest level of companies disclosing against it is the recommendation 5., which asks companies to describe the resilience of their strategy under different climate-related scenarios (7%). This is likely due to the difficulty of conducting scenario analysis.[13]

Which types of companies are reporting?

The exact number of companies disclosing information on non-financial issues (including climate-risk) is presently not known (European Reporting Lab, 2021). As a result, robust numbers regarding the characteristics of reporting companies are not available. However, the motivations for, and resources required to, develop climate-related disclosures – and ESG disclosures more generally – means that engaging companies are likely to be predominantly large multinational corporations (European Reporting Lab, 2021; Hirschi, 2021). [14] Analysis by TCFD (2021a) also suggests that it is the largest MNCs – with the greatest market capitalization – who are disclosing the most, although rates of disclosure is increasing across the board. [15]

Regarding geographical representation, Europe is by far the leading region for disclosures across all recommendations (EY, 2021; TCFD, 2021a). The picture for other regions is

[13] According to a survey conducted by the TCFD, 75% of companies reported that risk management is somewhat or very difficult to implement with many companies lacking processes for identifying, assessing, or managing climate-related risks (TCFD, 2020). In response to these difficulties, the TCFD developed a specific guidance "Guidance on Risk Management Integration and Disclosure" which addresses both physical and transition risks.

[14] This notion is reinforced by analysis by EcoVadis (n.d. in: European Reporting Lab, 2021), which found that − in 2019 − only 1% of SMEs (defined as companies with up to 999 employees) in the European Union publicly report on environmental issues, compared to 17% of large companies (defined as companies with more than 1000 employees).

[15] The assessment by TCFD (2021) only assesses companies with annual revenues exceeding one billion US dollars.

less clear, with different assessments reaching conflicting conclusions. For example, analysis by TCFD (2021a) shows following Europe – the regions Asia Pacific and Latin America disclose the most, while North America possesses the lowest level of disclosure. In contrast, analysis by EY (2021) finds that the alignment and quality of disclosures in North America is relatively high, and low in the Latin America and Asia regions. [16] Overall, it appears that TCFD alignment and quality of disclosures is strongly linked to the maturity of non-financial reporting in these regions and the engagement of domestic regulators and investors (EY, 2021), with higher alignment by especially European companies, likely being driven by increasing pressure from governments (TCFD, 2021a).

The alignment and quality of disclosures also appear to vary across different sectors, with sectors that typically have greater exposure to climate-related risks (physical and transition) generally performing higher (TCFD, 2021a; EY, 2021). For example, TCFD (2021a) found that companies from the materials and buildings, energy, insurance and agriculture, food and forest product sectors – all of whom are recognized as highly exposed to physical risks, transition risks, or both – generally performed higher than sectors which are less clearly exposed to climate-related risks – e.g., the technology and media sector. According to TCFD (2021a), differences between sectors is likely due to differences in investor pressure.

Importantly, different sectors tend to prioritize disclosing against different recommendations. The insurance sector for instance, leads in the disclosure of risk management processes across all groups, likely due to climate-related impact assessments being critical to many insurance companies (TCFD, 2021a). On the other hand, companies from the energy sector on the other hand have the highest level of disclosure on risks and opportunities while companies from the materials and buildings sector lead on the disclosure of metrics and targets, especially on GHG emissions. These differences are likely due to each sectors differing relationship to climate-issues. For example, carbon-intensive sectors such as the materials and building sector is likely to place greater focus on reporting on GHG emissions than less carbon-intensive industries. This observation begs the question whether all industries will achieve the same level of disclosures across all recommendations over time or whether inherent differences in the quality and comprehensiveness of disclosures will remain indefinitely.

2.2 Databases documenting non-state climate action

Recognizing that the private sector is a key player in addressing the challenges posed by climate change, a number of initiatives have been established to document and/or track climate action being implemented by the private sector – or non-state actors more broadly – at the global level (GCAP, 2021; UNFCCC, n.d.; Chan et. al, 2020). Data collected by these initiatives can often be accessed through an online platform allowing for the initiative's database to be utilized as of a data source for assessing private sector adaptation.

[16] There may be different reasons for these inconsistencies between assessments. For example, in TCFD (2021) the sample of companies reviewed in North America (762) is significantly larger than those reviewed for Asia Pacific and Latin America (333 and 52 respectively), which may lead to unfair comparisons between regions. Further, the analysis in EY (2021) does not include "high performing" countries in its analysis of the Asia Pacific region − specifically, Japan, South Korea and Oceania (i.e., Australia and New Zealand) − instead choosing to analyse these separately.

The most prominent initiative tracking climate action by non-state actors is the Global Climate Action Portal (GCAP), formerly known as Non-State Actor Zone for Climate Action (NAZCA), which is a UNFCCC-led initiative that documents climate actions implemented by non-state actors, either individually (i.e., an action/initiative implemented by a single actor) or as part of a cooperative initiative (i.e., initiatives being implemented by coalition of actors, often composed of different actor types).

Box 8 The Global Climate Action Portal

The portal was launched by the UNFCCC in 2014 with the aim to "present a clear, comprehensive view of Global Climate Action" (GCAP, n.d.). Importantly, the portal is formally included in the COP21 decision accompanying the Paris Agreement.[17] The portal also serves as "tracking vehicle" for the Marrakech Partnership for Global Climate Action launched at COP22 as a framework to strengthen collaboration between Parties and non-Party stakeholders to accelerate climate action. One of the Partnership's key functions is the tracking of progress and enhancing the transparency and credibility of non-party stakeholder action and the Partnership therefore supports the UNFCCC secretariat in strengthening the tracking capabilities of the GCAP (Marrakech Partnership, 2021).

The GCAP is partnered with prominent climate organizations that work with different types of non-state actors – e.g., international networks – who themselves collect information from members about their climate actions, such as CDP.[18] These partner organizations share publicly available data with the GCAP which serves as a central repository consolidating the outputs of non-state actor reporting from multiple platforms and organizations.

In addition to its data partners, the GCAP is also partnered with the Community of Climate Action Methodologies Data and Analysis (Camda)[19] which provide support for data collection and tracking of climate action progress across states, regions, cities, businesses, and investors, and produces different analyses, the first of which was released at the Global Climate Action Summit in 2018 (Camda, n.d.b). Since 2020, Camda is developing a "Progress Framework on Action", a standard framework for data

[17] NAZCA is mentioned twice in the decision text (UNFCCC, 2015b):
- Para 117. Welcomes the efforts of non-Party stakeholders to scale up their climate actions, and encourages the registration of those actions in the Non-State Actor Zone for Climate Action platform;
- Para 134. Invites the non-Party stakeholders referred to in paragraph 133 above to scale up their efforts and support actions to reduce emissions and/or to build resilience and decrease vulnerability to the adverse effects of climate change and demonstrate these efforts via the Non-State Actor Zone for Climate Action platform […];

[18] In addition to CDP, partner organisations include ICLEI (Local Governments for Sustainability), the Climate Bonds Initiative, the Climate Group, the Global Convent of Mayors for Climate and Energy, the Global Investor Coalition on Climate Change, and UN Global Compact.

[19] Camda community members are the following: America's Pledge, Bloomberg Philanthropies, BSR, C40, California Air Resources Board, CDP, Ceres, CIFF, ClimateNexus, ClimateWorks Foundation, Climate Bonds Initiative, Climate Strategies, Data-Driven EnviroLab, German Development Institute, European Commission, Global Covenant of Mayors, Global Climate Action Summit, Global Strategic Communications Council, Grantham Research Institute, GreenFaith, ICLEI, IDDRI, The Mission 2020 Campaign, New Climate Economy, NewClimate Institute, Regions4, PBL Netherlands Environmental Assessment Agency, Principles for Responsible Investment, Rocky Mountain Institute, The Climate Group, The Stanley Center for Peace and Security, UNEP DTU Partnership, UN Environment, United Nations Climate Change, University of Maryland, University of Oxford, We Mean Business, World Resources Institute, and WWF (Camda, n.d.a).

collection and tracking of climate action progress in states, regions, cities, businesses, and investors (ibid.). To date, Camda's work has primarily focused on tracking mitigation commitments by different actors but is now also pursuing efforts for developing metrics and indicators to track commitments on adaptation, resilience, and finance (Camda, n.d.c).

At the time of writing,[20] the database contains 26,122 non-state actors, all of whom are documented as having implemented at least one climate action of some description.[21] 9,983 of these actors are registered as companies and 1,441 as investors.[22] While a dataset of this size is large enough to enable some form of robust tracking and assessment of non-state climate action; adaptation by the private sector is very poorly represented. The database does not document any companies as implementing individual adaptation actions, despite documenting many as having implemented mitigation-related actions (e.g., committing to be net-zero by 2050). In the same vein, of the 151 cooperative initiatives registered on the GCAP, only 18 had clear relevance to adaptation and included at least one private sector actor as a participant; of which ten were jointly applicable to both mitigation and adaptation.[23]

Beyond GCAP, other notable databases with relevance to private sector adaptation include UNFCCC's Adaptation Private Sector Initiative (PSI) and the Global Center on Adaptation's Climate Cooperative Initiatives Database (C-CID).[24] While the overall datasets for these two databases are significantly smaller than that of the GCAP, these two databases actually contain more cases of private sector adaptation. The PSI database for example, contains 103 examples of adaptation actions implemented by private sector actors. These case examples have been submitted by private sector actors and collated by the PSI initiative as a means of showcasing private sector contributions to adaptation and sharing good practices (UNFCCC, n.d.). The C-CID meanwhile is a mapping initiative that records cooperative climate initiatives being implemented by non-state actors (Chan et al., 2020).[25] The database features initiatives that have been launched at climate summits and/or developed as part of international processes, as well as those featured on GCAP. It contains 298 entries, 18% of which (54 initiatives) are classified as "mainly adaptation" and 31% (92) are classified as "equally adaptation and mitigation".

[20] As of 23 November 2021.
[21] Including cities, regions, companies, investors, and other non-state organisations.
[22] Actors classified as investors includes both investors from the private sector and non-private sources of finance such as multilateral development banks.
[23] Here actors registered as "companies" and "investors" are considered as private sector actors. Multilateral Development Banks and multilateral financial institutions registered as "investors" (e.g., the African Development Bank and the World Bank) were not counted as private sector actors.
[24] In addition to databases with exclusive relevance to climate action, information about private sector adaptation could theoretically be found the entries of databases focussing on the wider ESG-arena. For example, the UN Global Compact – an initiative focusing on encouraging corporate sustainability – requires its 12,000 participating companies from more than 160 countries to report on ongoing efforts to achieve its 10 principles (UN Global Compact, n.d.-a and n.d.-b). As three of these principles relate to the environment, reporting to the UN Global Compact could represent a significant source of data. However, as these three principles are not explicitly climate-related, it is unclear if much of the information reported to the initiative would be relevant to adaptation.
[25] Cooperative climate initiatives are collaborative arrangements between two or more actors that include at least one 'non-state actor' or one 'subnational actor' with the objective of addressing climate mitigation or climate adaptation.

Information documented on these databases

The depth and scope of information documented in these databases varies between entries. For example, across all three databases some entries provide relatively detailed and informative data about objectives, goals and work packages, while others include very little information. In addition to ex-ante information, only the GCAP allows for initiatives to continuously update their entries by reporting on the actions they have implemented, the milestones reached, outputs delivered, and progress being made against the initiative's goals and targets. However, 39% of initiatives related to adaptation have not provided updated information and of the 61% that do, there is significant variation regarding what aspects of progress these initiatives have reported on and how this information is provided. For example, some initiatives, such as the R4 Rural Resilience initiative, report using quantitative impact metrics from the initiative's monitoring and evaluation system to provide an indication of the impact they have achieved so far, while others simply provide short descriptions of milestones reached, or hyperlinks to good news stories or reports outside of the platform.

Similarly, the range of private sector adaptation action documented varies between databases. For instance, in the GCAP and C-CID databases private sector actors are only documented as implementing adaptation as a part of cooperative initiatives that are typically high-level and include many participant organizations, often together with investors and other actor groups (sometimes over 100). These initiatives often focus on activities such as awareness raising, institutional capacity building and knowledge production which – while related to adaptation – are often intangibly linked to eventual reductions in climate risks. For example, only 67 out of 151 cooperative initiatives registered on the GCAP are registered as having "technical implementation" as a function (the only function with relevance to implementation of adaptation 'on-the-ground'),[26] [27] a number that goes down to four out of eighteen when excluding initiatives without private sector participants and relevance to adaptation. The PSI meanwhile is generally populated by smaller initiatives and discrete projects or actions, implemented by individual companies or small consortia that are much closer to risk reduction.

Operational and logistical limitations

All three databases have operational and/or logistical limitations that reduce their potential to serve as data sources for assessing private sector adaptation. These include:

[26] The GCAP defines 12 functions, most of which relate to high-level actions that are related to, but are tangibly a long way from, action that leads to risk reduction. These are: knowledge production; knowledge dissemination; technical implementation; institutional capacity building; norm and standard setting; campaigning; lobbying; increasing participation; training; funding; product development; and policy planning.

[27] Furthermore, the term "technical implementation" leaves room for interpretation and might not necessarily relate to the implementation of action that tangibly reduces climate risk on-the ground. The "Coalition of Climate Resilient Investment" for instance is one of the abovementioned four climate initiatives with the technical implementation function but works primarily on developing frameworks and tools to more efficiently price climate risks and facilitate resilience investments. In this case, risk reduction will not be achieved unless the products developed are actually applied by their intended end-users.

- Firstly, not all the databases appear to be continuously active and updated with the PSI and C-CID databases both being inactive since 2013 and 2020 respectively.[28] Further, while GCAP allows for initiatives to report on progress, the progress reporting relies on continuous engagement of the initiative. This is not always guaranteed and is likely to be one of the underlying reasons behind the fact that 31% of the cooperative initiatives relevant to adaptation have not reported on progress. The fact that the information in these databases is not being periodically updated draws questions about their ability to function as a reliable source of up-to-date data capable of demonstrating progress over time.

