



# Climate Data Requirements, Gaps, and Challenges to Support Climate-Related Financial Disclosures



Smart Prosperity  
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## About Smart Prosperity Institute

Smart Prosperity Institute is a national research network and policy think tank based at the University of Ottawa. We deliver world-class research and work with public and private partners – all to advance practical policies and market solutions for a stronger, cleaner economy.  
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# Abbreviations

<b>CAPSA</b>	Canadian Association of Pension Supervisory Authorities
<b>CSA</b>	Canadian Securities Administrators
<b>ESG</b>	Environmental, Social, and Governance
<b>FSB</b>	Financial Stability Board
<b>GFANZ</b>	Glasgow Financial Alliance for Net Zero
<b>IEA</b>	International Energy Agency
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>ISSB</b>	International Sustainability Standards Board
<b>NGFS</b>	Network for Greening the Financial System
<b>OSFI</b>	Office of the Superintendent of Financial Institutions
<b>PCAF</b>	Partnership for Carbon Accounting Financials
<b>SEC</b>	United States Securities and Exchange Commission
<b>SFAC</b>	Sustainable Finance Action Council
<b>SPI</b>	Smart Prosperity Institute
<b>TCFD</b>	Task Force on Climate-related Financial Disclosures
<b>TEG</b>	Technical Expert Group

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## Executive Summary

High-quality, transparent, reliable, and comparable climate-related financial disclosures are essential to advance sustainable finance. It helps to incorporate and quantify climate risks and opportunities, ensures assets can be correctly priced and helps to better inform decisions on investments as well as credit and insurance underwriting. Existing data gaps and challenges are hindering progress on climate-related financial disclosures and ultimately the advancement of Canada's climate objectives.

The Government of Canada launched the Sustainable Finance Action Council (SFAC) in May 2021 to support the implementation of sustainable finance best practices across Canada's financial sector and the growth of a well-functioning sustainable finance market. To support this work, Smart Prosperity Institute (SPI) has undertaken targeted research, co-generated with SFAC Technical Expert Group (TEG) members, to identify data gaps and challenges and to provide considerations for addressing them. Specifically, this research report: 1) identifies data requirements to support key climate-related financial disclosures; 2) assesses their availability, reliability and comparability to identify gaps and challenges; and 3) lays out future considerations and steps that can be taken by SFAC and other stakeholders such as federal provincial/territorial governments, regulators, standard-setters, statistical agencies/data providers, industry leaders, businesses and financial institutions.

This report represents an initial step in a larger effort to facilitate climate-related financial disclosures in Canada in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) and the recently launched reporting

standards from the International Sustainability Standards Boards (ISSB). As such, the research and analysis presented here is meant to inform ongoing discussions and build knowledge capacity, rather than to make explicit recommendations for next steps. As climate data is a cross-cutting issue, this report focuses on the use case of climate-related financial disclosures to the exclusion of other use cases such as lending/insuring/investing decision-making. It excludes analysis of nature-based financial disclosures, which is at a nascent stage and currently being developed by the Task Force on Nature-related Financial Disclosure, as well as of climate change-related impacts on health and wellbeing. Additional limitations of this research are reflective of the disclosure frameworks and standards assessed, such as the voluntary nature of disclosures for private companies which in turn affects data availability for different users such as financial institutions, regulators, etc. However, this is deemed as a disclosure coverage gap and its implications fall outside the scope of the analysis.

A comparison of climate-related financial disclosure standards and frameworks relevant to Canada shows that disclosures require a mix of qualitative and quantitative data, information, methodologies, and forward-looking analysis. Quantitative disclosures, which includes the development of commonly accepted metrics and targets, and their underlying methodologies and assumptions are often the first step in the disclosure process and are necessary inputs and supplements to qualitative disclosure requirements on governance, strategy, and risk management. As a result, this report prioritizes analysis of the quantitative data needs of disclosures. Based on initial consultations

with SFAC members and consensus from the literature, this report identifies five priority areas for quantitative disclosures:

1. **GHG Emissions** – information, numbers, and methodologies for measurement and reporting of emissions across the value chains (Scope 1, 2 and 3, including financed and insurance-associated emissions).
2. **Net Zero/GHG Emissions Reduction Targets** – information and metrics needed to set net-zero/GHG emissions reduction targets (e.g., interim emissions reduction targets).
3. **Physical Risks** – information, metrics, and analysis to understand business activities or asset’s exposure and vulnerability to physical risks.
4. **Transition Risks** – information, metrics, and analysis to understand business activities or assets exposure and vulnerability to the transition to a net-zero economy, resulting from policy, legal, market, reputation, technological changes, or social adaptation.
5. **Scenario Analysis** – methodologies and forward-looking analysis and results needed to assess physical and transition risks and opportunities.

For the five priority areas, the data requirements (including information, methodologies, and analysis) are assessed based on the disclosure expectations in the TCFD recommendations

and the ISSB disclosure standards. The gaps and challenges are framed using the Network for Greening the Financial System’s three dimensions of data gaps i.e., availability, reliability, and comparability.

A traffic light approach has been employed to visually summarize information with the caveat that the categorization of complex information required subjective decision-making by the authors. Areas marked in green are judged to have no or minor data availability, reliability or comparability challenges. Yellow areas indicate that the available data is subject to reliability & comparability challenges. Areas marked in red indicate that data is not expected to be available at present, but needs to be available in the future to meet the disclosure expectation/requirement (see **Table 3: NGFS Categorization of Climate Data Gaps** for details on each type of data challenge).

The table below provides a summary of data needs and analysis for the five priority areas. It should be noted that some data, such as GHG emissions data, underpins multiple areas of climate-related financial disclosures. To assess and disclose transition risks, preparing entities first need GHG emissions data to feed into analysis and disclosure of net-zero/emissions reduction targets. Similarly, scenario analysis feeds into and relies on transition and physical risk data



Disclosures	Data Needs	Summary of Analysis
<b>GHG emissions</b> (Scope 1, 2 and 3)	<p><b>Activity Data (Scope 1 and 2)</b> – Activities that generate emissions from assets owned/controlled by the company (Scope 1) and purchased energy (Scope 2)</p> <p><b>Emissions Factor or Global Warming Potential (Scope 1 and 2)</b> – Values used to convert source activity into GHG emissions/equivalent tonnes of carbon dioxide emissions</p> <p><b>Activity Data (Scope 3)</b> – Activities that generate emissions but originate outside the direct control of the company/asset include both upstream and downstream value chains</p> <p><b>Emissions Factor or Global Warming Potential (Scope 3)</b> – Values used to convert source activity into GHG emissions/equivalent tonnes of carbon dioxide emissions</p> <p><b>GHG Methodology and Assumptions</b> – Used to calculate emissions, mainly from the GHG Protocol</p>	<ul style="list-style-type: none"> <li>• Activity data and emissions factors are expected to be available for Scope 1 and Scope 2, mainly for large companies and less available for small-medium sized enterprises (SMEs);</li> <li>• Activity data and relevant emissions factors are less available for Scope 3 emissions given data collection, analysis, and management complexities. To fill data gaps, preparers of disclosures need to utilize broad sectoral-level proxies (physical or economic activity data) and secondary emissions factors (industry averages), which pose reliability and comparability challenges; and</li> <li>• GHG methodologies and assumptions for Scope 1, 2 and 3 emissions are available. Application is relatively easier for Scope 1 and 2 emissions while complex and challenging for Scope 3 emissions. These application challenges are expected to diminish over time via learning and ongoing guidance from regulators and standard setters.</li> </ul>
<b>Financed and insurance-associated emissions</b>	<p><b>Company/Investment/Asset Emissions</b> – Emissions either directly reported by company or investee (verified or unverified) or estimated from physical or economic activities (based on relevant and credible emissions factors and/or global warming potential)</p> <p><b>PCAF Standard Methodology and Assumptions</b> – Including attribution factor and data quality scores</p>	<ul style="list-style-type: none"> <li>• Financed and insurance-associated emissions data are available; however, it is dependent on availability from lender/investee/insuree and, otherwise, on estimations, which may not be fully accurate. Financial institutions may have to rely on data from third-party providers (sometimes multiples ones), which is expensive to procure and may be subject to non-transparent assumptions and methodologies;</li> <li>• There are challenges in financed and insurance-associated emissions that are specific to sectors (e.g., difficult for entities to calculate farm-level emissions in the agriculture sector);</li> <li>• Even if data is reported, there are often time lags, restatement of data by lender/investee/insuree and double counting challenges when lending, insuring or investing in entities/projects in the same value chain. These issues affect reliability of data for financial institutions users; and</li> <li>• Methodologies for calculating financed and insurance-associated emissions across different asset classes and business segments respectively are being developed by PCAF and methodological applications are expected to improve over time.</li> </ul>
<b>Net-zero/ GHG emissions reduction</b>	<p><b>GHG Emissions</b> – Inventory of company-wide Scope 1, 2 and relevant Scope 3 GHG emissions to set net-zero or GHG emissions reductions target</p> <p><b>Sectoral Pathways</b> – Provide the link between the science of the remaining carbon budget that can be emitted and the detailed steps that a specific sector/company can take to reduce GHG emissions to a particular level in a specified timeframe</p> <p><b>Transition Plans</b> – Information on impacts, strategies, investments to support GHG emissions reduction or net-zero transition (e.g., spending on energy savings initiatives, adopting renewable energy sources, use of carbon credits or offsets)</p>	<ul style="list-style-type: none"> <li>• GHG emissions reductions/net-zero targets are available, but may be hindered by a lack of full coverage of all scopes of emissions (i.e. 1, 2 &amp; 3) due to incomplete GHG emissions measurement or emissions reporting. Preparing entities rely on estimations to fill data gaps, which presents reliability and comparability challenges;</li> <li>• There are different approaches to analyzing sectoral pathways for preparing entities; there are assumption challenges and trade-offs associated with using them to set net-zero or emission reduction targets; and</li> <li>• Lack of clarity regarding application of existing frameworks and guidance adversely impacts the development of transition plans for both non-financial business and financial institutions.</li> </ul>