- Secondly, questions arise regarding the reliability of information on these databases. For example, 39% of the cooperative initiatives including private sector actors that are registered as "equally adaptation/resilience and mitigation" actually have very little relevance to adaptation or resilience (e.g., the entry for the EcoMobility Alliance is registered as "equally adaptation/resilience and mitigation, while making no reference to adaptation or resilience). Similar observations were made by Pauw and Chan (2018) in relation to a number of entries on the PSI database. This infers both that data reported by initiatives is in some cases provided incorrectly, e.g., categorized as "equally adaptation/resilience and mitigation" while only applying to mitigation, and that the data reported to these databases is not adequately screened or validated by the platform hosts.

- Thirdly, the functionality of these platforms makes extracting relevant data difficult. This is particularly the case for GCAP and C-CID which are lacking key features that would allow users to isolate relevant data quickly and minimize the possibility of missing entries. For example, the GCAP platform only allows user to view individual actions through the portal's 'actor view' meaning that users cannot easily isolate and extract information about certain types of individual climate action. Meanwhile, the C-CID platform does not allow users to filter initiatives based on their relevance to adaptation, mitigation, or both.

- Finally, a common feature across entries in these databases is that the provided information does not enable users to distinguish the role of the private sector in their implementation. This is particularly pertinent for large high-level cooperative initiatives that engage a wide range of actors, where the role and contribution of specific actor groups is deducible from the level of information provided.

2.3 Reporting to national governments

In the context of this report, the term "reporting to national governments" refers to processes in which companies, as well as other non-state organizations, are being asked by the national government to provide them with information relevant to adaptation. At present, it appears there are very few instances of national governments establishing systems and processes to facilitate this type of reporting. However, based on existing examples and developments in the role of national governments in the climate-related

[28] As stated on the website, the C-CID will be updated continuously, however without providing a clear timeline (GCA, n.d.). It should also be noted that C-CID date of inactivity coincides with the launch of the GCA's Status and Trends report in January 2021. As such, it may be the case that the database will be updated by the initiatives partners to inform future editions of this report.

corporate disclosure arena, this report finds that there is a potential role for national governments to play in collecting and analysing adaptation being implemented by their domestic private sectors.

Mandatory disclosure of climate-related risks

As mentioned in section 2.1, an increasing number of countries are introducing legislation mandating companies to publish climate-related corporate disclosures, mostly in accordance with the TCFD requirements (e.g., New Zealand, Switzerland, and the UK). With such mandatory reporting at the national level, there is potential for a large amount of adaptation related data to be collected by national governments, which could then be analysed and used to inform adaptation-related policy interventions (see Box 11, section 3.2), among other things. However, at present it is unclear if this data will be actively collected and stored by the national governments who have mandated such reporting, and whether these governments intend to utilize this data beyond checking compliance with their legal reporting requirements.

Adaptation specific reporting systems

In addition to utilizing mandatory climate risk related disclosures to generate data, national governments can also collect adaptation-related information from their domestic private sectors by establishing systems that do not rely on mandating and utilizing climate-related corporate disclosures as a secondary source of data. This report however has only found evidence of one such system being established – the Adaptation Reporting Power (ARP) being operated by the UK government; thereby strongly insinuating that their adoption is not widespread (see Box 9 and Annex 2).[29]

Box 9 The UK's Adaptation Reporting Power

The UK's approach, described in full in Annex 2, is centred around the Adaptation Reporting Power (ARP) (Government of the UK, 2008), a piece of primary legislation that enables the national government to direct (or invite) non-state actors to report on how they are exposed to climate related risks, and how they are addressing these risks (Government of the UK, 2021). Using the ARP as its legal basis for action, the UK government has developed a structured reporting system to periodically collect information from non-state actors that are of significant strategic importance to the UK's ongoing resilience efforts. As such, the UK does engage a certain segment of its private and non-state sectors through the ARP, namely operators, regulators, or administrators of key infrastructure (e.g., water, telecommunication, and transport infrastructure) and other human and natural systems (e.g., national parks and cultural sites).

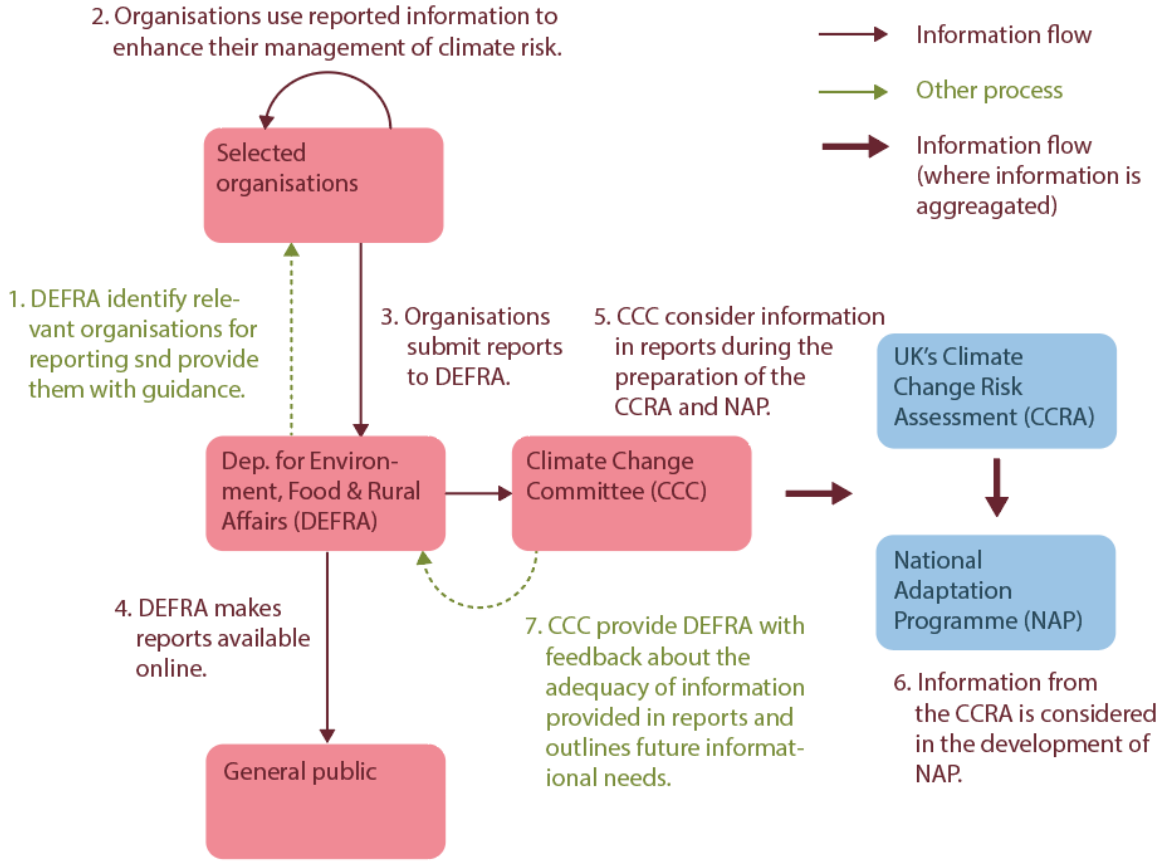
The ARP was established with two complementary aims. Firstly, to enable the government to understand to what extent operators, regulators, and administrators of key systems are prepared for increasing risks related to climate change, and secondly to encourage strategically important actors to begin adequately monitoring, assessing, and managing these risks.

[29] While this study has only found evidence of systematic collection of information related to exposure and adaptation to climate-risk from these two countries, this by no means precludes the existence of more examples.

The process is led by the Department for Environment, Food and Rural Affairs (DEFRA), who identify relevant organizations and coordinate the reporting process, including developing the reporting guidelines. Reports submitted under the ARP are considered by UK's Climate Change Committee (CCC) who lead the preparation of the UK's Climate Change Risk Assessment (CCRA) and National Adaptation Programme (NAP), as well as by other ad hoc reports prepared for the UK parliament and various ministries and departments of the UK government.

Further, following their submission, DEFRA makes reports publicly available.[30] Over its three cycles to date, the process for the ARP has developed iteratively, with DEFRA engaging with both the organizations being asked to report (the data providers) and the CCC (the primary data end-users) in order to reduce inefficiencies and enhance the outcomes of the process for all the parties involved.

Figure 3: Key flows of information under the ARP



The output of this reporting system is a series of reports that detail how climate issues are governed within the reporting company, the results of climate change risk assessments that they have conducted, and the strategic actions they are implementing in response to these risks. In this sense, the data generated by the ARP is generally aligned with the TCFD recommendations. However, as ARP reports are intended to

[30] Reports submitted under the ARP's second reporting cycle can be accessed via this link: https://www.gov.uk/government/collections/climate-change-adaptation-reporting-second-round-reports

focus on how organizations are exposed to, and managing, physical risks associated with climate change, they do not generally provide information on transition risks.

Further, organizations asked to report under the ARP are asked to disclose detailed information about the specific actions actors are undertaking to mitigate particular climate risks, including specific studies/assessments and the implementation of specific on-the-ground actions (e.g., structures and investments).

The reporting system developed under the ARP is seemingly unique amongst national governments and is considered to meaningfully inform the UK government's response to existing and emerging climate risks (CCC, 2017). However, a review conducted by the CCC in 2017 found that submissions vary in quality and comprehensiveness, and in certain areas lack consistency. In addition, with a handful of exceptions, current reporting generally fails to quantify climate risks, identify sectoral interdependencies in relation to enhancing climate resilience, or provide information about the results of adaptation actions being implemented. All of this is limiting the ability of the CCC to generate an aggregated assessment of climate resilience at the sectoral and cross-sectoral levels.

The system established under the ARP represents a relatively top-down and highly structured approach that is resource intensive for both the government to implement and the private sector to respond to. In light of this, the approach adopted by the United Kingdom may not be replicable in countries where the government has significantly less resources and/or technical capacity. However, given that this approach is just one example of how a government-led reporting system could take form, it does not necessarily mean that this is the only approach available. Instead, government-led reporting systems could also take a lighter and more bottom-up approach to collecting information from their domestic private sectors. An example of how a less resource intensive system could look can be seen in Box 10, which presents an assessment of private sector adaptation conducted in Chile by the business network Accion Empresas. While this system was not implemented by the Government of Chile, its results were subsequently utilized by the government in Chile's Fourth National Communication.

Box 10 Integrating assessments of private sector adaptation into national communications to the UNFCCC: Chile

In 2019, Accion Empresas – the largest non-union business network in Chile – commissioned a study into how its members perceive and are adapting to climate change [31] The study was conducted in response to the increasing recognition that: (a) the impacts of climate change are material to the profitability of many Chilean companies and – if left unmanaged – increasing climate risks could put the long-term viability of companies at risk; and (b) the private sector is in a strong position to capitalize on the potential benefits that these new conditions can bring.

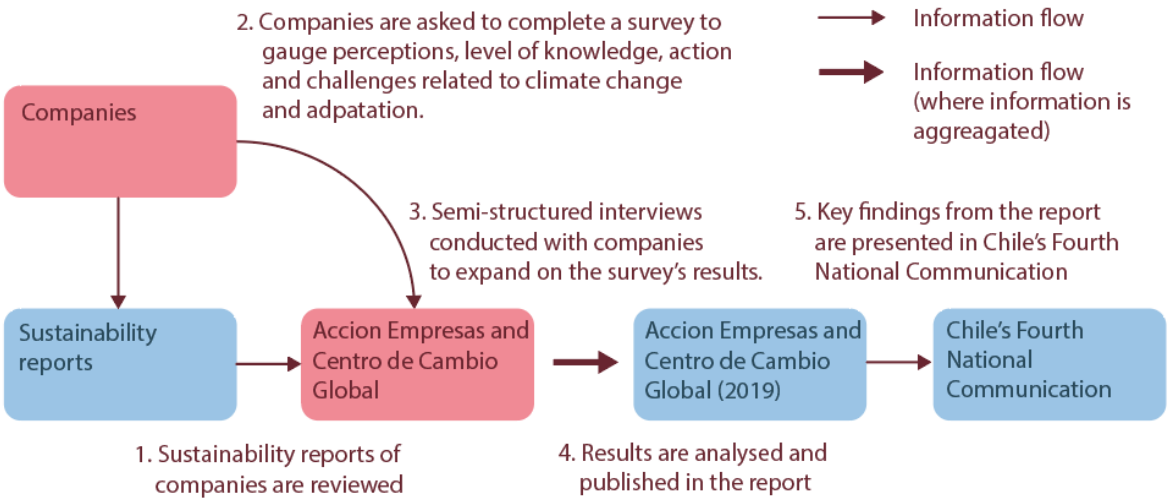
The purpose of the study was to develop an initial understanding of how climate change impacts are interacting with the business and operational models of companies in Chile,

[31] More information about Accion Empresas can be found here: https://accionempresas.cl/

in particular determining the extent to which they understand and have internalized the need to adapt to climate change. [32] This understanding was then intended to form the basis of a roadmap for developing an Accion Empresas-led work programme to build the capacity of Accion Empresas members to overcome barriers and challenges in adapting to climate change (Accion Empresas and Centro de Cambio Global, 2019).