Disclosures	Data Needs	Summary of Analysis
<b>Physical risks</b>	<p><b>Physical Hazards Data</b> – Data and analytics on the types and impact of past (historical) and projected (forward-looking) extreme weather events (floods, storms, wildfires, etc.) and gradual changes in climate (projected sea-level rise, hazardous air-borne pollutants, etc.)</p> <p><b>Asset Specific Data</b> – Information on assets (e.g., value of asset, size, year of construction, construction material, etc.) and location of physical assets (e.g., firms’ facilities) and value and supply chains (location of firms’ suppliers and customers) at the most granular level possible</p> <p><b>Adaptive Capacity</b> – Information and analytics on the degree of sensitivity to extreme weather events (e.g., data on how they coped with extreme weather events in the past)</p> <p><b>Vulnerability Assessment</b> – Data and analytics to translate physical hazards into damage or loss for exposed assets</p>	<ul style="list-style-type: none"> <li>Physical hazard and impact data are available via “off-the-shelf” datasets, but may be expensive to procure and may not capture Canada-specific sub-national/regional physical risks at the spatial and temporal granularity required;</li> <li>There is limited availability of asset characteristics and location data to map location-specific exposure;</li> <li>Adaptive capacity data is not readily and uniformly available across sectors and difficult to measure for preparers of disclosures; and</li> <li>There are modelling challenges related to assessing vulnerability from physical hazards as there is no one way to translate physical risks into economic impacts and disclose this information. Interactions between different types of physical risks are difficult to assess which may limit the overall usefulness of data.</li> </ul>
<b>Transition risks</b>	<p><b>GHG Emissions</b> – Data and information on Scopes 1, 2 and 3 emissions</p> <p><b>Net Zero/Emissions Reduction Targets and Sectoral Pathways</b> – Data and information on emissions reduction or net-zero targets (absolute and intensity based) and sectoral pathways to show how emissions will be reduced over time</p> <p><b>Transition Metrics</b> – Data and information which convert official-sector policies, shifts in consumer preferences and technology development into standardized metrics to measure transition risks</p> <p><b>Transition Preparedness</b> – Data and analytics on the degree of preparedness to transition to net-zero economy (e.g., firm’s transition plans, R&amp;D and other transition-related investments, exposures to carbon pricing, etc.)</p>	<ul style="list-style-type: none"> <li>GHG emissions data and net-zero/emissions reduction target-setting challenges impede transition risk assessment and disclosures;</li> <li>There is a shortage of standardized metrics to appropriately assess transition risks. Third-party data providers may undertake these analysis and present outputs in the form of temperature ratings/climate value-at-risk assessments, however, might use non-transparent methodologies to undertake analysis; and</li> <li>Data on transition preparedness are not always disclosed by preparing entities. In their absence, third-party data providers may fill the data and analytics gaps using their own models and assumptions, which may lead to incomparable and unreliable information for users of disclosures.</li> </ul>
<b>Scenario analysis</b>	<p><b>Scenario Analysis Models and Types</b> – Data and information on the model used and different types of scenarios used to make assessments</p> <p><b>Scenario Analysis Inputs and Assumptions</b> – Information about processes, assumptions, time horizons, outputs, and potential management responses to different scenarios</p>	<ul style="list-style-type: none"> <li>Different types of scenarios, models and guidance are available; and</li> <li>Business-relevant data and tools that provide inputs to companies for conducting scenario analysis are less available. Gaps lead to use of human judgement or third-party expertise and lead to unreliable and incomparable analysis and disclosures.</li> </ul>

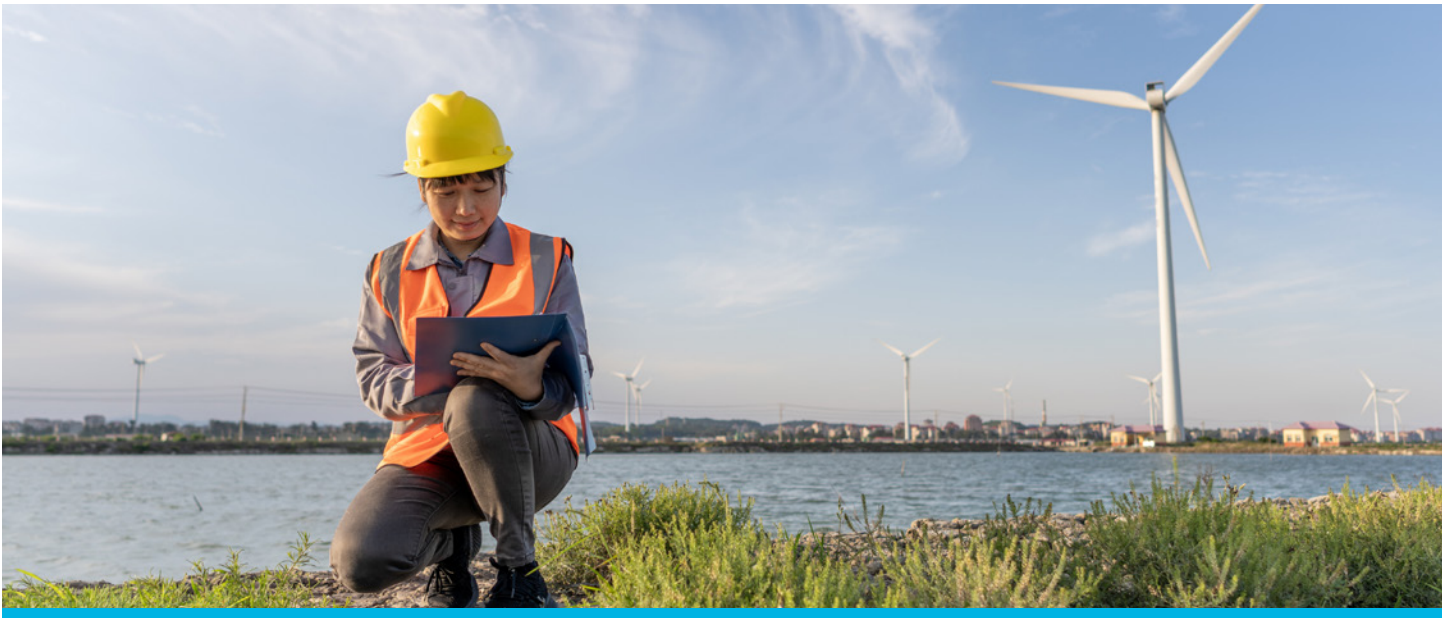


Based on this analysis, future efforts to close gaps and address challenges related to climate data for disclosures in Canada would benefit from:

- **Improved data availability:** Scope 1 and 2 emissions and net-zero target data are generally available. There are data challenges around Scope 3 GHG emissions, including financed and insurance-associated emissions, transition pathways, and business inputs for scenario analysis. More granular data and methodological guidance are required. Data to assess exposure, vulnerability to physical risks, and transition preparedness may not be available and there is a need to improve data availability in these areas through regular mapping, surveys.
- **Coordination between stakeholders:** Data availability varies across the five priority disclosure types. In cases where data is available, it may not be complete, comparable, and/or reliable. To continually fill climate data gaps and address challenges, greater coordination is needed amongst stakeholders such as federal provincial/territorial governments, regulators, standard-setters, statistical agencies/data providers, businesses, industry leaders and financial institutions to provide appropriate guidance, support analytics, and where relevant, conduct regular surveys. Adequate consideration must be given to stakeholders' different roles and responsibilities to outline effective coordination.

- **Data Support for SMEs:** SMEs may not have access to data or the capacity to analyze GHG emissions and analyze physical risk exposures, which may impede their ability to disclose this information. It may be useful to conduct a separate analysis of the tools & solutions available to support data collection and analysis by SMEs, with adequate considerations for sectoral differences. Efficient, ideally automated, data collection is important to minimize efforts and resources in data collection for financial institutions.
- **Alternate Data Use Cases:** Climate-related financial disclosure is one use case, and other use cases for financial decision-making may influence data needs. It may be useful to undertake a use case analysis for Canada's financial sector that assesses the data needs of different types of financial institutions for different use cases (e.g., investment and lending decision making, scenario analysis, etc.) and their availability. This analysis may assist in both the coordinated development of Canada-wide datasets in appropriate areas and allow for a deep-dive into capacity development requirements for companies (both large and small-medium size) and financial institutions to ensure that available data is/ can be standardized and decision-useful.





# 1 Introduction

High-quality, transparent, reliable, and comparable climate-related financial disclosures are essential to advance sustainable finance. It helps to incorporate and quantify climate risks and opportunities, ensures assets can be correctly priced and helps to better inform decisions on investments as well as credit and insurance underwriting. Requirements for climate-related financial disclosures are currently being developed both internationally and in Canada. However, data gaps and challenges remain a critical barrier to progress to climate-related financial disclosures and to Canada's broader climate objectives.

The Government of Canada launched the Sustainable Finance Action Council (SFAC) in May 2021 to integrate sustainable finance considerations into standard industry practice. The Council serves as a center of expertise, partnership and dialogue on sustainable finance issues in Canada and internationally. It champions the implementation of sustainable finance best practices across Canada's financial sector and the broader Canadian economy and supports the growth of a well-functioning sustainable finance market. This is expected to help accelerate the movement of private capital in support of the Government of Canada's climate goals.<sup>1</sup>

To support this effort, Smart Prosperity Institute (SPI) has undertaken targeted research, co-generated with SFAC Technical Expert Group (TEG) members, to provide considerations for future implementation. Specifically, the objective of SPI's research has been threefold:

1. To identify data requirements to support key climate-related financial disclosures;
2. To assess their availability, gaps and challenges

3. To identify future climate data-related data considerations and areas of work for SFAC and other stakeholders, including federal and provincial governments, regulators, standard-setters, data providing agencies, industry leaders, businesses, financial institutions and others.

This report represents an initial step in the larger effort to facilitate climate-related financial disclosures in Canada in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) and the recently launched reporting standards from the International Sustainability Standards Boards (ISSB).<sup>2</sup> As such, the research presented here is meant to portray data requirements and associated gaps and challenges to inform ongoing discussions and build knowledge capacity, rather than to make explicit recommendations.

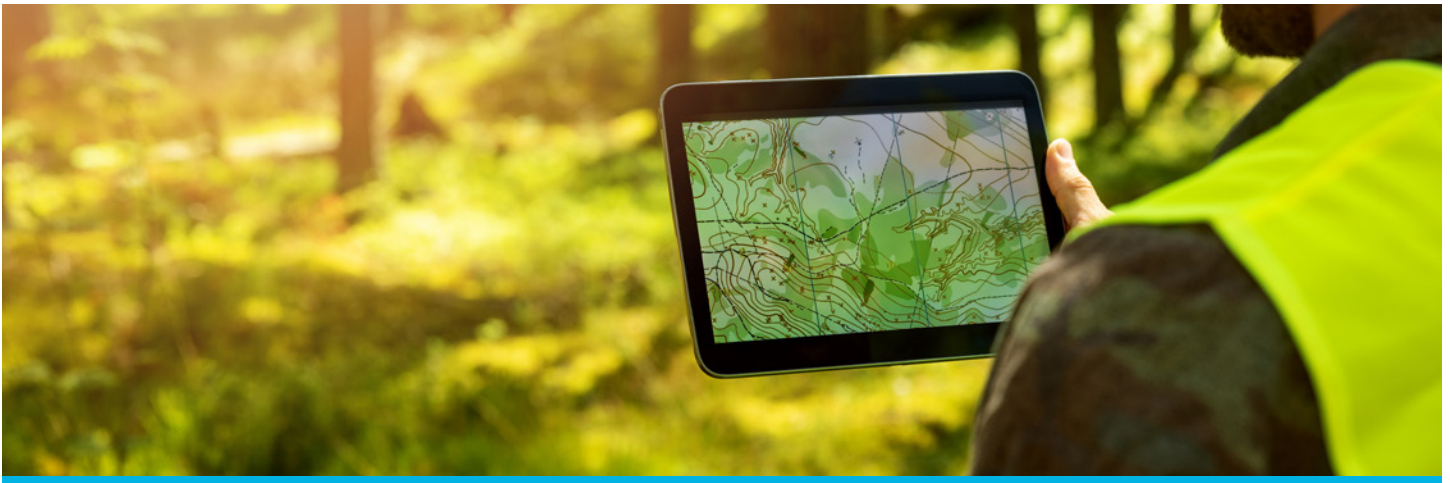
## The following key questions guided this work:

- What types of disclosures should be prioritized for analysis of data availability, reliability, and comparability?
- What are the relevant information, data and analytics needs?
- What are the existing data gaps and challenges?
- What are the different aspects that need to be considered to address data gaps & overcome challenges?

## To answer these research questions, this report adopts the following approach:

- Methodology to support identification of priority disclosures and data needs (**Section 2**);
- Analysis of data availability and gaps as well as challenges related to reliability and comparability (**Section 3**); and
- Future considerations and areas of work to address data gaps and address challenges (**Section 4**).





# 2 Methodology

## Comparison of Climate-Related Financial Disclosures Standards and Frameworks

This report begins by comparing climate-related financial disclosure standards and frameworks relevant to Canada to identify data needs to support disclosures and subsequent data gaps and challenges. **Table 1** below lists the standards and frameworks assessed in this report and gives their applicability and status. Notably, most of the standards and frameworks are in their final draft stages of completion, and the analysis provided in this report may be subject to change.

**Table 1: Climate-Related Financial Disclosure Standards and Frameworks Assessed**

Standards and Frameworks	Applicability	Status
<b>Task Force on Climate-Related Financial Disclosures (TCFD)</b> <i>Final Recommendations from the Task Force on Climate-Related Financial Disclosures</i> <sup>3</sup>	All organizations	Voluntary
<b>International Sustainability Standards Board (ISSB)</b> <i>IFRS S2 Climate-related Disclosures</i> <sup>4</sup>	All organizations	Effective from 2024
<b>Canadian Securities Administrators (CSA)</b> <i>National Instrument 51-107 Disclosure of Climate-related Matters</i> <sup>5</sup>	Publicly listed companies in Canada	Draft
<b>Office of the Superintendent of Financial Institutions (OSFI)</b> <i>Guideline B-15 Climate Risk Management</i> <sup>6</sup>	Federally-regulated financial institutions	Required
<b>Canadian Association of Pension Supervisory Authorities (CAPSA)</b> <i>Guideline on Environmental, Social and Governance Considerations in Pension Plan Management</i> <sup>7</sup>	Canadian pension plans	Draft
<b>United States Securities and Exchange Commission (SEC)</b> <i>Enhancement and Standardization of Climate-Related Disclosures</i> <sup>8</sup>	SEC-registered domestic or foreign companies	Draft
<b>Glasgow Financial Alliance for Net Zero (GFANZ)</b> <i>Recommendations and Guidance Financial Institution Net-zero Transition Plans</i> <sup>9</sup>	Non-binding guidance for financial institutions	Voluntary

**Table 2** provides a summary of the climate-related financial disclosure standards and frameworks relevant to Canada. The regulatory instruments and voluntary frameworks fall in line with TCFD and ISSB disclosure requirements. Therefore, for the purposes of comparison, the assessed disclosure standards and frameworks are grouped into the four pillars used by the TCFD and the ISSB standards – *Governance, Strategy, Risk Management, Metrics & Targets*. Additional category for disclosures related to transition plans have been included from GFANZ *Recommendations and Guidance Financial Institution Net-zero Transition Plans*.

**Table 2: Summary of Climate-related Financial Disclosure Standards and Frameworks**

CATEGORY	DISCLOSURE REQUIREMENTS	CSA*	CAPSA*	SEC*	OSFI	GFAZ
<b>Governance</b>	Describe the board of directors' oversight of climate-related risks and opportunities.	✓	✓	✓	✓	✓
	Describe management's role in assessing and managing climate-related risks and opportunities.	✓	✓	✓	✓	✓
<b>Strategy</b>	Describe the climate-related risks and opportunities the issuer has identified over the short, medium, and long term.	✓	✓	✓	✓	✓
	Describe the impact of climate-related risks and opportunities on the issuer's businesses, strategy, and financial planning	✓	✓	✓	✓	✓
	Describe the resilience of strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.		✓	✓	✓ <sup>§</sup>	✓
<b>Risk Management</b>	Describe the issuer's processes for identifying and assessing climate-related risks.	✓	✓	✓	✓	✓
	Describe the issuer's processes for managing climate-related risks.	✓	✓	✓	✓	✓
	Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the overall risk management.	✓	✓	✓	✓	✓
<b>Metrics &amp; Targets</b>	Disclose the metrics used by the issuer to assess climate-related risks and opportunities in line with its strategy and risk management process.	✓	✓	✓	✓	✓
	Describe the targets used by the issuers to manage climate-related risks and opportunities and the issuer's performance against these targets.	✓	✓		✓	✓
	Disclose Scope 1 GHG emissions and the related risks.	✓ <sup>‡</sup>	✓	✓	✓ <sup>+</sup>	✓
	Disclose Scope 2 GHG emissions and the related risks.	✓ <sup>‡</sup>	✓	✓	✓ <sup>+</sup>	✓
	Disclose Scope 3 GHG emissions and the related risks (or reasons for not disclosing this information).	✓ <sup>‡</sup>	✓	✓	✓ <sup>+</sup>	✓
	Disclose the reporting standard used by the issuer to calculate and disclose the GHG emissions.	✓	✓	✓	✓	✓
	If the reporting standard referred to above is not the GHG Protocol, disclose how the reporting standard used is comparable with the GHG Protocol.	✓	✓	✓	✓	✓
	Physical risks — the amount and percentage of assets or business activities vulnerable to physical risks.			✓	✓	
	Transition risks — the amount and percentage of assets or business activities vulnerable to transition risks.			✓	✓	✓
	Climate-related opportunities — the proportion of revenue, assets or other business activities aligned with climate-related opportunities, expressed as an amount or as a percentage.				✓	✓
<b>Transition Plan Foundations &amp; Engagement Strategy</b>	Explicitly state the ambition of the transition plan in terms of net-zero date, interim targets, and the pathway used to develop the net-zero transition plan.				✓	✓
	Describe short-medium-long-term net-zero transition targets for the firm and individual business lines (if relevant).					✓
	Describe how the transition plan supports a just transition.					✓
	Describe current and future engagement with customers, clients, and suppliers.					✓
	Describe current and future engagement with policy and advocacy efforts.				✓	✓

✓ represents disclosure requirements from the disclosure frameworks and guidelines

\* represents disclosure standards and frameworks that are currently in their draft versions

§ OSFI looks for a scenario which limits warming to the level aligned with the latest international agreement, or lower, in disclosures from federally-regulated financial institutions

‡ The draft CSA rule presents two options: 1) require mandatory disclosures of Scope 1, 2 and 3 GHG emissions or provide rationale for not doing so (i.e., comply or explain); or, 2) require mandatory disclosures of Scope 1 (either material or in all cases) and adopt the comply or explain approach for Scope 2 and 3 emissions