The approach adopted by the assessment comprised three steps. Firstly, sustainability reports published by members of Accion Empresas were reviewed in order to identify how Chilean companies perceive the importance of climate to their operations, and the materiality of risks posed by climate change. Secondly, the members were asked to complete an online survey aimed at exploring how they perceive and understand climate change and its impacts and potential opportunities, and to identify the types of action being implemented as well as challenges faced by these companies.[33] Finally, a series of semi-structured interviews were conducted with companies who responded to the survey to expand on their responses, and the survey's overall results. [34]

Figure 4 flows of information under Accion Empresas and Centro de Cambio Global (2019)



The findings from this research were published by Accion Empresas as part of the "Empresas y cambio climático en Chile: el camino hacia una adaptación sostenible" (Accion Empresas and Centro de Cambio Global, 2019). Key findings of this report were subsequently fed into the adaptation section of Chile's Fourth National Communication, enabling Chile to include information about how the domestic private sector is adapting to climate change, and the current gaps in its response and its adaptation needs. This information is placed alongside similar information relating to other key actor groups, namely, the national government, sub-national governments, and civil society actors (Government of Chile, 2021).

[32] It is important to note that this assessment was not intended to provide an exhaustive and/or statistically representative overview of how the Chilean private sector perceives or is adapting to climate change.
[33] Invitations to participate in the survey were sent to 128 companies affiliated with Accion Empresas. In total, 38 responses were received representing a response rate of 27%.
[34] In total, nine semi-structured interviews were conducted.

While there is no formal mechanism currently in place to systematically repeat this kind of assessment for Chile's subsequent national communications or other reports, the results of this first exercise could provide the basis for a long-term effort to create a database to track private sector adaptation actions and needs at the national level.

These two case studies exemplify that reporting to governments can be conducted using very different approaches and can vary significantly in terms of the data that they generate. For example, the one-off assessment in Accion Empresas and Centro de Cambio Global (2019) is characterized by its explorative, bottom-up approach, allowing companies to determine what they understand as adaptation and what they disclose about their adaptation efforts. As such, it provides them with a relatively free reign in terms of what information to disclose. The UK's approach on the other hand has involved the development of a structured largely top-down reporting framework that clearly outlines what information companies need to disclose (see an overview in Table 1, Annex 3).

In tandem, differences in approach mean that the data collected through those two systems varies quite significantly. The reporting requirements under the UK's ARP for example are aligned with the TCFD recommendations and ask respondents to provide a full overview of their governance structures, strategies, plans and objectives for managing physical climate risks, their risk assessment processes, and the results of these processes. On top of this, under the ARP organizations are also asked to provide a full ledger of the individual adaptation actions that they are implementing to reduce the identified climate risks. [35]

Meanwhile, the assessment implemented in Accion Empresas and Centro de Cambio Global (2019) was intended to generate a 'snapshot' of how companies in Chile (i) perceive the materiality of climate change impacts and their preparedness for these impacts, and (ii) generate some insights into what companies are already doing to adapt to climate change, rather than providing a full overview of how they are integrating climate issues into key aspects of their organization (i.e. governance, risk management and strategy), as the TCFD recommends.

A common characteristic of both case studies is that neither was implemented with the objective to provide input into wider assessments on private sector adaptation (e.g., the global stocktake). Instead, the implementation of these systems was driven by the objective to generate data that could inform the development of adaptation related interventions. Differences in the target companies of these two interventions however has led to different segments of private sector actors being engaged. For example, the ARP only targets organizations deemed as of significant strategic importance to the UK's ongoing resilience to climate change. As such, the ARP does not target the most significant companies in terms of climate risks, market capitalization or the value of assets managed, but instead targets organizations that operate the country's key infrastructure (e.g., transport, utilities, communications, and health, amongst others). However, as Accion Empresas' membership is composed of large enterprises with a cross-sectoral spread, the assessment in Accion Empresas and Centro de Cambio Global (2019) generally engages large companies from a wider variety of sectors.

[35] Thus, in this sense, the requirements under the ARP go beyond the TCFD recommendations and its supplementary guidance, which – as outlined in section 2.1 – are unclear on the extent to which reporting organisations should report on the specific adaptation measures they are implementing.

+3. Linking private sector adaptation reporting to the global stocktake

After exploring the climate-related reporting landscape and what it means for generating data relevant to private sector adaptation, this section explores how adaptation-relevant information being reported by the private sector could be linked to the global stocktake and reviews the extent to which this information is already being aggregated upwards. Following this, the section presents some of the key gaps, limitations and challenges that may inhibit adaptation-relevant information from the private sector being considered by the global stocktake.

3.1. Pathways linking private sector reporting to the global stocktake

Based on the mapping of private sector reporting processes in the section 2, this section proposes potential pathways through which information being reported by companies could be considered by a global-level assessment of private sector adaptation to climate change. These proposed pathways are illustrated in Figure 6. As a starting point, the figure reflects that companies can report on adaptation through one (or more) of the three broad types of reporting: (1) reporting via climate-related corporate disclosures; (2) reporting to databases documenting non-state climate action; and (3) reporting to national governments.

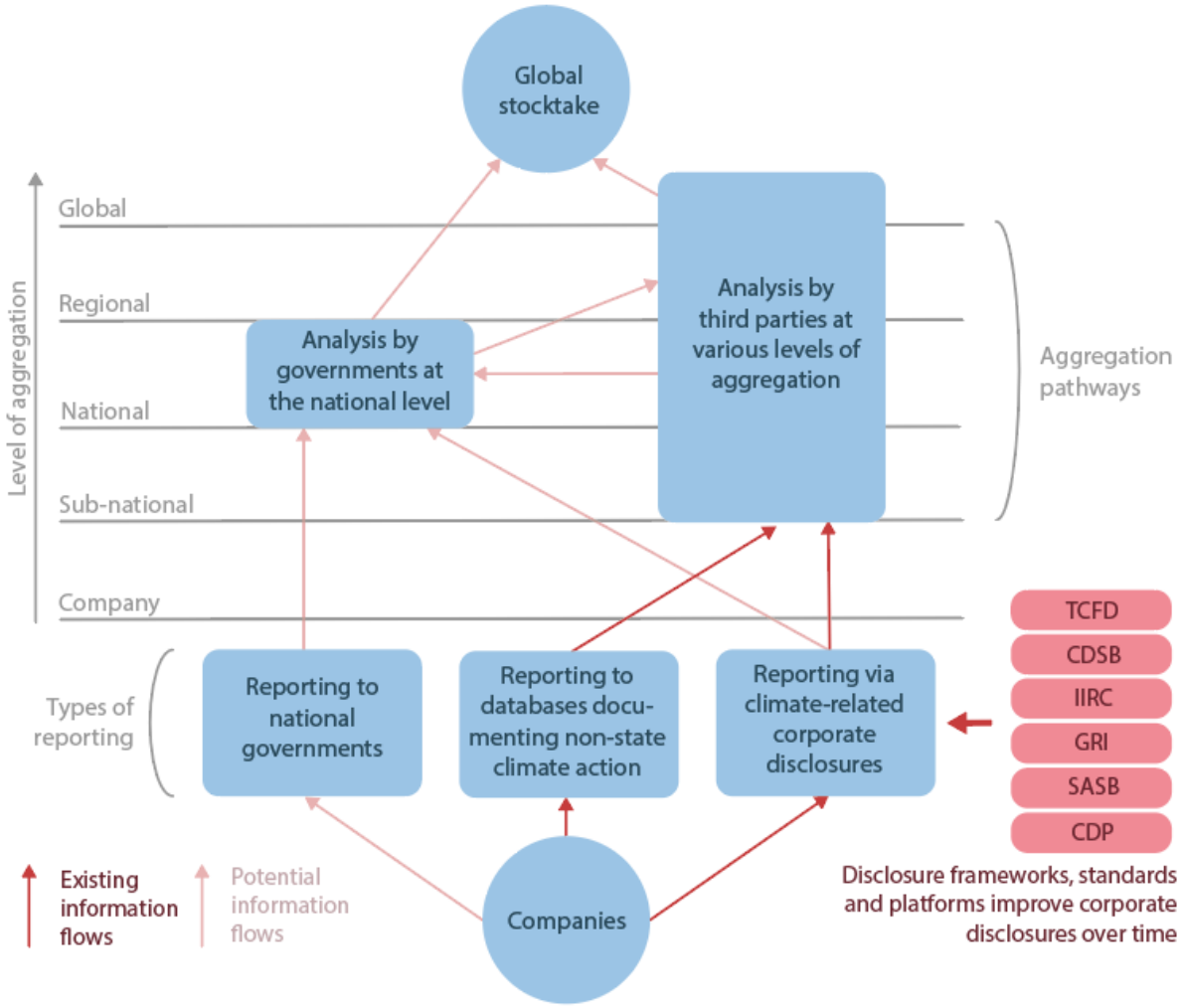
Figure 5 demonstrates that once companies have reported via one of these types of reporting, information can be assessed at aggregated levels (e.g., at a sectoral, sub-national, national, regional or global level). Two broad and inter-connected pathways for aggregating information upwards have been identified: (1) via analysis conducted by national governments; and (2) via analysis conducted by third parties at various aggregated levels (including intergovernmental organizations, research institutions, and consultancies). Due to the different objectives possessed by different types of third parties for conducting this analysis, it is likely that their assessments will be conducted at various levels of aggregation and detail. In other words, they can vary from being specific to certain sectors and/or geographic areas, to being applicable across all sectors and geographies. Assessments by national governments meanwhile, are most likely to be conducted at the national level.

The distinction between analyses conducted by these two actor groups is made based on how the results of these analyses could be considered by the global stocktake. As illustrated in Figure 5, analyses conducted by national governments can be directly considered by the global stocktake if the results of these assessments are being included within the country's reports to the UNFCCC (i.e., national communications, adaptation communications, and biennial transparency reports or voluntary contributions to the global stocktake), which are to be explicitly considered by the global stocktake during its preparation (UNFCCC, 2018 and 2021a).

Analyses being conducted by third parties meanwhile, do not have a defined pathway into the global stocktake. However, decision 19/CMA.1 – which establishes the modalities for

the global stocktake – does not preclude any relevant sources of information from being considered under the global stocktake. Theoretically, this would allow the global stocktake to consider assessments conducted by third parties. In order to keep the process practical however, Christiansen et al. (2019) suggests that the global stocktake is likely to only consider assessments contained within flagship report series applicable to adaptation at the global level – e.g., UNEP's Adaptation Gap Report, GCA's Status and Trends Report – or the state of non-state climate action more generally – e.g., New Climate Institute's report series Global Climate Action from Cities, Regions and Businesses. As such, in order to be considered within the global stocktake, it is likely that the results of aggregated assessments of private sector adaptation would first need to be incorporated into other high-profile reports that assess adaptation progress at a global level.

Figure 5 Information pathways linking private sector adaptation reporting to the global stocktake



3.1.1 To what extent is adaptation-relevant information being reported by the private sector being assessed at aggregated levels?

At present, adaptation related information being reported by the private sector is not being assessed with the purpose of evaluating progress being made in private sector adaptation. Nevertheless, information being reported via the three types of reporting identified in this report are – to different extents – being assessed at aggregated levels. This section outlines how data being generated by each type of reporting process is being aggregated, to what extent, and by whom.

Reporting via climate-related corporate disclosures

A significant number of global/regional level assessments have been conducted that assess the extent to which corporate disclosures are aligned with the TCFD recommendations (e.g., CDP, 2020 and 2021; ECB, 2020; EY, 2018, 2019 and 2021; Moody's, 2021; TCFD, 2018, 2019, 2020 and 2021a; Vigeo Eiris and Four Twenty Seven, 2020). [36] These assessments typically have large sample sizes (500 to over 12,000 companies), often made possible with the assistance of Artificial Intelligence (see TCFD, 2020 and 2021a; Moody's, 2021; Vigeo Eiris and Four Twenty Seven, 2020). Further, several studies (e.g., those by TCFD, EY and Moody's) are conducted annually, allowing for analysis of progress overtime.

While these assessments generally succeed in their purpose of providing an overview of trends in the uptake and application of eleven TCFD recommendations in corporate disclosures, as well as – in some cases – insights into the general quality of climate-related disclosures, they typically do not focus on analysing how, or the extent to which, the private sector is actually managing present and future climate risks (physical or transition); which would be of more of value to assessments of progress such as the global stocktake. At present, assessments that do explicitly take this extra step and use the contents of corporate disclosures to generate additional insights into how companies are managing climate-related risks are currently limited to a handful of studies that do not provide comprehensive analysis of this issue. For example, studies such as Loew et al. (2021) and CDP (2020 and 2021) touch upon private sector adaptation to climate change, but do not go into any great depth.[37]

Beyond assessments of how aligned corporate disclosures are with the TCFD recommendations, climate-related corporate disclosures – in particular those made through CDP's Climate Questionnaire – have also been used by academia to investigate what types of climate actions companies have been implementing (see Sakhel, 2017; Kouloukoui et al., 2018; Kouloukoui et al., 2019). These studies are most often based on

[36] By global in scope, it is meant that they are not limited to a specific country or region − e.g., Europe. In most − if not all − cases however, the assessments cited do not have full coverage across all countries. For example, EY (2018, 2019, 2020, and 2021) only assess disclosures from companies registered in 18 countries spread across all five continents, while the most recent assessment conducted by TCFD (2021a) covers 69 countries.

[37] A potential reason why the assessments referred to above have not meaningfully expanded into assessing how the private sector is managing climate risks is likely due to the fact that the primary aim of the TCFD is to ensure that investors − the primary audience of corporate disclosures − have better access to the information about climate risk that they need to make informed investment decisions; and not to enable aggregated assessment progress being made in adaptation (as is the case for national reporting to the UNFCCC and SDGs, for example).

small sample sizes and implemented with the objective of generating insights concerning how the private sector perceives climate risks, their approaches to managing these risks, and the barriers and enablers to implementing climate action. Such studies are relevant to policy creation however, they do not provide indications of progress overtime – which represents a key dimension in assessing progress towards global adaptation goals (UNEP, 2017). Further, with the exception of a handful of studies (e.g., Gasbarro et al., 2016), these largely focus on mitigation actions (i.e., those that aim to reduce GHG emissions).