+ The draft SEC rule requires disclosure of Scope 1 and 2 emissions. Scope 3 emissions are to be included if material and/or Scope 3 emissions reduction targets have been set



## Identification of Types of Priority Disclosures

As illustrated by **Table 2**, climate-related financial disclosures require a mix of qualitative and quantitative data, information, methodologies, and forward-looking analysis. Qualitative disclosures related to governance, strategy, risk management, transition planning and engagement strategies are specific to organizations preparing disclosures. On the other hand, quantitative disclosures rely on the development of commonly accepted metrics and targets and their underlying methodologies and assumptions. The completion of quantitative disclosures is often the first step in the disclosure process as they feed into and supplement qualitative requirements such as disclosures related to governance, strategy, and risk management. For these reasons and because quantitative disclosures can help decision-makers identify and analyze drivers, exposure, and financial impacts of climate-related risks and opportunities, this report prioritizes analysis of the quantitative data needs of climate-related financial disclosures.<sup>10</sup>

A general consensus exists in the literature on which quantitative disclosures to prioritize. The Network for Greening the Financial System's (NGFS) Progress Report on Bridging Data Gaps identified six broad metrics for "translating the complex impacts of climate change on the financial system into decision-useful, comparable measurements, namely GHG footprint, transition sensitivity, physical vulnerability, pathway alignment along with finance mobilization and environment social governance (ESG) ratings."<sup>11</sup> SPI's *Transparency Gap* report found that company and activity level GHG emissions, climate-related targets, physical risk information, and forward-looking climate scenarios are key disclosures for effective and transparent risk management and decision-making.<sup>12</sup> GFANZ and the Financial Stability Board (FSB) also highlight that GHG emissions (particularly Scope 3 emissions), emissions reduction targets, and forward-looking physical and transition risk metrics are key areas of disclosures.<sup>13</sup>

Building on the research and analysis described above as well as consultations with SFAC TEG members, the following are deemed to be the five-priority quantitative climate-related financial disclosures where data availability needs to be assessed, and gaps and challenges addressed.<sup>14</sup>

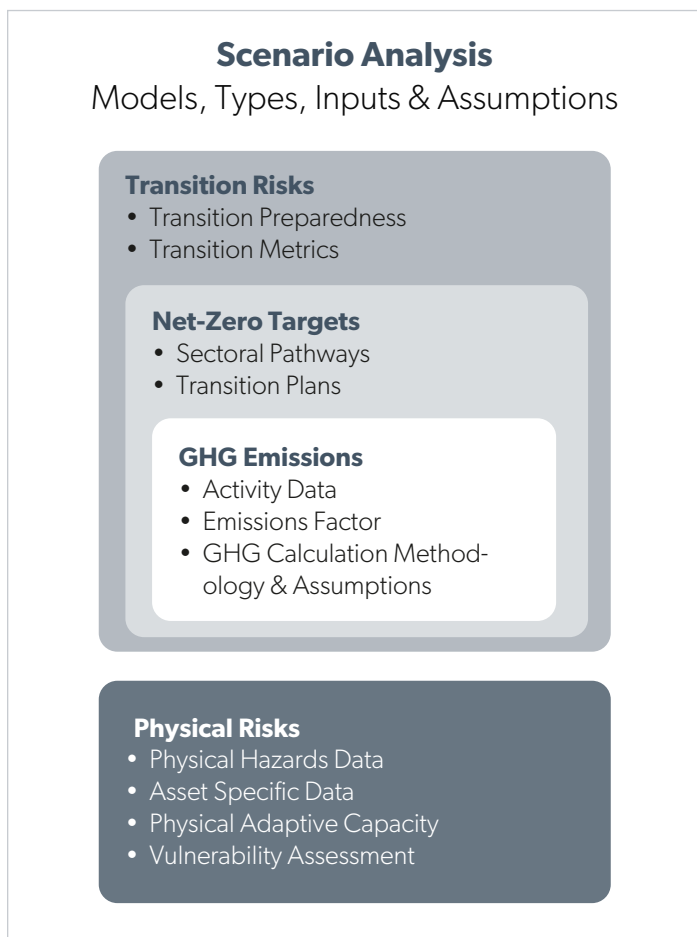
## Priority Climate Disclosure Types

1. **GHG Emissions** – information, numbers, and methodologies for measurement and reporting of emissions across the value chains (Scope 1, 2 and 3, including financed emissions and insurance-associated emissions).
2. **Net Zero/GHG Emissions Reduction Targets** – information and numbers needed to set net-zero/GHG emissions reduction targets (e.g., interim emissions reduction targets).
3. **Physical Risk** – information, numbers, and analysis to understand business activities or asset's exposure and vulnerability to physical risks.
4. **Transition Risk** – information, numbers, and analysis to understand business activities or assets exposure and vulnerability to the transition to a net-zero economy, resulting from policy, legal, market, reputation technological changes, or social adaptation.
5. **Scenario Analysis** – methodologies, forward-looking analysis and results needed to assess physical and transition risks and opportunities.

**Figure 1** illustrates the relationship between the data requirements for the five priority areas. Some data, such as GHG emissions, underpins multiple areas of climate-related financial disclosures. To assess and disclose transition risks, preparing entities first need GHG emissions data to feed into analysis and disclosure of net-zero/emissions reduction targets. The data needs for analysis and disclosure of physical risks are separate from that of transition risks and there are no likely overlaps. Scenario analysis feeds into and relies on transition and physical risk data.



**Figure 1: Overlap of Climate Data Requirements to Support Disclosures**



## Analyzing Gaps & Challenges

The following section provides analysis of data requirements across the five priority areas based on desk research and consultations with SFAC members. To frame the gaps and challenges, this report adopts the three dimensions of data gaps i.e., **availability**, **reliability** and **comparability** employed in NGFS' *Progress Report on Bridging Data Gaps*.<sup>15</sup> **Table 3** defines these dimensions.

## Scope and Limitations of the Research

This report is an initial attempt to identify and analyze priority data requirements, gaps and challenges for the purposes of climate-related financial disclosures and has the following limitations:

- **Focus on disclosures as one data use case:** Climate data is a cross-cutting issue and affects a variety of public and private stakeholders in different ways. The NGFS' *Progress Report on Bridging Data Gaps* report adopted a user-centric approach and classified several use cases that define the application of climate data across different stakeholders. This report focuses on NGFS' use case of climate-related financial disclosures. There are other use

**Table 3: NGFS Categorization of Climate Data Gaps**

Dimension of Data Gaps	Features of Data Gaps
<b>Availability</b>	<ul style="list-style-type: none"> <li>• <b>Coverage</b> refers to data availability in sufficient quantity across entities in terms of geographies, enterprise population, asset classes and data types.</li> <li>• <b>Granularity</b> refers to whether existing data has a sufficient level of disaggregation to meet the purpose required by the data user.</li> <li>• <b>Accessibility</b> refers to the ease with which users can draw on data for their respective purposes.</li> </ul>
<b>Reliability</b>	<ul style="list-style-type: none"> <li>• <b>Quality</b> consists of assessing the plausibility of information, checking its internal consistency and benchmarking it to external data sources.</li> <li>• <b>Auditability</b> refers to the assessment of data quality or usability for a specific purpose.</li> <li>• <b>Transparency</b> refers to the clarity in methodologies, definitions and any other necessary criteria.</li> </ul>
<b>Comparability</b>	<ul style="list-style-type: none"> <li>• <b>Comparability</b> (as a whole) refers to the using of common definitions and technical standards, such as taxonomies and certification labels to help understand data.</li> </ul>

cases for climate data (e.g., lending and investment decisions, scenario analysis, etc.) where data requirements are expected to overlap. However, depending on the use case, priority data requirements, availability, associated gaps and challenges are expected to change.

- **Emphasis on TCFD/ISSB disclosures:** This report focuses on disclosures related to the TCFD framework and ISSB standards. It does not analyze nature-related financial decision making and disclosures, which is currently being developed by the Taskforce on Nature-related Financial Disclosure.<sup>16</sup> Future considerations need to be given to analyzing data requirements, gaps and challenges that serve the needs of both climate-related and nature-related disclosures to conduct a more holistic assessment of data requirements, gaps and challenges.
- **Lack of disclosures by private companies:** While many private companies voluntarily disclose climate data, they are not required to do so under the assessed disclosure standards and frameworks. Disclosures from private companies, especially relatively larger ones, are important in order to price in climate risks and opportunities for the broader economy and its absence may create data challenges for different users such as financial institutions, regulators, etc. However, disclosure coverage gap and its implications fall outside the scope of the analysis. Future research may assess how this disclosure coverage gap can be closed, using different policy and regulatory instruments outside the domain of securities regulators, to ensure a level playing field between publicly listed and private companies.



### 3 Analysis of Data Availability, Gaps, and Challenges

This section provides the analysis for each of the five priority areas, which includes:

- summarized disclosure expectations;<sup>17</sup>
- applicability of disclosure standards and frameworks;
- data requirements (includes information, methodologies and analysis);
- data availability and gaps; and
- data reliability and comparability challenges.

Detailed versions of the disclosure expectations can be found in **Annex A**. A traffic light approach has been employed to visually summarize information with the caveat that some of the categorization required subjective decision-making by the authors.

Notably, the three data gaps dimensions (availability, reliability, and comparability) are not equally applicable across the five priority areas. Where data is not expected to be available, visually summarized as red, it may not be possible to provide analysis of reliability and comparability considerations. In these cases, the summary tables state them as not applicable or “N/A”. Some data requirements are related to methodologies that need to be disclosed, which in most cases, are available and thus marked as green. Nonetheless, there are broad challenges associated with applying these methodologies in practice, which ultimately affects disclosures. It should be recognized that these challenges can and need to be solved through learning by doing and continued guidance from regulators and standard setters as global practices develop for both climate data and disclosures.

Traffic Light Legend for Summary Tables
<b>Green:</b> no or minor data availability, reliability or comparability challenges
<b>Yellow:</b> available data is subject to reliability & comparability challenges
<b>Red:</b> data is not expected to be available but needs to be available in the future to meet the disclosure requirement

#### Greenhouse Gas Emissions Scope 1, 2 and 3

Publicly listed companies, federally-regulated financial institutions, pension plans, SEC-registered domestic or foreign companies and financial institutions voluntarily adopting the GFANZ guidance are/will be required to disclose Scope 1, 2 and 3 GHG emissions.

Based on the TCFD/ISSB, the following are disclosure expectations for Scope 1, 2 and 3 GHG emissions:

- Absolute GHG emissions;
- GHG emissions intensity – physical or economic;<sup>18</sup>
- Approach to consolidation of business (equity share or operational control);



- For Scope 2 emissions – disclose method (location-based or market-based); and
- For Scope 3 emissions – disclose categories included within measure of emissions.

Notably, GHG emissions estimations and disclosures are in line with the GHG Protocol, a multi-stakeholder partnership which provides the standardized framework to measure and manage GHG emissions from private and public sector operations, value chains and mitigation actions.<sup>19</sup> The data gaps and challenges associated with measuring Scope 1, 2 and 3 GHG emissions (except for financed and insurance-associated emissions) are listed below and summarized in **Table 4**:<sup>20</sup>

**Activity data and emissions factors are expected to be available for primary facilities (Scope 1) and purchased energy (Scope 2).** Large companies, both publicly listed and private ones, are generally able to gauge their activities (e.g., fuel and electricity consumption) and have relevant emissions factors to calculate and disclose their Scope 1 and 2 GHG emissions. SMEs might not have the capacity or resources to collect, interpret and analyze data (activity data, emissions factors, global warming potential, usage of methodology) and, therefore, might not measure and disclose Scope 1 and 2 GHG emissions.<sup>21</sup> In case granular activity data are not available, preparing companies may have to rely on proxies (e.g. sectoral emissions intensities/emissions intensities in other jurisdictions) to calculate Scope 1 or 2 emissions.<sup>22</sup> Proxy data are less reliable but fill data gaps for Scope 1 and 2 emissions.

**Activity data and relevant emissions factors are less available for Scope 3 emissions given data collection, analysis and management complexities.** Most preparing companies across sectors with material emissions struggle to obtain relevant and sufficiently granular activity data across their value chains to calculate Scope 3 GHG emissions.<sup>23</sup> Reasons include preparers being unable to obtain information from value chain entities, value chain entities not being able to consistently and accurately measure their activity, complex corporate structures creating challenges in data collection, lack of supplier-specific emissions factors to calculate GHG emissions and value chain entities having different reporting timeframes resulting in significant reporting lags. To fill the data gaps, preparers utilize a combination of supplier-specific activity data, where available, and broad sectoral-level physical or economic activity data with secondary emissions factors (industry averages) and/or information from third-party data providers. Quantification may involve subjective decision-making and recalculation in subsequent years. Overall, these challenges lead to less reliable and comparable data for Scope 3 emissions.<sup>24</sup>

**GHG methodologies and assumptions are available with application challenges varying across different scopes of emissions.** For Scope 1 and 2 emissions, guidance and assumptions from the GHG Protocol and other sources are relatively easier to apply for estimations and disclosures. However, for Scope 3 emissions, there are complexities and challenges in applying methodologies and assumptions across different categories of the upstream and downstream value chains across different sectors, which ultimately affects disclosures. The challenges related to application of methodologies are expected to be solved in the long-term via individual learning and ongoing guidance from regulators and standard setters.





**Table 4: GHG Emissions Data Availability, Reliability, and Comparability**

Information, Data & Analytics Needed to Support Disclosures <sup>25</sup>	Data Availability	Reliability & Comparability
<b>Activity Data</b> – activities that generate emissions from assets owned/controlled by the company (Scope 1), purchased energy (Scope 2), and upstream and downstream activities (Scope 3)	<b>Scope 1 and 2:</b> Expected to be available for for mainly large companies and not SMEs	N/A
	<b>Scope 3:</b> Limited availability from value chain entities	Less reliable and comparable if broad proxies (physical or economic activity data) are used
<b>Emissions Factors</b> – values used to convert source activity (e.g., kilowatt-hour of electricity, litres of diesel fuel) into GHG emissions  <b>Global Warming Potential</b> – values used to convert different types of GHGs into equivalent tonnes of carbon dioxide (CO <sub>2</sub> e)	<b>Scope 1 and 2:</b> Expected to be available	N/A
	<b>Scope 3:</b> Limited availability of supplier-specific emissions factors	Less reliable and comparable if broad emissions factors (industry averages) and third-party data are used
<b>Methodology and Assumptions</b> – used to calculate GHG emissions	Available for Scope 1, 2 and 3 from the GHG Protocol, guidance documents, statistical agencies, data providers, etc. Application of Scope 3 methodologies and assumptions expected to improve over time	N/A

### Financed and Insurance-Associated Emissions

Federally-regulated financial institutions, pension plans and financial institutions voluntarily adopting the GFANZ guidance are/will be required to disclose financed and insurance-associated emissions (i.e., emissions related to financial services and activities including underwriting, investment and lending) in line with TCFD and ISSB requirements.

The Partnership of Global Accounting Financials (PCAF) is a global partnership of financial institutions that work together to develop and implement a harmonized approach to assess and disclose the GHG emissions associated with their loans, investments and insurance. PCAF has established the *Global GHG Accounting and Reporting Standard for the Financial Industry* (“PCAF Standard”), which provides detailed guidance on financed and insurance-associated emissions.<sup>26</sup> The following are the general disclosure expectations under PCAF:

- Absolute emissions (Scope 3 Category 15 under GHG Protocol);
- GHG emissions intensity – economic, physical or weighted average carbon intensity;<sup>27</sup>
- For financed emissions only under PCAF Standard, disclose use of operational control approach; and
- Data quality – disclose description of types and sources of emissions (including whether data is verified or unverified by a third-party auditor) and weighted score of data quality based on reported emissions or reasons for omissions.

The data gaps and challenges associated with financed and insurance-associated emissions are listed below and summarized in **Table 5**:

**Financed and insurance-associated emissions data is available but faces challenges; it is dependent on data availability from lendees/investees/insureds and, in its absence, on estimations and third-party data providers.**

Effective analysis and disclosure of financed and insurance-associated emissions requires adequate climate disclosure from the entities financed/invested/insured by financial institutions. However, financial institutions are often unable to obtain emissions data from the borrower or portfolio level or are unable to capture the information in a standardized and accessible format. As a result, they must rely on estimations (e.g., physical or economic activity data and industry average emissions factors) for computations, which may not be accurate enough to calculate financed emissions. Common challenges include emissions factors not adequately matching with the economic or physical activity of the financed company or asset and concerns associated with double counting of emissions. Financial institutions may have to rely on third-party data providers (sometimes multiples ones), which are expensive to procure and who may use different, untransparent assumptions and methods to estimate undisclosed emissions data.<sup>28</sup> This creates issues with the reliability and comparability of financed emissions data and thus limits the usefulness of data for financing decision making. These challenges are expected to be resolved gradually and in a phased manner (for larger companies first and eventually SMEs) as more granular proxies and borrower and insured-level emissions data become available.

**There are challenges in financed and insurance-associated emissions calculations that are specific to sectors.**

Financed and insurance-associated emissions are disclosed across sectors and asset classes, which face unique challenges. For example, it may be difficult to calculate financed emissions for residential mortgages due to the scarcity of building-specific energy labels, energy consumption data, and the volume of mortgages in a financial institution’s portfolio. Similarly, in the agriculture sector, it is difficult for entities to calculate their emissions at the farm level. Hence, there is less availability of GHG emissions data for financial institutions.

**Even when borrowers, insurance holders, or portfolio entities report data, time lags, restatement of data and double counting challenges affect reliability and comparability for financial institution users.**

Borrowers, insured or portfolio companies often have lagged timelines to calculate and report emissions due to complexities in calculation, delays in obtaining information from value chains (e.g., a preparer could have a December year-end reporting cycle, but needs data from entities in the value chain that have March year-ends) and delays in auditing. This results in significant reporting lags and ISSB deliberations show that untimely disclosure poses an underlying data quality challenge.<sup>29</sup> The preparer’s disclosures are based on estimates, or use underlying GHG emissions data that is inconsistent with regard to the time period in which the emissions arose, resulting in lower quality and less reliable data for users.<sup>30</sup>

There are additional comparability and reliability challenges for financial institutions when lendee/investee/insuree restate their data or change their reporting boundary (e.g., due to change in measurement methods, structural changes in data or better data becoming available over time).<sup>31</sup> If historical emissions data for financial institutions are not restated using the most recent lendee/investee/insuree companies, historical comparisons will quickly become obsolete.<sup>32</sup> There are also double counting challenges (i.e., GHG emissions are counted more than once in the financed emissions calculation), which occurs when a financial institution lends to, insures or invests in companies or projects in the same value chain.<sup>33</sup> It should be noted that PCAF recognizes these challenges and continues to provide guidance around these issues. Nonetheless, these financed and insurance-associated emissions measurement challenges affect other critical areas such as net-zero target setting and transition planning.