Reporting to databases documenting non-state climate action

Numerous studies have used datasets provided by non-state climate action databases as an input into their investigations. However, the vast majority of these studies focus on the mitigation potential of non-state actors (e.g., UNEP, 2018; New Climate Institute, 2019 and 2021; Data Driven Yale et al., 2018; Data-Driven EnviroLab and New Climate Institute, 2020), with seemingly little focus being placed on adaptation and adaptation by the private sector specifically (Hale et al., 2020).

Exceptions to this can be found in a small collection of studies that use the case studies of private sector adaptation provided by the PSI's database to develop insights into the private sector's perception of climate change adaptation and to provide greater understanding of how adaptation implemented by the private sector can manifest itself (see Chan and Pauw, 2014; Pauw and Chan, 2018). Given the relatively small size of the PSI database and its lack of information concerning adaptation results, these studies are unable – and do not attempt – to use the PSI database to track progress overtime.

Furthermore, given that companies and investors are often part of international cooperative climate initiatives, the few studies that utilize the databases of the C-CID and GCAP to investigate the role of these initiatives in achieving global climate goals (i.e., across adaptation, finance as well as mitigation) and evaluate their contribution towards these goals also have notional relevance to private sector adaptation. Recognizing the role those high-level cooperative initiatives potentially have in accelerating climate action, a number of studies (e.g., ClimateSouth, 2018; GCA, 2021; Chan and Amling, 2019; Hale et al., 2020; Chan and Deneault, 2021) have developed and begun to apply analytical frameworks to assess progress in ambition, implementation, and impact that allow tracking of the international cooperative initiative landscape. These studies are useful for enhancing the understanding of the impact/potential of international cooperative climate initiatives and identifying gaps and needs in the cooperative initiative landscape. However, as the data they are assessing is reported at the initiative-level, such studies are unable to provide disaggregated analysis regarding the specific role or contribution of private sector actors within these multi-stakeholder coalitions, beyond detailing the number of companies and/or investors participating in these initiatives.

Reporting to national governments

Section 2.3 highlights that there are presently very few examples of national governments establishing systems to facilitate the collection of adaptation-relevant information from the private sector (this report only uncovered one example, in the UK). As a result, examples of aggregated analysis of data being generated via these systems is also scarce; essentially limited to the consideration of the ARP's outputs within the UK's National Climate Change Risk Assessment and National Adaptation Programme (see Figure 3).

3.2 Gaps and limitations

This report has thus far demonstrated that companies are increasingly disclosing adaptation relevant information through the various types of reporting, which could represent data sources for assessing progress in private sector adaptation at aggregated levels. However, the report also highlights that there are potentially some significant gaps in both 1) the information being generated by private sector reporting processes, and 2) the present pathways that could facilitate the aggregation of this data to the global stocktake. In this section, the report will present and discuss several potential key gaps and limitations across these two areas.

3.2.1 Gaps and limitations in the data being requested by private sector reporting

The data needs assessing adaptation progress at aggregated levels, particularly the global level, has been discussed at length by grey and academic literature (e.g., UNEP, 2017; Leiter et al., 2019). This literature forms the point of departure for identifying the gaps and limitations discussed in this subsection. In addition, as this report could only unearth one example of a government-led private sector reporting systems (see section 2.3), gaps and limitations are not identified for this reporting pathway. Instead, the potential for government-led reporting mechanisms to act as source of data for the global stocktake is discussed in Box 11.

- **Datasets are likely to be limited in size and subject to reporting bias**

To ensure that the findings of any global assessment of private sector adaptation are robust and representative, datasets need to be of a certain size and representative across key dimensions – which in the context of the private sector would mean that datasets should have coverage across companies belonging to different size brackets, sectors and geographic regions, among others. However, data generated through the types of reporting identified in this report either appear to lack sufficient sample sizes to represent a robust source of information and/or are subject to clear and significant reporting bias. As such, their ability to provide a robust and representative picture of the progress being made in adaptation by the private sector as a whole is reduced.

These limitations are most apparent in the datasets generated by databases documenting non-state climate action, where the largest dataset of adaptation actions or initiatives is only 103.[38] Additionally, while these databases are found to include adaptation actions from across sectors and geographic regions, reported actions are predominantly implemented by multinational corporations, while those of smaller firms are highly underrepresented (Pauw and Chan, 2018).

Issues relating to the size of datasets are less apparent for corporate disclosures. Already, large aggregated assessments of corporate disclosures (e.g., CDP, 2020 and 2021; ECB, 2020; EY, 2018, 2019 and 2021; Moody's, 2021; TCFD, 2018, 2019, 2020, and 2021a; Vigeo Eiris and Four Twenty Seven, 2020) demonstrate that an increasing number of companies – from a wide range of sectors –regularly prepare climate-related corporate

[38] Provided by the Private Sector Adaptation Initiative. As mentioned in section 2.2, adaptation actions are poorly represented in significantly larger non-adaptation specific climate action databases − e.g., Global Climate Action Portal.

disclosures.[39] However, due to the nature of climate-related corporate disclosures and the internal resources required to produce them, the companies producing these disclosure will predominantly be large or multi-national corporations with a tendency to be based in certain regions of the Global North (i.e. Europe, North America, Australia and New Zealand). As such, their ability to capture adaptation in certain segments of the private sector (e.g., companies based in the Global South and micro, small and medium enterprises generally) is likely to be limited.

- **Information about adaptation action is likely to be difficult to aggregate**

For data to be meaningfully aggregable, data needs to possess a certain level of comparability, consistency, comprehensiveness, and coherency (Ford and Berrang-Ford, 2016). However, the complexity of adaptation and its context-specific nature mean that a 'one-size-fits-all' approach to reporting on adaptation required to achieve highly aggregable data would methodologically be difficult to implement, particularly at the global-level. Further, even if it was methodologically possible, there is significant concern that this would lead to 'over harmonization', at the expense of enabling robust analysis (Gnych et al., 2016; Leiter and Pringle, 2018; Leiter et al., 2019). Thus, while there is clearly a balance to be struck between data that is perfectly aggregable and data that is meaningful and context-sensitive (Leiter et al., 2019; Adaptation Committee, 2021), it appears that the aggregability of data generated by private sector reporting is presently low despite this trade-off, and thereby poses significant room for improvement.

For example, the increasingly widespread adoption of the framework established by the TCFD recommendations should in theory facilitate standardization across corporate disclosures which would ensure that information disclosed is – on a basic level – comparable, consistent, comprehensive, and coherent. However, findings from recent assessments (e.g. TCFD, 2020 and 2021a; EY, 2018, 2019 and 2021; Vigeo Eiris and Four Twenty Seven, 2020) indicate that present reporting has significant room for improvement in aligning with the TCFD recommendations, something that poses significant questions about the extent to which information contained within current corporate disclosures can be aggregated and will undoubtedly limit the granularity of insights that could be drawn assessing them at aggregated levels.

There is however, a general acceptance among practitioners (e.g. TCFD, 2020 and EY, 2021) that the quality of disclosures will improve overtime as companies institutionalize the various processes required to generate the information for meeting the TCFD recommendations.[40] In the meantime, as the overall quality of disclosures made through CDP's structured climate questionnaire is generally higher than those made through company reports (Kouloukoui et al., 2019; EY, 2018; ECB, 2020; TCFD, 2020; Vigeo Eiris and Four Twenty Seven, 2020; Loew et al., 2021), assessments could improve the granularity of their analysis by using CDP data in isolation. However, this would mean reducing the sample size and may lead to further reporting bias.

[39] The study by Moody's (2020 in: TCFD, 2020), for example, assesses the disclosures of over 12,000 companies. While CDP states that 9,600 companies report via its climate change questionnaire annually.

[40] Similar improvements over time have been observed in comparable reporting processes related to climate action implemented by other actor groups. For example, the quality of reporting by countries to the UNFCCC has been observed to improve overtime by several commentators (Ellis and Moarif, 2015; Huang, 2016; Vallejo, 2017; Wang and Gao, 2018; Kawanishi et al., 2019).

Likewise, there are significant questions regarding aggregability of data generated by databases documenting non-state climate action. As these databases typically rely on self-submission, often without only limited or no process of verification, individual submissions can vary greatly in terms of their focus, completeness, and level of detail (Pauw and Chan, 2018). As such, the datasets provided by individual databases tend to lack consistency, coherency and comparability between entries (Hale et al., 2020).

- **Information about adaptation results will also be difficult to aggregate, when available**

One of the primary aims of the global stocktake is to assess progress towards the global goal on adaptation (Adaptation Committee, 2021). As the global goal on adaptation is framed in terms of adaptation results (specifically in terms of adaptive capacity, resilience, and vulnerability to climate change),[41] evaluating to what extent adaptation is leading to adaptation results should be viewed as a key objective of the global stocktake.

As highlighted in section 2.1, climate-related corporate disclosure initiatives, notably the TCFD, urge companies to disclose on internal targets they have established in relation to physical climate risks, and the related metrics being used to assess progress towards these targets. As such, corporate disclosures should theoretically include information about adaptation results. While they do not distinguish between use of targets and metrics for physical risks and transitional risks in their analysis, assessments of corporate disclosures find that the use of climate-related metrics and targets is significant and increasing year-on-year (e.g., TCFD, 2021a; EY, 2021). TCFD (2021a) for example, finds that the disclosure of climate related metrics and targets has increased from 34% to 44% and 21% and 34% respectively between 2018 and 2020; suggesting that companies are establishing – and disclosing – targets and metrics related to climate-risk.

Due to the wide variation in the relationships different companies have with climate change, it is highly likely that the targets they set in response to physical risks will also vary greatly. The respective metrics to track progress towards those targets will thus also be very different. Even though the TCFD and other climate-related disclosure frameworks and standard setters promote the development and disclosure of metrics and targets related to physical risk and provide examples and guidance on how to develop suitable metrics; they stop short of specifying and prescribing the distinct metrics and targets that should be used – even at the sectoral-level.[42] As a consequence, information disclosed within corporate disclosures relating to adaptation results is likely to be difficult to compare and aggregate – even when metrics appear to be highly similar (UNEP, 2021).

Similar methodological issues are likely to be equally – if not more – applicable to databases documenting non-state climate action. Information reported to these databases

[41] Article 7 of the Paris Agreement established the global goal on adaptation of "enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate response in the context of the temperature goal".

[42] For example, while of provides examples of targets/metrics that can or have been used in relation to physical risk, it does not prescribe definitions, baselines or target years for these metrics or targets. For example, the TCFD's Guidance Metrics, Targets and Transition Plans provides "reduce percentage of assets value exposed to acute and chronic physical climate-related risks by 50% by 2050" as an example of a quantified target, however it does not provide prescriptions about what constitutes exposure, nor does it prescribe 50% or 2050 the target/timeframe companies should use.

is typically found to be ex-ante. However, since COP26 the GCAP allows single actors and cooperative initiatives to report on progress in implementation and results, leading to a handful of cooperative initiatives with relevance to adaptation providing updates to their entries. However, as highlighted in section 2.2, these entries vary greatly in terms of the extent to which they report on progress and results, how they do this and the metrics they use.

- **Adaptation reporting does not capture all forms of private sector adaptation**

Private sector adaptation can occur at different levels or be implemented with different objectives. For example, Linnenluecke, Griffiths and Winn (2013) highlight that private sector adaptation can be implemented at four broad levels: at the industry-level, at the firm-level, at the individual decision-maker level, and at a broader societal level. Meanwhile, Lesnikowski et al. (2011 and 2015) divide adaptation action into two typologies – 'groundwork' and 'adaptation' – based on the action's proximity to risk reduction.[43] Any limitations in the scope of adaptation captured by the differing types of reporting will have implications for the scope of assessments possible using this data.

As corporate disclosures are company-level reports, they cannot be relied upon to include meaningful information about private sector adaptation occurring above the company level (i.e., cooperative initiatives occurring at the industry level or above). Meanwhile, even at the company-level, disclosure frameworks appear to place the focus on disclosing certain forms of adaptation, while being less clear on the disclosure of others. For example, the TCFD recommendations and aligned disclosure frameworks explicitly recommend for corporate disclosures to include information relating to actions that build institutional capacity to manage climate risks, either through conducting climate risk assessments or through establishing processes and institutional arrangements at the strategic/policy-level (e.g., allocating responsibility for climate risks to key decision makers [i.e., the board of directors], the mainstreaming of climate risks into pre-existing risk management processes, or the development of adaptation plans).

However, they are less clear on whether companies should report on the discrete adaptation actions they are implementing 'on-the-ground' and that lead to tangible reductions in climate risk. As the contents of corporate disclosures are ultimately company-led, this does not necessarily preclude the disclosure of these actions. However, it means that it is unclear to what extent increasingly TCFD-aligned corporate disclosures will include information about the discrete 'on-the-ground' adaptation measures companies are implementing in order to achieve their adaptation-related targets.[44]

The scope of adaptation reported to databases documenting non-state climate action meanwhile is more mixed with the type of adaptation, or level at which it is implemented, differing across the three databases assessed. For example, C-CID's database exclusively contains high-level cooperative initiatives that are involve multiple

[43] In the framing used by Lesnikowski et al. (2011 and 2015), groundwork actions are those that considered critical for informing and preparing for adaptation. (i.e., enhance adaptive capacity). Adaptation actions meanwhile are those that are implemented to tangibly improve resilience or reduce risk and/or vulnerability.

[44] A review of corporate disclosures conducted by CDSB (2020) found that the presence and depth of information relating to 'on-the-ground' actions varied greatly across the disclosures reviewed, with some disclosures providing lots of information about these activities and others providing little to no information.

organizations and are, almost by definition, being implemented above the company-level. Similarly, although single actions implemented by individual companies are relevant to the platform's scope, adaptation-relevant actions reported to the GCAP are also exclusively cooperative initiatives. PSI's database meanwhile, possesses a mix of actions being implemented by individual companies and consortia of different actors (including at least one company).