**Methodologies for calculating financed and insurance-associated emissions across different asset classes and business segments respectively are being developed by PCAF and methodological applications are expected to improve over time.** The PCAF Standard, including the attribution factors (i.e., the percentage of total loans and investments covered in the financed and insurance-associated emissions inventory) and data quality score hierarchy, is at a nascent stage. They are being developed for different asset classes for financed emissions and business segments for

**Table 5: Financed and Insurance-Associated Emissions Data Availability, Reliability and Comparability**

Information, Data & Analytics Needed to Support Disclosures	Data Availability	Reliability & Comparability
<p><b>Company/Investment/Asset Emissions</b> – emissions either directly reported by company or investee (verified or unverified) or estimated from physical or economic activities (based on relevant and credible emissions factors and/or global warming potential)</p>	<p>Available; either directly from borrower, insured or portfolio companies or through estimations or third-party data providers</p>	<p>Available data may not be accurate enough to reliably calculate financed and insurance-associated emissions;</p> <p>Sector-specific issues pose calculation challenges (e.g., difficult to obtain farm-level GHG emissions for agriculture sector);</p> <p>Time lags and restatements by borrower, insured or portfolio companies negatively affect data quality;</p> <p>Third-party data providers may use non-transparent methodologies to estimate emissions</p>
<p><b>Attribution Factor</b> – data on the share of the outstanding amount of loans and investments of a financial institution over the total equity, revenue or debt of the company or project</p>	<p>Available</p>	<p>Comparability and reliability challenges exist as financial institutions interpret and apply PCAF’s methodology differently, but is expected to improve over time as interpretation and implementation become standardized</p>
<p><b>Data Quality Scores</b> – (numbers) to show data quality based on source of data as part of five-step data quality scoring methodology developed by PCAF Standard per asset class — with ‘1’ being the highest and ‘5’ the lowest</p>		

insurance-associated emissions.<sup>34</sup> There are shared challenges associated with application in Canada and globally, resulting in deviations in practices and disclosures across financial institutions. Nonetheless, the methodological application is available and expected to improve over time through guidance from standard setters and shared learnings across institutions and jurisdictions.

## Net Zero/GHG Emissions Reduction Targets

Federally-regulated financial institutions, pension plans, and financial institutions voluntarily adopting the GFANZ guidance are/will be required to provide disclosures related to net zero/GHG emissions reduction targets:<sup>35</sup>

Based on TCFD/ISSB, the following are the general disclosure expectations for net-zero/GHG emissions reduction targets:

- Objective of the target;
- Absolute or intensity-based target;
- Base period, period over which target applies and interim targets (if set);
- Comparison with latest international agreement on climate change (e.g., Paris-aligned target);
- Validation by third party, if conducted;
- Information if target was derived using sectoral decarbonization approach; and
- Strategies and plans to achieve target.

The challenges around net-zero/GHG emissions reduction target setting are detailed below and summarized in **Table 6**:

**GHG emissions reductions/net-zero targets are available, but they might be hindered by a lack of complete coverage of all scopes of emissions due to incomplete GHG emissions measurement or emissions reporting.** Firms may be unable to set targets if they do not know the underlying emissions inventory of their value chains. Inadequate data coverage on GHG emissions can hinder a companies' ambitions by causing them to set targets for Scope 1 and 2 emissions only, as compared to for all three scopes of emissions. Preparing entities may have to rely on estimations to fill data gaps, which may present reliability and comparability challenges in setting targets.<sup>36</sup> Data is needed at the loan portfolio, investment, insurance policy level to set financed emissions and insurance-associated emissions reduction targets. This may often be incomplete, available after significant time lags, developed inconsistently across areas of the business, or missing entirely. The non-uniformity in disclosure also makes it difficult to set financed emissions reduction targets across the different sectors and asset classes and insurance-associated emissions reduction targets for different insurance types.<sup>37</sup>

**There are different approaches to analyzing sectoral pathways for preparing entities plus trade-offs associated with using them to set net-zero or emission reduction targets.** Reporting companies may not be able to set credible targets across all relevant scopes of emissions without assessing sectoral pathways. Sectoral pathways clarify preparer's level of ambition by highlighting how their GHG emissions targets are aligned with recognized pathways to emissions reductions. A wide range of assumptions are leveraged across pathways, which introduces comparability and reliability challenges for sectoral pathways if a given assumption changes or proves inaccurate. There are also both top-down and bottom-up approaches to evaluating sectoral pathways. The top-down approach is designed to apply carbon budgets and other variables to model the transition of the economy as a whole system. This requires a great deal of simplification to apply these carbon budgets to specific sectors and regions and lacks the inclusion of industry specifics and feasibility. Bottom-up pathways tend to be industry-specific. They are actions or targets set by the sector and are often built upon sectoral entities' views of what is feasible. Bottom-up approaches may not contain (but should consider) sufficient cross-sector nuances to accommodate firms with complicated sectoral mappings or reliably link to the global transition. Using a different approach to understand and analyze sectoral pathways has its trade-offs in understanding the cause and effect relationship between sectoral actions and outcomes impacting target setting and disclosures.<sup>38</sup>

**Lack of clarity regarding application of existing frameworks and guidance impacts the development of transition plans.** A transition plan articulates a company's overall approach to the net-zero transition and includes information regarding climate change objectives, targets, actions, progress, and accountability mechanisms. Credible transition plans need to incorporate and disclose a variety of qualitative information, such as governance structure and responsibilities, engagement strategy with stakeholders, and quantitative ones, such as current emissions, investments and other relevant information.<sup>39</sup> Guidance and frameworks for transition plans are readily available, including the TCFD *Guidance on Climate-related Metrics, Targets, and Transition Plans* and GFANZ's *Expectations for Real-Economy Transition Plans*. These guidance and frameworks have commonalities, but also notable differences. Reporting entities often do not know which transition plan guidance and frameworks to apply or which elements to include in their approaches.<sup>40</sup> The absence of clarity may lead to transition plans lacking reliability and comparability. This in turn affects financial institutions' transition planning as portfolio-level emissions reduction and transition plan is crucial for the financial institutions to understand and formulate their own transition strategy.

**Table 6: Net-Zero/GHG Emissions Reduction Target Data Availability, Reliability, and Comparability**

Information, Data & Analytics Needed to Support Disclosures	Data Availability	Reliability & Comparability
<b>GHG Emissions</b> – inventory of company-wide Scope 1, 2 and relevant Scope 3 GHG emissions to set net-zero or GHG emissions reductions target	Available; mainly for Scope 1 and 2 emissions and less for Scope 3 emissions (including financed and insurance-associated emissions)	Difficult to set reliable and comparable net-zero or GHG emissions targets without complete coverage of emissions and reliance on proxies
<b>Sectoral Pathways</b> - provide the link between the science of remaining carbon budget that can be emitted and the detailed steps that a specific sector/company can take to reduce GHG emissions to a particular level in a specified timeframe. Pathways can be used to set emissions reduction/net-zero targets with a specific ambition, such as to limit temperature rise (e.g., 1.5 degrees C) <sup>41</sup>	Available; different approaches to assess transition pathways (both top-down and bottom-up)	Comparability and reliability challenges if data assumptions are inaccurate; different methodological approach to assessing transition pathways trade-offs create challenges in understanding the cause and effects relationship between sectoral actions and outcomes, impacting target setting
<b>Transition Plans</b> – information on impacts, strategies, investments to support GHG emissions reduction or net-zero transition (e.g., spending on energy savings initiatives, adopting renewable energy sources, use of carbon credits or offsets)	Available	Lack of clarity on application of existing guidance and frameworks may hinder development of reliable and comparable transition plans for both non-financial businesses and financial institutions

## Physical Risks

Publicly listed companies, federally-regulated financial institutions, pension plans, and SEC-registered domestic or foreign companies are/will be required to disclose information related to physical risks.

Based on TCFD/ISSB, the following are the general disclosure expectations for physical risks:

- Process of monitoring and managing climate-related physical risk, including assumptions and tools used; and
- Cross-industry metrics: the amount and percentage of assets or business activities exposed and vulnerable to physical risks<sup>42</sup>

The data gaps and challenges around physical risk are detailed below and summarized in **Table 7**:

**Available data may not capture Canada-specific sub-national/regional physical hazards at the level of granularity required.** Several agencies provide “off-the-shelf” datasets identifying geographical areas exposed to individual physical hazards. These physical risk datasets differ in scope (i.e. type of hazards covered), temporal and spatial granularity.<sup>43</sup> To obtain relevant information, preparing entities may have to rely on multiple and sometimes global datasets, which tend to have high monetary costs that can significantly decrease availability. This creates the need for granular, regularly updated, Canada-specific sub-national/regional physical hazard datasets.<sup>44</sup> These datasets may need to be made freely available for all businesses to reduce challenges with availability.

### There is limited availability of asset characteristics and location data to map exposures.

A given entity’s exposure to physical climate risks varies depending on the relevant physical hazards, characteristics of the asset (e.g., value of asset, size, year of construction, construction material, etc.), and geographic location of assets and activities.<sup>45</sup> Asset and location-specific data are expected to be available with preparing entities. However, disclosure of this information is often incomplete - presenting data challenges. For example, available data about the asset generally includes only information at the headquarter level or related to the central operational site of the business. It may also not be easily accessible as information may be merged with other datasets. This makes assessing physical risks for larger firms with multiple commercial locations difficult. Data on suppliers and customers, who are also exposed to physical risks and therefore impact that entity’s exposure, may not be publicly available.<sup>46</sup>

### There are modelling challenges related to assessing vulnerability from physical hazards.

Entities need to undertake vulnerability assessment i.e., translate data on assets’ exposure to physical risks to changes in economic variables, including a firms’ balance sheets/cash flows.<sup>47</sup> The assessment requires more analytics and modelling than primary data. Preparing institutions must utilize different types of models to assess vulnerability from physical risks. These models differ across hazards (acute physical hazards such as floods vs. chronic physical hazards such as droughts etc.), time horizon (ranging from 1 to 80 years), climate scenarios (different Intergovernmental Panel on Climate Change’s Representative Concentration Pathways), and outputs (ranging from qualitative scoring to quantitative metrics or financial estimates). Developing and using these models entails



significant expertise and human judgement as there is no standardized way to translate physical risks into economic impacts.<sup>48</sup>

Additionally, physical hazards are not experienced in isolation as an event and can trigger second-order impacts (e.g., a flood can trigger impacts that are socio-economic such as health shocks, crop losses which could lead to market, liquidity, and other related risks). However, these impacts are not easily captured in models. There is limited information on the interactions and interdependencies across physical risks and they are typically assessed in isolation, which limits the overall usefulness of the data.

**Vulnerability modeling is not generally done in-house and there is reliance on third-party data vendors.** They may use proprietary algorithms, particularly when actual physical risk and location data are unavailable. The generated output (e.g., climate risk scores) may be interpreted differently across providers owing to differences in methodologies/assumptions applied and may not be updated on a regular basis.<sup>49</sup> Therefore, the outputs may not be completely comparable and reliable for users.

**Adaptive capacity data is not readily available.**

Vulnerability assessment requires understanding firms’ adaptive capacity to physical hazards and adaptation-related policies (e.g., impact of changes to construction policies/building code that protect against climate-related damages to homes and buildings). The data is not easily or uniformly available across sectors as these activities (e.g., adding flood defenses to mitigate flood risks) reduce the potential impact of physical risk in ways that are difficult to measure for preparers.<sup>50</sup>

**Table 7: Physical Risk Data Availability, Reliability, and Comparability**

Information, Data & Analytics Needed to Support Disclosures	Data Availability	Reliability & Comparability
<b>Physical Hazards Data</b> – data and analytics on the types and impact of past (historical) and projected (forward-looking) extreme weather events (floods, storms, wildfires, etc.) and gradual changes in climate (projected sea-level rise, hazardous air-borne pollutants, etc.)	May not be available; Canada-specific sub-national/regional physical risk hazards and impacts data may not be obtainable at the spatial and temporal granularity required	N/A
<b>Asset Specific Data</b> – information on assets (e.g., value of asset, size, year of construction, construction material, etc.) and location of physical assets (e.g., firms’ facilities) and value and supply chains (location of firms’ suppliers and customers) at the most granular level possible	May not be available; preparing entities may not disclose own information; upstream and downstream supplier-level information may not be available	N/A
<b>Adaptive Capacity</b> – information and analytics on the degree of sensitivity to extreme weather events (e.g., firms’ adaptation plans and resilience measures, data on how they coped with extreme weather events in the past)	May not be available; involves activities to reduce potential impact of physical risks in ways that are difficult to measure	N/A
<b>Vulnerability Assessment</b> – data and analytics to translate physical hazards into damage or loss for exposed assets	Available; requires more modelling and analytics	Requires significant expertise and human judgement as there is no easy way translate physical risks into economic impacts; reliance on third-party data providers who may use non-transparent, proprietary methodologies, which may lead to unreliable and incomparable data for users

## Transition Risks

Publicly listed companies, federally-regulated financial institutions, pension plans, SEC-registered domestic or foreign companies, and financial institutions voluntarily adopting the GFANZ guidance are/will be required to disclose information related to transition risks:

Based on TCFD/ISSB, the following are the general disclosure expectations for transition risks:

- Process of monitoring and managing climate-related transition risk, including assumptions and tools used; and
- Cross-industry metrics: the amount and percentage of assets or business activities exposed and vulnerable to transition risks

The data gaps and challenges associated with transition risk are detailed below and summarized in **Table 8**:

**Emissions data and net-zero/emissions reduction target-setting challenges impede transition risk assessment and disclosures.** Other things being equal, firms with higher emissions or less stringent emissions reduction or net-zero targets are expected to face higher transition risks. Therefore, the main barriers to effective analysis and disclosures of quantitative transition risk are incomplete measurement of Scope 1 and 2 emissions, limited availability of Scope 3 emissions, target setting for only narrow scopes of entities’ emissions and trade-offs in using different sectoral pathway approaches. These challenges may lead to less reliable transition risk data.

**There is a shortage of standardized metrics to appropriately assess transition risks.** Metrics related to firms’ transition risks should go beyond GHG emissions and include more granular and forward-looking information on transition risks. These should include: the impacts of official sector policies designed to facilitate the transition to a net-zero emissions economy, shifts in consumer preferences and technology, and others areas which impact transition risks and affect firm balance sheets. Standardized transition-oriented metrics may not be available. Third-party data providers who undertake this analysis may use non-transparent methodologies to present outputs in the form of temperature ratings/climate value-at-risk. An added consideration is that metrics should be able to distinguish between increased exposure towards carbon-intensive assets vs. deliberate exposure towards carbon-intensive assets to assist in the net-zero transition. For example, if a bank lends \$1.5 billion to an oil and gas company and the company decides to install a carbon capture unit for which the bank lends an additional \$0.5 billion, the bank’s total transition risk exposure for the oil and gas company may now equal \$2 billion. Future transition risk metrics could consider the use of the additional \$0.5 billion in an appropriate manner for the bank’s transition risk management and disclosure.

**Data on transition preparedness are not always disclosed by preparing entities.** Surveys conducted by the FSB states that the quantitative inputs needed to assess preparedness are not always available directly from companies for the purposes of users.<sup>51</sup> These include but are not limited to: granular data on firms’ revenues across different business lines, transition-related

**Table 8: Transition Risk Data Availability, Reliability, and Comparability**

Information, Data & Analytics Needed to Support Disclosures	Data Availability	Reliability & Comparability
<b>Emissions Data</b> – data and information on Scopes 1, 2 and 3 emissions	Available; mainly for Scope 1 and 2 emissions, limited availability of Scope 3 emissions	Incomplete GHG emissions measurement may lead to less reliable transition risk assessment
<b>Net Zero or Emissions Reduction Targets and Sectoral Pathways</b> – data and information on emissions reduction or net-zero targets (absolute and intensity-based) and sectoral pathways to show how emissions will be reduced over time	Available; but targets may not cover all scopes of emissions	Incomplete coverage of targets and trade-offs in sectoral pathways assessment may lead to less reliable transition risk assessment
<b>Transition Metrics</b> – data and information which convert official-sector policies, shifts in consumer preferences and technology development into standardized metrics to measure transition risks	May not be available; Third-party providers may fill gaps using their proprietary models	N/A
<b>Preparedness for Transition</b> – data and analytics on the degree of preparedness to transition to net-zero economy (e.g., firm’s transition plans, R&D and other transition-related investments, exposures to carbon pricing, etc.)		

investments, exposures to carbon pricing, and transition strategy/plans. In their absence, external data providers may fill the data and analytics gaps using their own models and assumptions, which may lead to uncomparable and unreliable information for users. These data gaps can only be closed when company-level or asset-level data becomes available i.e., preparing companies have capacity to disclose this information.

## Scenario Analysis

Federally-regulated financial institutions, Canadian pension plans, SEC-registered domestic or foreign companies, and financial institutions voluntarily adopting the GFANZ guidance are/ will be required to disclose information related to scenario analysis.

Based on TCFD/ISSB, the following are the general disclosure expectations for scenario analysis.

- Type and the sources of scenarios;
- Comparison across a diverse range of climate-related scenarios;
- Scenario alignment with the latest international agreement on climate change;
- Reason for choosing scenario;
- Time horizons used in the analysis;
- Inputs — the scope of risks, the scope of operations covered, and details of the assumptions; and
- Assumptions about the way the transition to a net-zero economy macroeconomic trends energy usage and mix, and technology.

Data gaps and challenges associated with scenario analysis are listed below and summarized in **Table 9**:

**Different types of scenarios and models are available to conduct scenario analysis.** Scenario types are available from organizations such as International Panel on Climate Change (IPCC), International Energy Agency (IEA), NGFS, and others, while models can be developed in-house or obtained from external providers. While available, it should be recognized that there are challenges in mapping scenarios to impacts in business portfolios. These challenges are expected to be solved over time through learnings and guidance from regulators and standards setters.

**There are gaps associated with business-relevant data inputs and tools to conduct scenario analysis which poses reliability and comparability challenges.** Input data gaps may arise due to difficulty in obtaining data from customers/suppliers or data mining limitations (e.g. specifics on properties for physical risk-related scenario analysis).<sup>52</sup> In addition, most of the input data available is expected to be environment and climate change related and not focused on the socio-economic data needed to develop and undertake scenario analysis at the company level.<sup>53</sup> For financial institutions, lack of granular, sector-specific and timely data from counterparties (e.g., physical risk exposure, reliance on emissions-intensive inputs, and opportunities to substitute to lower emissions-intensive inputs, etc.) pose challenges in obtaining inputs, conducting and disclosing their own scenario analysis. Different organizations have to employ subjective judgement or look towards expertise from external third-party data providers to fill data gaps; different levels of capacity may also cause reliability and comparability challenges.

**Table 9: Scenario Analysis Data Availability, Reliability, and Comparability**

Information, Data & Analytics Needed to Support Disclosures	Data Availability	Reliability & Comparability
<b>Scenario analysis models and types</b> – data and information on the model used and different types of scenarios used to make assessments	Available; both different types of scenarios and models	N/A
<b>Scenario analysis inputs and assumptions</b> – information about processes, assumptions, time horizons, outputs, and potential management responses to different scenarios	Business relevant inputs and tools are available; but there are gaps due to difficulty in obtaining customer or supplier specific data, data mining limitations and non-availability of socio-economic input data.  For financial institutions, lack of granular and sectoral data from counterparties (entities which were financed) creates input data gaps	Use of subjective judgement and/or expertise from external data providers to fill input gaps may lead to unreliable and incomparable analysis





## 4 Future Considerations

### Improving Data Availability

Generally, data to measure Scope 1 and 2 GHG emissions is available either directly with entities or through proxy estimations. Absolute and/or intensity-based net-zero or emissions reduction targets and interim targets are stated by companies. However, Scope 3 GHG emissions, including financed emissions, are challenging to calculate and disclose by preparing entities. There are additional challenges around transition pathways and planning and business inputs for scenario analysis while climate data to assess exposure, vulnerability to physical risks, transition risk may not be available. A full summary of the data analysis for the five priority areas is provided in **Annex B**.