3.2.2 Gaps in the linkages between private sector reporting and the global stocktake

- **Clear pathways for aggregating reported data to the global level are missing**

With the exception of formal submissions to the UNFCCC by country Parties – which decision 19/CMA.1 states will be reviewed by the global stocktake – the logistical implications of conducting a global assessment of progress across multiple dimensions mean that it is highly unlikely that the global stocktake will conduct its own empirical analysis of raw data. Instead, if the global stocktake is to consider data from non-state actors, it is more likely to rely on aggregated assessments conducted by third parties (e.g., research organizations). As such, for the data generated by private sector adaptation reporting to be considered in the global stocktake, mechanisms for aggregating data (i.e., studies and assessments) will be required to take this data from the individual company level to the global level.

Although section 3.1 demonstrates that data being generated by all three forms of private sector adaptation reporting are – to some extent – being assessed at aggregated levels, the existing analyses generally do not focus enough on assessing how the extent to which the private sector is adapting to physical climate risks and tracking this overtime; foci that would be relevant for the global stocktake. Thus, it can be concluded that the necessary mechanisms for aggregating and analysing adaptation-related information disclosed by the private sector, to the extent that this information could feasibly and meaningfully be considered by the global stocktake, are currently not in place.

Box 11 A role for government-led reporting systems?

As highlighted in section 2.3, real world examples of national governments establishing systems for collecting information related to adaptation from their domestic private sectors are extremely rare. Consequently, the potential for this pathway to inform the global stocktake to any significant extent in its upcoming cycles is likely to be limited.

While this is likely to be the case in the short-term at least, if widely implemented, government-led reporting systems have the potential of becoming a significant source of data for the global stocktake. Particularly, if the outputs of such a system are integrated into national reporting to the UNFCCC, which would ensure that information about private sector adaptation is present within a source of data that will be considered during the global stocktake (UNFCCC, 2018 and 2021a).

As national-level reporting systems require resources to develop and operate, contributing to the global stocktake alone is unlikely to be a sufficient motivation for countries to implement them. However, as demonstrated by the UK's ARP, the outputs of government-led reporting systems can serve as important input into the development of adaptation-related interventions; ensuring that the resilience and adaptation needs of the private sector are taken into account in the development of these interventions when

they otherwise would not have been. The examples set by the UK and Chile case studies further illustrate that there is no one-size-fits-all approach to collecting information about private sector adaptation, and that approaches can be adjusted to fit the specific objectives, capacities and potential resource constraints of the implementing government.

Alternatively, instead of relying on empirical data collection, governments could also utilize the increasing amount of information being generated by climate-related corporate disclosure of companies operating in their jurisdictions. This would be particularly applicable in countries where such disclosure has been made mandatory as, while in many cases modalities of this legislation is yet to be clarified, these governments will likely be collecting disclosures anyway for the purposes of compliance verification and enforcement. While adopting this approach would undoubtedly represent a lighter less resource-intensive approach to assessing private sector adaptation, an obvious drawback to utilizing existing corporate disclosures as a secondary data source would be that governments would have less control over both the companies that are reporting and the information they provide.

- **Opportunities for the global stocktake to consider information about private sector adaptation**

While the importance of the private sector in addressing climate change adaptation is well recognized, under the present modalities proposed for the global stocktake it is unclear to what extent information about private sector adaptation could be considered by the global stocktake. For information on private sector adaptation to be considered by the global stocktake, it would need to be clearly included as a "source of input" (UNFCCC, 2018 and 2021a). The potential "sources of input" presented in decision 19/CMA.1[45] could present several entry points for information relating to private sector adaptation, including:

- Reports and communications from Parties,[46] and voluntary submissions by Parties,[47] and;

[45] Sources of input are listed in paragraph 37, decision 19/CMA.1. The sources listed are: (a) Reports and communications from Parties, in particular those submitted under the Paris Agreement and the Convention; (b) The latest reports of the Intergovernmental Panel on Climate Change, pursuant to decision 1/CP.21, paragraph 99; (c) Reports of the subsidiary bodies, pursuant to decision 1/CP.21, paragraph 99; (d) Reports from relevant constituted bodies and forums and other institutional arrangements under or serving the Paris Agreement and/or the Convention; (e) The synthesis reports by the secretariat referred to in paragraph 23 above; (f) Relevant reports from United Nations agencies and other international organizations, which should be supportive of the UNFCCC process; (g) Voluntary submissions from Parties, including on inputs to inform equity considerations under the global stocktake; (h) Relevant reports from regional groups and institutions; (i) Submissions from non-Party stakeholders and UNFCCC observer organizations;

[46] "Reports and communications from Parties" primarily refers to reports/communications submitted under the Paris Agreement and Convention – i.e., national communications, adaptation communications, BTRs, NDCs etc.

[47] No precise definition of voluntary submissions is provided by UNFCCC decisions; however it is likely that this term refers to submissions submitted by Parties to the UNFCCC with the explicit intention of informing the global stocktake. Under this understanding, voluntary submissions would not refer to existing periodic reports/communications submitted by Parties to the UNFCCC.

- Submissions from relevant reports from regional groups and institutions and non-Party stakeholders.

The relevance of the former will be determined by the ability and desire of countries to include information about private sector adaptation within their reports and communications to the UNFCCC. At present however the visibility of the private sector – and non-state actors at large – within the adaptation components of these reports and communications is generally low (Lesnikowski et al., 2015), with Chile's Fourth National Communication representing an exception. The relevance of the latter meanwhile will depend upon global-level assessments of private sector adaptation being available, which is presently not the case.

The sources of input for the global stocktake were also discussed at COP26 under the Subsidiary Body for Scientific and Technological Advice (SBSTA). Here it was agreed that the non-exhaustive presented in decision 19/CMA.1, including the submissions from non-Party stakeholders "will serve as basis for the sources and types of information for the global stocktake" (UNFCCC, 2021, p. 1) as well as that "further sources and types of information […] will also serve as a basis for the sources and types of information for the first global stocktake with a view to informing the technical assessment component thereof" (ibid.). These "further sources and types of information" are however not specified and therefore no judgement can be made to what extent this would include data on private sector adaptation.

Additionally, a UNFCCC "non-paper" outlining a proposed approach for the first global stocktake insinuates that the sources and themes to be considered within the technical assessment will – at least partially – be led by a series of "guiding questions" to be proposed by the Subsidiary Bodies ahead of the global stocktake's "information and collection" phase (UNFCCC, 2018 and 2021a).[48] If private sector adaptation is not covered within these guiding questions – as is the case for the tentative list of guiding questions proposed for the first cycle of the global stocktake in the UNFCCC's "non-paper" – then the relevance of this data to the global stocktake cycles is likely to be limited.[49]

[48] The Subsidiary Bodies involved are the Subsidiary Body for Implementation and the Subsidiary Body for Scientific and Technological Advice (UNFCCC, 2018).
[49] It appears that the discussion concerning guiding questions for the first cycle of the global stocktake was not advanced during COP26.

+ 4. Summary and outlook

This report has demonstrated that the private sector is already disclosing information relevant to adaptation through the various types of reporting. At present however, it seems that the datasets generated by private sector reporting possess limitations that reduce its potential to be used in global-level assessments of progress in private sector adaptation. This sentiment particularly applies to the two pathways (i) reporting to national governments and (ii) reporting to databases documenting non-state climate action. In the case of reporting to national governments, this is because government-led reporting systems are not presently adopted widely enough to secure sufficient global coverage. In the case of reporting to databases documenting non-state climate action meanwhile, it seems that such databases are not large enough to serve as the basis for usefully assessing progress in private sector adaptation at the global level, nor are do they generate data that would enable the aggregation or tracking overtime necessary.

Reporting via climate-related corporate disclosures may represent an exception to the above, primarily driven by the recent momentum surrounding the TCFD recommendations and climate-related disclosure more broadly. As illustrated in this report, climate-related corporate disclosure already generates large quantities of data with global coverage – albeit with notable imbalances between regions, sectors and companies of different sizes.[50] [51] Furthermore, due to alignment behind the TCFD recommendations as well as companies' growing experience in applying them, the data generated through this process is becoming increasingly comprehensive and comparable – meaning that its potential to be meaningfully aggregable is also increasing.

Despite positive trends, this report highlights that significant questions remain concerning the usability of present data, particularly among disclosures that are not prepared by the largest companies or made through the CDP platform. Further, while disclosure initiatives are increasingly producing resources to build capacity of companies in using metrics to measure and report on adaptation-related outcomes, the need for these outcome metrics to be highly context specific means that those used in corporate disclosures are unlikely to be comparable across sectors and geographies. As such, in contrast to mitigation, the potential for aggregating quantitative data relating to adaptation outcomes is highly limited.

Beyond issues relating to the quantity or quality of data, this report also highlights that there is a present dearth of appropriate assessments and studies that could act as important linkages between private sector reporting and the global stocktake. This state

[50] Since climate-related corporate disclosures are decentralised (i.e., not systematically disclosed through one specific platform or set of comparable platforms), estimating the actual number of companies engaging in climate-related corporate disclosures is very difficult (European Reporting Lab, 2021). However, an indication of the minimum order of magnitude of corporate disclosures that are available can be attained by looking at how many companies disclose via CDP – reported to be 9,600 in 2020 – and/or by looking at the size of datasets used in large assessments – which often exceeds 1,000 (see TCFD, 2021; Vigeo Eiris and Twenty Four Seven, 2020) and is approximately 12,000 in the assessment by Moody's (2020 in: TCFD, 2020).

[51] As mentioned in 2.1, while participation in climate-related corporate disclosures is a global phenomenon, participation is clearly greater in certain regions, typically those considered to be in the "Global North" – i.e., Europe, Australia, New Zealand, Japan, and North America.

of affairs may be due to the due to the current limitations in data quality and quantity hindering a sufficient database necessary for conducting studies and assessments into this field. However, given that the global stocktake is unlikely to conduct its own empirical assessments of information that is not submitted by country Parties to the UNFCCC through official channels, for thematic areas such as private sector adaptation that typically do not strongly feature in Parties' submissions to the UNFCCC (Lesnikowski et al., 2015), assessments conducted by third parties – particularly those undertaking assessments at the global level – will represent an important source of input to the global stocktake. Importantly however, the report also highlights that – with the specific modalities and thematic priorities for the global stocktake's first cycle yet to be fully decided – it is presently unclear if and to what extent the global stocktake will be considering information concerning private sector adaptation.

Possible starting points for assessing climate-related corporate disclosures at aggregated levels

Unlike climate change mitigation, for which the reduction of greenhouse gas emissions represents an effective means for assessing impact, quantitative uniform metrics for adaptation that lend themselves to aggregation are generally lacking (Leiter et al., 2019). As discussed in section 3.2, generic challenges in aggregating outcome/impact-orientated adaptation metrics will inevitably be equally applicable to the metrics being applied by companies within their corporate disclosures, which – due to the need to be decision-useful to end-users at the company-level – are likely be highly-context specific and therefore unlikely to be comparable.

Consequently, assessing progress in adaptation using corporate disclosures will – at least in the short- to medium-term – likely rely on tracking process indicators associated with adaptation best practices.[52] On its most basic level, this would involve tracking the number of companies that have implemented certain broad measures that are generally acknowledged to enhance the enabling environment and lay the groundwork for adaptation actions,[53] while deepening this analysis could involve expanding lines of enquiry to assess specifically *how* companies are implementing these measures.[54] It is important to highlight that such an approach would not provide information on whether companies are reducing their vulnerability or increasing their resilience to climate change, however it would provide an indication of if companies are establishing the necessary processes and governance structures to increase their capacity to adapt (Robinson, 2017; Lwasa, 2015, Kumamoto and Mills, 2012; and Mannke, 2010 and 2011).

The current gaps and limitations in the data provided by corporate disclosures outlined in section 3.2 will undoubtedly reduce the level of analysis possible through the approach proposed above. However, the fact that global level assessments of how corporate

[52] Similar approaches have been proposed as a short- to medium-term approach for tracking government-led adaptation (UNEP, 2017), and have been used to good effect in 2020 and 2021 editions of the Adaptation Gap Report (UNEP, 2020 and 2021).

[53] Such actions could be based on the TCFD recommendations, e.g., integration of physical climate risks into broader risk assessment processes, or establishment of governance structures explicitly related to decision-making concerning climate-related risks.

[54] This could involve distinguishing between different approaches to assessing climate risk, e.g., tracking whether scenario analysis was used to inform the assessment, whether a comprehensive range of climate impacts were assessed, or whether interdependencies with, for example, suppliers was considered.

disclosure align with the TCFD recommendations already adopt comparable approaches demonstrates that assessing large datasets of corporate disclosures is already possible at the global level, despite the limitations to data quality.

Furthermore, while current assessments of corporate disclosures do not typically assess how private sector actors are *actually* adapting to climate change, the lines of enquiry that underlie the research question of 'how aligned are disclosures with the TCFD recommendations?' – being posed by assessments of corporate disclosure alignment with the TCFD – and the research question 'what are companies disclosing about how they are adapting to climate change?' – that would be posed by assessments of private sector adaptation – are sufficiently linked so that the latter could be developed by building on the existing approaches developed for the former. Box 12 provides an example of an assessment framework developed by Vigeo Eiris to assess disclosure alignment to the TCFD recommendations which could be adapted to assess private sector adaptation at aggregated levels.

Box 12 Vigeo Eiris TCFD Climate Strategy Assessment

Vigeo Eiris has developed the TCFD Climate Strategy Assessment Framework for assessing the extent to which corporate disclosures align with the recommendations of the TCFD. While their framework is primarily focused on determining the alignment of disclosures with the TCFD recommendations and what information companies are providing in response to these recommendations, 15 of the 27 indicators used in their assessment methodology could be used to assess if, how, and to what extent, companies are adhering to generally accepted adaptation best practice, based on the TCFD recommendations (see indicators in Table 2).

Table 2 List of adaptation-relevant indicators within the TCFD Climate Strategy Assessment Framework established by Vigeo Eiris

TCFD element	Adaptation-relevant indicators
Governance	• Processes used to inform the board members/committees about climate change related issues • Processes used by the board to integrate climate change related issues in the company's strategy • Processes used by the board to monitor and oversee progress over climate-related goals and targets • Climate change related responsibilities assigned to management level positions • Processes used to inform the management (e.g., CEO, CFO, COO) of climate-related issues
Strategy	• Climate change scenario analysis and their potential impacts on the company's business strategy • Climate change factored into financial planning • Participation in climate-related industry/multi-stakeholder working groups

Risk Management	• Risk management plans • Integration into overall enterprise risk management • Adaptation activities to ensure resilience to physical impacts of climate change plan to support long-term business strategy • Engagement with companies or value chain • Analysis of evolving legislation on climate change • Risk mapping, materiality assessments and balanced score cards • Enhanced due diligence applied to projects and transaction

Source: Adapted from Vigeo Eiris and Twenty Four Seven (2020)

In some cases, these standardized indicators could be used without modification to assess adaptation. For example, the five standardized indicators developed to track alignment to the TCFD recommendations relating to governance could be repurposed to track whether companies have established the necessary internal governance structures to ensure that climate-related risk (which includes physical risk) is being taken into consideration by the company's key decision makers. Meanwhile, other indicators may require some adaptation to ensure that they are explicitly relevant to physical climate risks.

It is also important to note that the adaptation-relevant indicators used in the Vigeo Eiris TCFD Climate Strategy Assessment framework do not necessarily offer full coverage of adaptation-related issues. For example, the framework has an explicit indicator for tracking if companies have disclosed on the development of a "low-carbon transition plan" but does not possess an equivalent indicator for adaptation plans.

Ongoing and future developments

Ongoing developments in adaptation reporting by the private sector indicate that the quantity and quality of the data being generated by the three types of reporting identified in this report will increase. However, the extent to which this is likely to increase varies significantly between these types of reporting.

Of the various types of reporting reviewed, reporting via climate-related disclosures shows the most potential for improvement. Driven by growing and widespread support for TCFD, both voluntarily and as mandated by several governments, the quantity of companies periodically reporting adaptation-related information through corporate disclosures, and the quality of these disclosures can be expected to continue increasing over time. Improvements in quality are likely to be further enhanced as companies gain more experience in executing the internal processes required to generate climate-related information (e.g., scenario analysis) and in communicating this information clearly and comprehensively in their corporate disclosures.

The potential of the two other types of reporting assessed in this report are however conditional on future developments.

For databases documenting non-state climate action to become a feasible input for assessing progress in private sector adaptation, these databases – in particular GCAP –

need to significantly enhance their ability to capture private sector adaptation. Further, while GCAP has recently introduced provisions for non-state actors to report on progress made and the outcomes of their climate actions, greater coherency in the data being reported is needed for this data to be useful for analysis at aggregated levels. This particularly applies to cooperative initiatives with relevance to adaptation, initial reporting by which varies dramatically in terms of the extent to which they report on progress and results, how they do this and the metrics they use.

Due to the high-level nature of many of these cooperative initiatives and their tendency to varying significantly in their functions and objectives, achieving convergence to the extent that data on progress and outcomes becomes meaningfully comparable and aggregable will be difficult. However, such convergence among adaptation focused cooperative initiatives may – at least to a certain extent – be facilitated by the umbrella campaign “Race to Resilience”, which aims to align existing non-state actor-led national, regional and global initiatives under the goal of "building resilience of 4 billion people from vulnerable groups and communities" (UNFCCC, 2021c). In order to make credible progress towards this goal, the Race to Resilience campaign has developed a comprehensive metrics framework that records pledges and tracks the results from the cooperative initiatives under this campaign. As part of this campaign, participating initiatives have to report annually on their progress using this metrics framework (Climate Champions, 2021).

As the Race to Resilience metrics framework has only been launched at COP26, it remains to be seen whether it will succeed in its objectives. Nevertheless, consolidated reporting in this manner has the potential to generate data that could be used to track the contribution of these initiatives to specific adaptation goals – in this case building the resilience of vulnerable people.

With regards to government-led reporting systems, the UK and Chile case studies of national reporting systems demonstrate that governments can monitor and assess adaptation in their domestic private sectors, principally as a means of informing adaptation policy interventions. However, while these examples provide inspiration for other countries, at present there is little indication that similar systems are being implemented by other countries. As such, it is unclear whether such systems will be sufficiently adopted by countries to the extent where they could provide a representative picture at the global level. The increasing number of governments that mandate companies to provide TCFD aligned disclosures is a more promising development in that regard.

+ 5. Recommendations

In response to the gaps and limitations highlighted in section 3.2, this section provides several recommendations for 1) increasing the quantity and quality adaptation relevant data generated by private sector reporting, and, 2) establishing/strengthening pathways that link available data sources for private sector adaptation to the global stocktake.

To increase the quantity and quality of adaptation relevant data generated by private sector reporting, improvements can be facilitated through different stakeholders:

1. **Climate-related disclosure initiatives and other relevant business organizations need to place greater focus on building capacity for companies to report on physical risks and their management within corporate disclosures**

   Reporting on physical climate risks and related risk management represents a fundamental aspect of the TCFD recommendations and is notionally of equal importance to reporting on transition risks. However, at present there is a clear imbalance between those two risk categories with a greater focus being placed on transition risks than on physical climate risks by key players in the climate-related disclosure arena (e.g., disclosure framework providers, standard setting organizations, and other disclosure-related initiatives). This imbalance is also reflected in the multiple initiatives and campaigns targeting mitigation in the private sector, such as the Science Based Targets initiative or the Business Ambition for 1.5°C. Consequently, there is a greater availability of guidance, tools and metrics for building the capacity of companies to measure, assess, manage, and report on transition risks associated with GHG emissions than for there are for physical climate risks.

   This gap is of particular importance as the underlying processes that companies need to conduct to generate the required information for reporting on physical climate risks are, from a technical perspective, difficult to implement, notably risk assessments and scenario analysis and tracking adaptation measures. This is particularly the case for smaller companies that do not possess the same level of resources as their larger counterparts. Furthermore, as many companies – regardless of size – likely have limited or no prior experience in conducting these assessments and processes, there is need for capacity building in that regard. This need is also confirmed by the increasing use of the TCFD Knowledge Hub and its online resources (TCFD 2021a), notably the TCFD online course which reached 10,000 completions in 2021 since the launch in 2020.

   While some efforts are underway – for example, the TCFD has developed a “Guidance on Scenario Analysis for Non-Financial Companies” and is further scheduled to publish guidance related to reporting on climate adaptation strategies in 2022 there is a clear need for key players in the

climate-related disclosure arena to provide greater guidance to companies in the area of physical climate risks, especially for smaller sized companies.

2. **The Global Climate Action Portal should seek to increase the extent to which it captures adaptation being implemented by the private sector**

The Global Climate Action Portal (GCAP) represents the most prominent database for climate action by non-state actors. However, as highlighted in section 2.2, adaptation action being implemented by the private sector is currently very poorly represented in this database. This particularly applies for adaptation actions implemented by individual companies, which are completely absent from the GCAP database despite similar data existing for mitigation actions.

As adaptation action is highly context specific, reporting on adaptation action in a manner that is coherent and meaningful is likely to be difficult, particularly across large samples of companies across varying geographies and sectors. However, a starting point could be developing standardized metrics based around types of action recommended by the TCFD and other prominent organizations – e.g., 'scenario analysis conducted', 'company adaptation strategy developed' or 'internal targets for adaptation established'. This data could be extracted from the results of CDP's climate questionnaire, which already serves as data provider to the GCAP.

The GCAP already uses similar categories for mitigation actions being implemented by companies, typically relating to commitments – e.g., 'halve emissions by 2030' and 'reach net-zero by 2050' – and to a lesser extent for adaptation action implemented by cities, regions and countries, for whom the GCAP tracks whether they have developed an adaptation plan. As such, capturing comparable metrics relating to private sector adaptation would enable users of the GCAP, including researchers such as the Climate Action Methodologies Data and Analysis (Camda), to make comparisons between the extent to which the private sector is engaging in mitigation and adaptation action. Additionally, it would ensure parity between companies and other non-state actors by ensuring that private sector action is not systematically under-reported.

3. **National governments can play a role in increasing the quantity and quality of corporate disclosures by mandating corporate disclosure in alignment with the TCFD recommendations**

National governments can play a role in increasing the quantity and quality of corporate disclosures by building on the experiences of the UK, Switzerland and others in making TCFD-aligned climate-related corporate disclosure mandatory for certain companies. In the case of the EU, the European Commission will develop its own standard for its Corporate Sustainability Reporting Directive, however building on the TCFD.

Such a step may not be currently feasible for many countries, particularly where the wider practice of non-financial disclosure has yet to gain significant traction. However, in countries where it has – i.e., Europe, North America, and some major economies in East and South Asia, Latin

America, and Oceania – mandating certain companies to disclose on climate-related risks as per the TCFD recommendations should represent a feasible means of instigating both an uptake in its adoption and an enhancement in the quality of disclosures.

To date, seven countries and the EU have implemented or are implementing TCFD aligned official reporting requirements, while in a further 27 countries the TCFD recommendations have received the support of the national government, or at least one government ministry or national supervisory or regulatory body (TCFD, n.d.). To varying degrees, these governments have already communicated to their domestic private sectors that they believe comprehensively disclosing on climate-related risks is important. For these countries, making climate-related disclosure as per the TCFD recommendations mandatory for certain companies within their jurisdiction represents a logical next step.

To better link available data to the global stocktake the following key actors can address current gaps:

4. The research community needs to develop and execute approaches for tracking and assessing progress in private sector adaptation at the global level

Despite the emergence of private sector reporting on adaptation issues over the past decade, this report demonstrates that there is currently an absence of studies using this data to assess to what extent the private sector is adapting to climate change at regional or global levels.

This particularly applies to corporate disclosures, which – while not being without their limitations – presently represent a unique source of data that provides insights into how companies perceive and manage climate-related risks. Given that this data is becoming increasingly comprehensive and comparable, and is achieving greater coverage across countries and regions, there is a need for the research community to develop approaches to assess this data at scale, as a means of generating snapshots of private sector adaptation at regional and global levels – and eventually enabling the tracking of private sector adaptation over time. As demonstrated by TCFD Status Reports and other large assessments of corporate disclosure,[55] new approaches enabled by technological advancement, such as the use of AI, could represent a promising means of analysing large numbers of reports and other relevant documents. Researchers embarking on this task could take their point of departure from the approaches used by the handful of global-level assessments that assess the extent to which corporate disclosures are aligned with the TCFD recommendations (see section 3.1.1). While these assessments primarily investigate current practice in climate-related corporate disclosure, and typically stop short of explicitly analysing how the private sector is *actually* adapting to climate

[55] See TCFD Status Report 2021, p. 80, for detailed information on TCFD's AI-based review methodology.

change, the two lines of enquiry are inherently linked, meaning that there is scope for building upon the approaches already established.

As community of data and analytical experts, the Camda group with a large variety of stakeholders would be an obvious stakeholder to drive this work forward, also in line with their objective of "providing credible climate action information from regions, cities, **businesses**, investors and civil society" (Camda, n.d. a).

Importantly, Camda is working explicitly in support of the global stocktake, having stated in a declaration to "produce recommended metrics prior to and in support of the Global Stocktake" (Camda, 2019). A declaration issued by the Camda subgroup – the Climate Action Data 2.0 workgroup – at COP26, reiterated the Camda's support to the global stocktake by committing to "support the goals and strategic imperatives of the Marrakech Partnership and the Climate Champions, including the Global Climate Action portal and **inputs to the Global Stocktake**" (Camda, 2021). The declaration further states that Camda will "develop solutions to the identified actor needs through existing data platforms and by collectively leveraging emerging technologies to improve climate data tracking" (ibid.), emphasizing the role Camda could play in utilizing these new types of technologies.

While having focused primarily on mitigation so far, Camda is now also pursuing efforts to develop metrics and indicators to track commitments on adaptation & resilience as well as finance. Whether those metrics will relate to adaptation actions by the private sector, and individual companies in particular, remains to be seen.

5. **National governments can track and assess adaptation in their domestic private sectors through establishing bespoke reporting systems**

By establishing bespoke systems for tracking and assessing adaptation by their domestic private sector, and then subsequently including the results of assessments in their submissions to the UNFCCC via reporting instruments and/or voluntary submissions, countries could provide the global stocktake with the information needed to adequately consider private sector adaptation within its technical assessment.

On its own, contributing to the global stocktake may not be a sufficient motivation for countries to establish systems for tracking and assessing private sector adaptation; particularly for developing countries who are unlikely to prioritize this given their greater resource constraints and difficulties of preparing reports to the UNFCCC in general. However, as demonstrated by the UK's Adaptation Reporting Power, the outputs of such systems can also serve as important inputs for developing adaptation-focused policy interventions. As such, it is rather their ability to strengthen government-led interventions that should represent the primary driver for governments to establish their own systems for assessing and tracking

private sector adaptation; with the possibility of contributing to the global stocktake representing a co-benefit.

Alternatively, instead of relying on empirical data collection, governments could also utilize the increasing amount of information being generated via climate-related corporate disclosure by companies operating in their jurisdictions. This would be particularly applicable in countries where such disclosure has been made mandatory as – while in many cases modalities of this legislation is yet to be clarified – these governments would likely be collecting disclosures anyway for the purposes of compliance verification and enforcement. While adopting this approach would undoubtedly represent a less resource-intensive approach to assessing private sector adaptation than for instance UK's approach, an obvious drawback to utilizing existing corporate disclosures as a secondary data source would be that governments would have less control over both the companies that are reporting and the information these provide. This drawback could be avoided by governments who have made climate-related disclosure mandatory, if they ensure that both the companies mandated to report and the scope of the information that they are mandated to report on coincides with their information needs for developing and assessing adaptation focused policy interventions.

6. **The global stocktake should ensure it remains open to including information about progress in private sector adaptation**

Accepting that the global stocktake is fundamentally a Party-driven process and therefore has a mandate to focus on issues prominent under the UNFCCC, the global stocktake should remain open to considering available information about progress in private sector adaptation, including the results of any future regional and/or global assessments of private sector adaptation derived from private sector reporting processes.

This report illustrates that climate-related reporting by the private sector is disproportionately coming from large multinational corporations. As the resilience and adaptation needs of this segment of the private sector does not feature strongly within the Paris Agreement or under the convention (Schaer et al., 2019), information generated by private sector reporting processes could be at risk of getting overlooked in favour of other thematic areas that are more aligned with the agreements the global stocktake is mandated to serve. However, given that the private sector is widely considered to be a key player in the broad-based coalition required to implement adequate climate action, and that private sector resilience to climate change is integral to the resilience of wider society, the extent to which large, often multinational, corporations are adapting to climate change is of interest to any stocktake of global adaptation, particularly given their large market capitalization and propensity to support large networks of smaller enterprises.

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Annex 1: Format and structure of CDP's Climate Questionnaire

CDP's Climate Questionnaire was initially designed to enable companies to self-report on their greenhouse gas emissions. However, since its launch in 2002, the questionnaire has been through a number of iterations to enhance its utility to investors and ensure that it continues to be aligned with the various ESG and climate relevant frameworks described above. Most recently, in 2018, CDP's Climate Questionnaire was altered significantly to be aligned with the TCFD's 11 recommendations (CDP, 2021e).

In its 2021 iteration, CDP's Climate Questionnaire comprises 12 core modules, plus two additional modules applicable to specific sectors only. As can be seen in Table 3 below, these modules are clearly aligned with the four thematic areas that structure the TCFD's 11 recommendations.

Table 3 Alignment between the thematic areas of the TCFD's recommendations and the modules of CDP's climate change questionnaire

TCFD thematic area	CDP Climate Questionnaire module
Governance	(1) Governance
Strategy	(3) Business strategy
Risk Management	(2) Risks and opportunities
Metrics and targets	(4) Targets and performance; (5) Emissions Methodology; (6) Emissions data; (7) Emissions breakdown; (8) Energy; (9) Additional metrics; (10) Verification; (11) Carbon Pricing.
Unaligned	(12) Engagement; (13) Module dependencies;[56] (14) Module dependencies.[57]

Source: CDP (2021f)

The modules themselves are composed of a series of questions and sub-questions that solicit information relating to each recommendation made by the TCFD. To ensure that the information solicited through the questionnaire is able to be both (i) adequately context specific and (ii) comparable between respondents, the questionnaire often provides respondents with both a list of standardized responses to each question, and the possibility to provide a written response to contextualize or explain the companies answer to the question.

For example, in response to the TCFD recommendation 1. "describe the board's oversight of climate-related risks and opportunities", question 1 of the governance module asks respondents:

"*Is there board-level oversight of climate-related issues within your organization?*"

[56] Applicable to the agriculture, food, beverages, tobacco, paper and forestry sectors only.
[57] Applicable to the financial services sector only.

For respondents, answering this initial question requires a selecting either "yes" or "no" answer. However, this question is followed by either two or one sub-questions (depending on the initial answer) that further elaborate on the specific information companies need to provide in order to comprehensively meet the TCFD's recommendation.

If yes:

(a) Identify the position(s) of the individual(s) on the board with responsibility for climate-related issues.
(b) Provide further details on the board's oversight of climate-related issues.

If no:

(c) Why is there no board-level oversight of climate-related issues and what are your plans to change this in the future?

For each of these sub-questions, respondents are provided with a range of standardized responses that should adequately capture the majority of circumstances (e.g. for sub-question (a) the questionnaire provides 13 different generic board positions (e.g. Board Chair, Director on Board, CEO, CFO and COO) that *may* have responsibility for climate related issues), as well as an opportunity to provide further descriptive information that can add additional detail or put standardized responses information into context.

Annex 2: The United Kingdom's Adaptation Reporting Power

Background

The Adaptation Reporting Power (ARP) is a mechanism established by the UK government that facilitates the transfer of information related to present and emerging climate risks from key infrastructure providers, regulators and public bodies to the national government.

The given purpose of the ARP is two-fold. On the one-hand, the information generated by the ARP is intended enable the government monitor whether important actors in the national context are taking appropriate action to monitor, assess and manage climate-risk, and thus provide it with vital intelligence on resilience and level of preparedness in key sectors. This information is then formally fed into the next iteration of the UK's Climate Change Risk Assessment (CCRA) and National Adaptation Programme (NAP), as well as being made publicly available on the UK government's website. On the other hand, the process of formally reporting to the national government on climate-related issues is intended to support reporting actors to meaningfully engage in the process identifying, assessing, and managing present and emerging climate risks and integrate climate change risk management into their operations.

How does the ARP process work?

The ARP has its origins in the Climate Change Act (2008), a piece of primary legislation that represents the UK's legal basis for addressing climate change. Amongst other things, this act gives the national government the power to direct (or invite) operators of key public infrastructure (incl. both publicly owned and private organizations) and industry regulators and public bodies to report on how they are addressing current and future climate impacts.

The process is managed by the Department for Environment, Food and Rural Affairs (DEFRA), who are presently coordinating the ARP's third reporting cycle, the reporting window for which is scheduled to close at the end of 2021.

To keep the process manageable for both themselves and organizations asked to report, the government will not ask all potentially eligible organizations to report. Instead, for its third reporting cycle, DEFRA identified relevant organizations by applying a three-part criteria that considers whether (i) organizations are identifiable as vulnerable according to the UK's most recent CCRA, (ii) organizations are already covered by other reporting requirements (e.g., mandatory TCFD disclosures), and (iii) whether the organization is large enough for reporting under the ARP to be considered proportionate (DEFRA, 2018).[58]

[58] The UK government believes that asking certain organisations that are identifiable as vulnerable under the CCRA to report under the ARP would be disproportionate. This is particularly the case where vulnerable sectors are dominated by a large number of smaller providers. Where appropriate, the government will invite umbrella organisations to report on behalf of members. (DEFRA, 2018).

In its third reporting cycle, the ARP has engaged 88 different organizations, with reporting continuing to be voluntary.[59] Once engaged, organizations are expected to submit a report to DEFRA that details the risks they are facing related to climate change, and how they are managing (or planning to manage) these risks. To facilitate comparable/consistent reporting across organizations, DEFRA provides reporting organizations with an excel-based template that identifies the key areas of information organizations *should* include in their reports, and provides guidance concerning how this information should be included (e.g., the preferred format, level of detail required, and the need for evidence and/or substantiation). In particular, this template asks organizations to provide information in relation to across four themes:

(a) Background information relating to the organization generally and how it governs climate change internally;
(b) The results of their climate risk assessments;
(c) A ledger of actions being planned and implemented to manage the identified risks (including results of monitoring and evaluation of actions reported on in previous cycles of the ARP);
(d) Any case studies of best practice the organization may have and want to share.

While this template is designed to facilitate comparable/consistent reporting across organizations, it does not provide a strict template for organizations to follow. As such, organizations are responsible for generating their own reporting formats that are able to adequately include the information requested by the excel template provided (a summary of the information requested for the ARP's third reporting cycle is provided in Table 4). To ensure that the modalities for reporting are optimized, reporting burdens reduced, and consistency across sectors enhanced, DEFRA is actively engaging with reporting organizations in order to develop tailored reporting templates that fit in with existing reporting processes within their sector.

Table 4 summary of the information requested for the ARP's third reporting cycle

Background information	Risks (incl. indirect risks)	Risk mitigation actions
General: • Organization profile • Geographic relevance *Institutional governance of climate change*: • Institutional arrangements for managing climate change • How climate change considerations are	• Climate variable(s) related to each risk identified • Anticipated impacts of risks identified • Risk owners (i.e., actor responsible for managing the risk) • Point that risk becomes unacceptable (i.e., decision threshold point)	• Action owners • Implementation timetable and current status • Anticipated or realized benefits (ideally supported by quantitative indicators) • Barriers to implementation

[59] The organisations being engaged in the ARP's third cycle can be categorised as infrastructure providers, regulators and public bodies who operate across the following sectors: water, energy, transport, environment, heritage, health and finance.

mainstreamed into BAU activities • Objectives, plans or strategies related to climate change	• Risk scores for present, 2050, and 2080 timeframes (incl. level of confidence and qualitative explanation of each risk) • Any assumptions made in relation to the risks identified	• Remaining residual risk • Additional actions planned or required to manage residual risks • Interdependencies with other organizations or sectors

Outputs and results of the ARP process

As aforementioned, the ARP has two objectives, to inform the next iteration of the UK's CCRA and NAP. This process is facilitated by the Climate Change Committee's (CCC) Adaptation Sub-Committee (ASC), which leads the development of the CCRA and NAP and utilizes the reports submitted under the ARP as a source of data to inform the contents of these documents.

In a review of how reports from the ARP's second reporting cycle have helped the ASC fulfil develop the CCRA, NAP and other reports, the CCC (2017) states that overall it continues to support the ARP process as it yields important evidence that would not otherwise be available to the Government, to Parliament, and the ASC itself. However, while this review found the ARP to be useful, CCC (2017) was clear that – in order to build a reliable picture of climate change risks and opportunities at the national, regional or sectoral level – certain aspects of the ARP need to be improved in the next reporting cycle.

Several limitations highlighted by CCC (2017) were procedural. For example, the timing of the ARP's second reporting cycle was misaligned with the process for developing the CCRA and NAP. As a result, only half of the reports submitted under the ARP's second reporting cycle were done so in time to be adequately considered in the CCRA and NAP. Likewise, the fact that the second reporting cycle was voluntary has led to the emergence of gaps in sectoral coverage as approximately a quarter of the organizations invited to report declined to.[60] In lieu with this, CCC (2017) also recommends that DEFRA expand the scope of the ARP to include, or expand participation from, important sectors that do not yet report, although this recommendation has only been implemented in the ongoing reporting cycle to a limited extent.[61]

However, other limitations related to the quality of the reports being submitted. In particular, CCC (2017) highlights that large variations in the extent to which organizations provide certain types of information limits the extent to which the data can be assessed at aggregated levels (e.g., the sectoral level). Meanwhile, certain important information gaps

[60] In its first cycle, the government directed 91 organisations to report mandatorily, with a further 13 organisations being invited to report voluntarily. In its second cycle, the pool of organisations engaged by the ARP was expanded by eleven, however the need to report was made voluntary for all organisations.

[61] CCC (2017) suggest that the ARP's third reporting cycle should include, or expand participation of, actors from the Telecoms sector, Financial sector, Health and Social Care sector, and Local Authorities. Of these suggested sectors, the range of reporting actors has only been expanded in the financial sector.

were also observed to be present across the vast majority of reports. Important information gaps identified include:

- **Quantification of the climate risks identified**. Risks disclosed by reporting organizations were rarely quantified, meaning that it was difficult to gauge the scale of risk relative to other business risks.
- **Results of the adaptation actions being implemented**. Information about the results of actions being implemented by organizations was largely limited to providing general statements about benefits and impacts, as opposed to specific evidence of reduced vulnerability (e.g., through quantitative indicators) that would contribute to understanding if progress is being made across sectors or more generally.
- **Interdependencies in mitigating climate risks**. While many organizations reporting under the ARP have considered their strategic interdependencies and take part in cross-sector forums to identify interdependencies between infrastructure operators and strengthen collaborative efforts to enhance resilience, the results of this work are not included in their reports under the ARP.

These limitations apply to the results of the ARP's second report cycle. With the third reporting cycle only just beginning to garner results, it is as of yet unclear whether progress will have been made to bridge this information gaps. The strategy for the ARP's third reporting cycle (DEFRA, 2018) however, does indicate that these shortcomings will be addressed through the greater engagement with reporting organizations to agree on the informational content reports should include, as well as providing these organizations with clearer guidance – something that was notably absent from the second reporting cycle. While it is unclear if this will be enough to bridge the gap for the ongoing reporting cycle, guidance developed by DEFRA and shared with reporting organizations does include necessary references to the data gaps identified in the review by CCC (2017).

Annex 3: Assessing the response of Chilean companies to climate impacts

Co-authored by: Sebastian Vicuña, Centro de Cambio Global

Background

In 2019, Accion Empresas[62] – the largest non-union business network in Chile and representative of the World Business Council for Sustainable Development (WBSCD) in the country – commissioned a study into how member companies perceive and are adapting to climate change. The study was conducted in response to the increasing recognition that: (a) the impacts of climate change are material to the profitability of many Chilean companies and – if left unmanaged – increasing climate risks could put the long-term viability of companies at risk; and (b) the private sector is in a strong position to capitalize on the potential benefits that these new conditions can bring. In Chile, some companies have begun to internalize the effects of climate change as one of their challenges. However, as noted by the Third National Communication of Chile to the United Nations Framework Convention on Climate Change (UNFCCC), adaptation efforts by these actors have not been sufficiently captured (Government of Chile, 2016).

The purpose of the study was to develop an initial understanding of how climate change impacts are interacting with the business and operational models of companies in Chile, in particular determining the extent to which they understand, and have internalised, the need to adapt to climate change.[63] This understanding was then intended to form the basis of a roadmap for developing an Accion Emrpesas-led work programme to build the capacity of Accion Empresas member companies to overcome barriers and challenges in adapting to climate change (Accion Empresas and Centro de Cambio Global, 2019). The results of this report together with a review of the available literature and surveys distributed among different types of actors provided the foundation of the presentation of the adaptation section of the Fourth National Communication of Chile (Government of Chile, 2021).

How was the study conducted?

The approach adopted by the assessment was composed of three steps:

The first step was to review sustainability reports published by member companies of Accion Empresas. The purpose of this review was to identify how Chilean companies perceive the importance of climate to their operations, and the materiality of risks posed by climate change. As part of the assessment, text referring to either how climate change and its impacts are perceived by the company or adaptation actions committed to or already implemented by the company, was reviewed.

In the second step, members of Accion Empresas were asked to engage through an online survey aimed at exploring the extent to which they perceive and understand climate

[62] More information about Accion Empresas can be found here: https://accionempresas.cl/

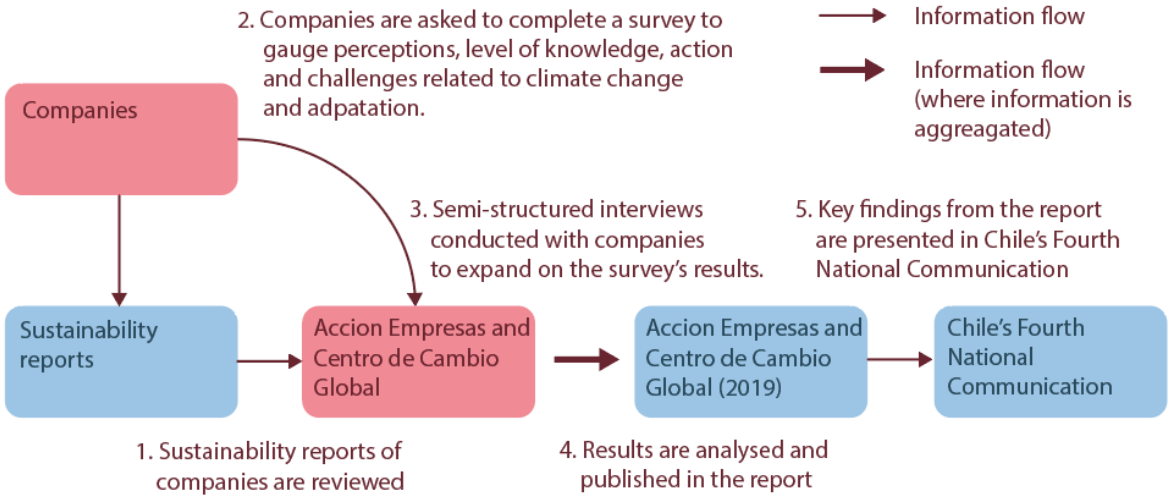
[63] It is important to note that this assessment was not intended to provide an exhaustive and/or statistically representative overview of how the Chilean private sector perceives or is adapting to climate change.

change and its impacts and potential opportunities, and to identify the types of action being implemented and challenges faced by these companies.[64]

The final stage of the assessment involved conducting a series of semi-structured interviews with companies who responded to the survey in order to expand on their responses, and the survey's overall results.[65]

Following the collection and analysis of this data, the findings from this assessment were published by Accion Empresas as part of the "Empresas y cambio climático en Chile: el camino hacia una adaptación sostenible", alongside the proposed road map to advance an Accion Empresas-led work program (Accion Empresas and Centro de Cambio Global, 2019).

Figure 6 Flows of information under Accion Empresas and Centro de Cambio Global (2019)



Key findings

The assessment generates several key findings regarding companies in Chile that are relevant to potential future policy interventions, in particular the aforementioned work programme that assessment is intended to inform.

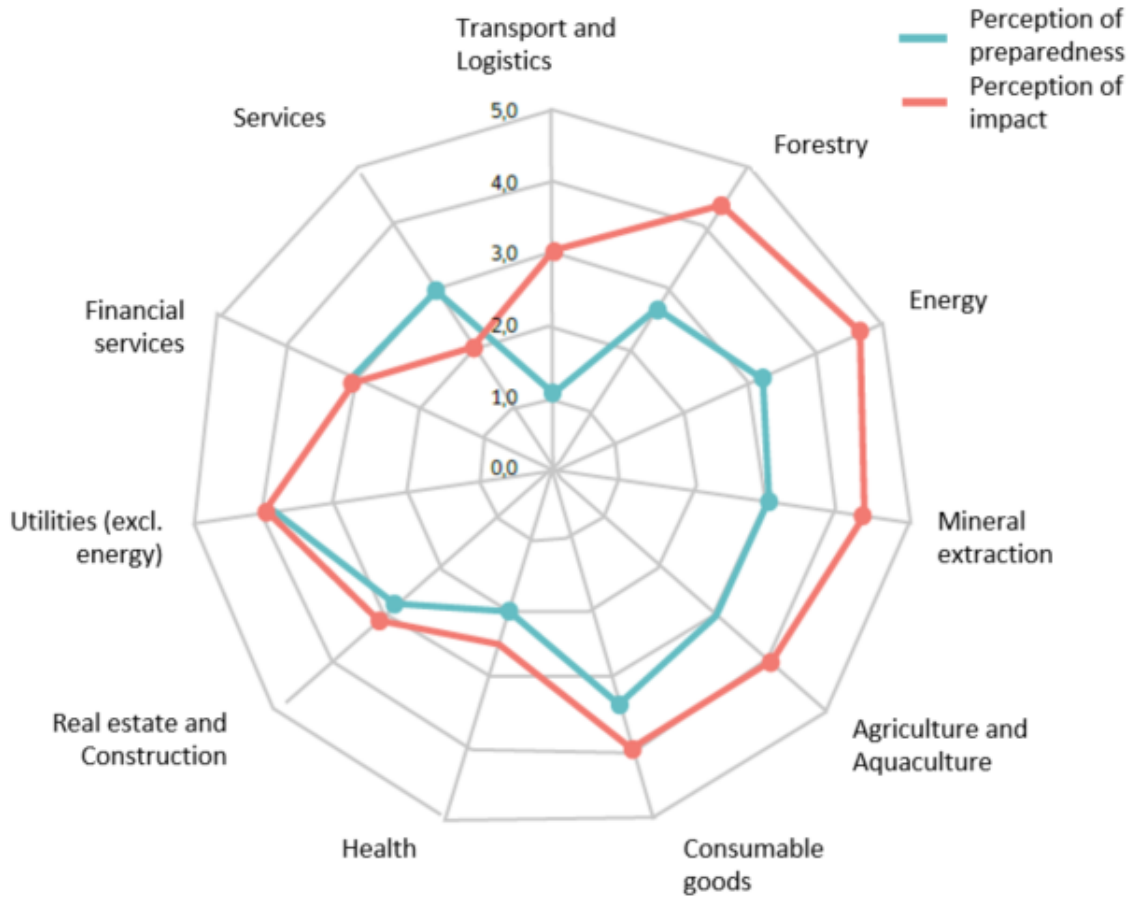
Firstly, the assessment finds that there while companies overwhelmingly regarded climate change as a material to their business operations and recognize that there is a business case for adaptive action; there is an unequal level of understanding across the companies surveyed regarding climate change, the risks it poses for companies, and how these risks are manifest differently across different geographic regions. Further, the assessment finds that companies possess gaps in their understanding of: (i) of climate change as a phenomenon, (ii) the technical language associated with climate change, (iii) how climate change should be integrated into management and decision-making processes, and (iv) the indirect risks posed by climate change (e.g., risks to company reputation).

[64] Invitations to participate in the survey were sent to 128 companies affiliated with Accion Empresas. In total, 38 responses were received representing a response rate of 27%.
[65] In total, nine semi-structured interviews were conducted.

Secondly, and in line with the first finding, the assessment found that while many companies view climate change as a source of risk, the climate change related actions reported by companies were often more obviously linked to issues associated with the environmental aspects of corporate social responsibility, i.e., environmental conservation and climate change mitigation.

Finally, the assessment also found that there were inherent differences between sectors in terms of the extent to which companies belonging to different sectors consider themselves to be exposed to, and prepared for, the impacts of climate change. As can be seen in Figure 7 below, the assessment found that companies belonging to sectors with a heavy reliance on natural resources generally consider themselves to be more exposed and prepared. The self-perception of companies from certain sectors that they are more prepared for climate change was also reflected in the adaptation measures reported during the assessment, which were generally more advanced forms of adaptation. For example, companies from these sectors were found to be preparing studies to advance their understanding of climate risks and opportunities, and/or investing in upgrading or replacing technology in order to reduce their dependence on certain resources. Examples of actions being implemented by companies in each can be seen in Table 5 below.

Figure 7 Self-declaration of level of affectation and preparation for climate change of companies in Chile



(Source: Government of Chile, 2021, based on Accion Empresas and Centro de Cambio Global, 2019)

Table 5 Examples of adaptation measures developed by companies engaged by Accion Empresas and Centro de Cambio Global (2019)

Sector	Business	Example of adaptation initiative
Energy	Enel Chile	Conservation plan for the Maule basin in which the conservation potential of natural areas functional to the conservation of the water resource and define a collaborative action plan.
	Colbún	Design and implementation of a chamber sediment cleaning equipment load to protect turbines from wear due to large amounts of sediment in periods of ice melt.
	Transelec	Strengthening of institutional arrangements between actors relevant to fighting fires: the National Forest Corporation (CONAF), National Office of Emergency of the Interior Ministry (ONEMI), and the Chilean Army, among others.
	ENAP	Installation of a natural gas turbine in the Aconcagua cogeneration plant that will operate with a closed steam / condensate cycle with the refinery located in the same basin of the Aconcagua River. This will allow for constant consumption of water with respect to the current situation.
Mineral extraction	Anglo American Chile	Evaluation of the impact of climate change on the business through studies state-of-the-art climate modelling for the Los Bronces copper mine.
	Minera Escondida	Development of water desalination plants to incorporate in the mines of copper. Delivering a Framework for Water Desalination Plants at industrial level and large scales.
Other services	Deuman	Development of Adaptation Plans consisting of analysis of the current situation, vulnerability analysis, action plan and short-term roadmap
	Consultora Técnica Sustrend	Artificial Aquifer Recharge for the Groundwater Community in the Copiapó valley.

Manufacturing	CCU	Reinforcing CD Copiapó's perimeter wall to protect against alluvium.
	Cristal Chile	Regeneration of water softeners due to temperature rises.
Retail	Cencosud S.A.	Water reduction plan for reducing water consumption by 10% in its operations.
Health	BUPA	To reduce water consumption, it is proposed to use taps with aerators of flow.
Financial services and insurance	RaboFinance	At the parent company level, a Climate Action Plan was defined with eight main initiatives. Some are locally applicable; others are more applicable at the group or parent company-level (such as reporting in line with the TFCD recommendations).
Waste and water	Aguas Andinas	Construction of the Pirque mega pond in order to increase the number of hours of autonomy of the supply service up to 34 hours, in response to extreme hydrometeorlogical phenomena.
		Implementation of leak search systems within the water distribution system using Helium gas and implementation of rupture indicators
Agriculture and Agroforestry	CMPC	New forms of Green Financing for energy efficiency projects, pollution prevention, sustainable forest management, green buildings, biodiversity and conservation, water, and eco-efficient products.
		Development of the Eucahydro Project, aimed at optimizing the use of water through an early selection of genotypes of eucalyptus globulus, nitens and hybrids. Initiative that promotes the selective use of genotypes of minor environmental impact in situations and sites of water scarcity.
	Granja AgroAcuicola Diaguitas EIRL	Bio-integrated animal and plant production systems that recirculate water and nutrients that are produced by fish, then sent to hydroponic systems to then return the water back to the fish.
	IANSA	Through the Aquasat system, the beetroot planting areas are monitored to generate evapotranspiration maps

		through satellite images, thus efficiently managing irrigation.
Transport	METRO S.A.	Incorporation of air conditioning in a large part of the train fleet, and inter-circulation corridors to transport a greater number of people per trip.

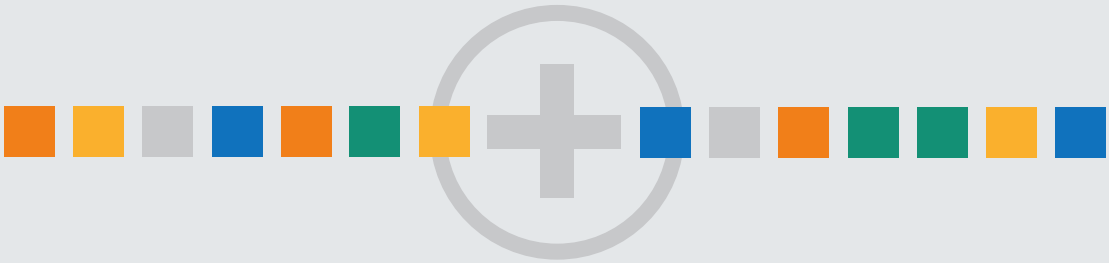
Further outcomes of the assessment

The report serves as a roadmap to advance a work programme to address the challenges Accion Empresas member companies are facing in adapting to climate change. Since the publication of this report, Accion Empresas has built on the understanding generated by the assessment in Accion Empresas and Centro de Cambio Global (2019) to develop a screening tool that supports firms to identify climate risks that are material to their business and operational models.

As a co-benefit of this work, key findings of this report were fed into the adaptation section of Chile's Fourth National Communication, enabling Chile to include high-level information about how the domestic private sector is adapting to climate change, and the current gaps in its response and its adaptation needs. This information is placed alongside similar information relating to other key actor groups, namely, the national government, sub-national governments, and civil society actors. As such, the Government of Chile has provided the UNFCCC with a more comprehensive picture of the status of adaptation within its jurisdiction.

Future implications

As mentioned above, the assessment underlying Accion Empresas and Centro de Cambio Global (2019) was an ad hoc process specifically implemented in order to advance an Accion Empresas-led work programme address the challenges member companies of its network are facing in adapting to climate change. However, while there is no formal mechanism currently in place to systematically repeat this kind assessment, the results of this first exercise could provide the basis for long-term efforts to create an ongoing programme to track the private sector's perception and management of climate risks and ongoing adaptation needs.



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