These findings match observations by SFAC's Data TEG related work to scan climate change-related data available at the federal and provincial/territorial levels in Canada and create a climate data inventory. The report finds that there are large amounts of climate change-related data available within federal and provincial/territorial departments, but not enough economic and social data. In addition, relatively little data provides "off-the-shelf" insights for financial decision-making.

To calculate Scope 3 GHG emissions (including financed and insurance-related emissions), granular emissions factors and sub-sectoral economic or physical activity (e.g., sub-sectoral industry codes to accurately reflect multiple business lines of large, diversified entities), data are needed that are common across different sectors.

For transition pathways, both analytical and guidance are needed to show how changes in assumptions and approaches affect outcomes of sectoral pathway analysis. There are also challenges with sector-specific data for relevant pathways and future analysis should consider data availability challenges for the carbon-intensive sectors of the economy.

For physical risks, there is a need for up-to-date mapping of common physical hazards for all businesses in Canada. These need to be downscaled to the postal-code level of granularity across all the standard warming scenarios to help assess exposure and vulnerability for business and financial institutions. These datasets may need to be made freely available for all businesses to reduce challenges with availability. Information on asset characteristics, asset location, and adaptive capacity of preparing entities needs to be disclosed through regular assessments or surveys conducted by third-parties.

For transition risks, standardized transition risk metrics and information on entity's transition preparedness needs to be more readily available. On the other hand, for scenario analysis, there is a need for more availability and guidance around business-relevant inputs and tools to conduct and ultimately disclose scenario analysis results.

## Coordination Between Stakeholders

As seen from the analysis, data availability varies across the five priority disclosure types. In cases where data is available, it may not be complete, comparable, and/or reliable. To continually fill climate data gaps and address data challenges, greater coordination is needed amongst stakeholders such as federal provincial/territorial governments, regulators, standard-setters, statistical agencies/data providers, businesses and financial institutions. It is important to recognize that these stakeholders have different roles. Adequate consideration needs to be given to understand the different roles that these stakeholders play within Canada's sustainable finance ecosystem for effective coordination and SFAC may take lead in providing additional clarity.

Areas where coordination between stakeholders may help fill data gaps and challenges:

- Continual updating of existing guidance from regulators and standard setters on the usage of proxy data, restatement of emissions data and emissions factors for the GHG emissions estimations. Additionally, regulators and standard setters could suggest actionable steps if information is unavailable, and/or if new information and calculation methodologies become available.
- Guidance and analytics support from governments and regulators to businesses and financial institutions on Canada-specific scenarios and pathways for sectors (e.g., agriculture) and translating sectoral pathways to entity-level emissions reduction to facilitate net-zero or emissions reduction target setting.
- Coordination between governments, regulators, financial institutions, and businesses on standardization of transition plan metrics and qualitative information to show transition preparedness and help companies and financial institutions develop net-zero or reduction targets.
- Regular surveys and analytics from statistical agencies/data providers to assess risks associated with physical hazards for businesses and financial institutions across Canada.
- Regular climate scenario analysis by regulators (such as the Bank of Canada and OSFI climate scenario analysis pilot) for different types of physical and transition risks to better understand data gaps for counterparties i.e. businesses which have been financed by financial institutions.

## Data Support for SMEs

SMEs may not have access to data or the capacity to analyze GHG emissions and analyze physical risk exposures, which might impede their ability to disclose this information.<sup>54</sup> It may be useful to conduct a separate analysis of tools & solutions available to support data collection and analysis from SMEs with adequate considerations for sectoral differences. Another consideration might be analyzing the measurement and disclosure of Scope 2 GHG emissions associated with energy consumption directly from the preparing companies' local energy utility.

## Analyzing Data Use Cases

Climate-related financial disclosure is one use case, and there are other use cases for financial decision-making which may change data needs. It may be useful to undertake a use case analysis for Canada's financial sector. SFAC, with support from regulators such as the Bank of Canada and OSFI, could commission this assessment to analyze the specific types of data required and whether it is available by different financial institutions across sectors for the five priority areas. Assessment of data needs by different types of financial institutions for different use cases (e.g., investment decision-making scenario analysis, etc.) and their availability may not only assist in the coordinated development of Canada-wide datasets in appropriate areas, but also deep-dive into capacity development requirements for companies (both large and small-medium size) and financial institutions to ensure that available data is/can be standardized and decision-useful.

Notably, SFAC's Data TEG conducted a bottom-up physical risk matrix analysis. Amongst others, the participants observed that it is difficult to articulate exposure, vulnerability and financial analysis until it is put in the context of a specific use case. Use cases help users relate/formulate commentary to data attributes and specify missing data. This observation strengthens the reasoning for conducting further use case development and analysis.

# Annex A: Disclosure Expectations

For each of the broad categories of climate disclosures, the disclosure expectations are based on TCFD’s *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures* and ISSB’s IFRS S2 *Climate-related Disclosures* requirements.

## Governance

Disclosure Requirements	Data Needed to Support Disclosures
Describe the <b>board’s oversight</b> of climate-related risks and opportunities.	<ul style="list-style-type: none"> <li>Information on the identity of the governance body or individual within a body within the board responsible for oversight of climate-related risks and opportunities;</li> <li>Description of how the body’s responsibilities for climate-related risks and opportunities are reflected in the entity’s terms of reference, board mandates and other related policies;</li> <li>Information on how often the body and its committees (audit, risk or other committees) are informed about climate-related risks and opportunities;</li> <li>Description of how the body and its committees consider climate-related risks and opportunities when overseeing the entity’s strategy, its decisions on major transactions, and its risk management policies, including any assessment of trade-offs and analysis of sensitivity to uncertainty that may be required;</li> <li>Description of how the body and its committees oversee the setting of targets related to significant climate-related risks and opportunities, and monitor progress towards them; and</li> <li>Description of management’s role in assessing and managing climate-related risks and opportunities, including whether that role is delegated to a specific management-level position or committee and how oversight is exercised over that position or committee (including setting and monitoring of targets).</li> </ul>
Describe <b>management’s role</b> in assessing and managing climate-related risks and opportunities.	

## Strategy

Disclosure Requirements	Data Needed to Support Disclosures
Describe the <b>climate-related risks and opportunities</b> the organization has identified over the short, medium, and long term	<ul style="list-style-type: none"> <li>Description of significant climate-related risks and opportunities and the time horizon over which they could reasonably be expected to affect its business model, strategy and cash flows, its access to finance and its cost of capital;</li> <li>Information on whether the risks identified are physical risks or transition risks; and</li> <li>Description of how it defines short, medium and long term and how these definitions are linked to the entity’s strategic planning horizons and capital allocation plans.<sup>55</sup></li> </ul>
Describe the <b>impact</b> of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning.	<ul style="list-style-type: none"> <li>Description of the current and anticipated effects of significant climate-related risks and opportunities on its value chain;</li> <li>Description of where in its value chain significant climate-related risks and opportunities are concentrated (for example, geographical areas, facilities or types of assets, inputs, outputs or distribution channels);</li> <li>Description on how entity is responding to significant climate-related risks and opportunities, including how it plans to achieve any climate-related targets it has set;</li> <li>Description of significant climate-related risks and opportunities have affected its most recently reported financial position, financial performance and cash flows; and</li> <li>Description of how it expects its financial position to change over time, given its strategy to address significant climate-related risks and opportunities.</li> </ul>



Disclosure Requirements	Data Needed to Support Disclosures
<p>Describe the <b>resilience</b> of the organization’s strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.</p>	<ul style="list-style-type: none"> <li>• Information on climate resilience including the implications on strategy, uncertainties considered, entity’s capacity to adjust or adapt to changes;</li> <li>• Description of how the scenario analysis has been conducted: <ul style="list-style-type: none"> <li>◦ which scenarios were used for the assessment and the sources of the scenarios used;</li> <li>◦ whether the analysis has been conducted by comparing a diverse range of climate-related scenarios;</li> <li>◦ whether the scenarios used are associated with transition risks or increased physical risks;</li> <li>◦ whether the entity has used, among its scenarios, a scenario aligned with the latest international agreement on climate change;</li> <li>◦ an explanation of why the entity has decided that its chosen scenarios are relevant to assessing its resilience to climate-related risks and opportunities;</li> <li>◦ the time horizons used in the analysis;</li> <li>◦ the inputs used in the analysis, including—but not limited to—the scope of risks, the scope of operations covered, and details of the assumptions; and</li> <li>◦ assumptions about the way the transition to a net-zero economy will affect the entity, including policy assumptions for the jurisdictions in which the entity operates; assumptions about macroeconomic trends; energy usage and mix; and technology.</li> </ul> </li> </ul>

## Risk Management

Disclosure Requirements	Data Needed to Support Disclosures
<p>Describe the organization’s processes for <b>identifying and assessing</b> climate-related risks.</p>	<ul style="list-style-type: none"> <li>• Description of how it assesses the likelihood and effects associated with such risks (such as the qualitative factors, quantitative thresholds and other criteria used);</li> <li>• Description of how it prioritizes climate-related risks relative to other types of risks; and</li> <li>• Information on whether it has changed the processes used compared to the prior reporting period.</li> </ul>
<p>Describe the organization’s processes for <b>managing</b> climate-related risks.</p>	<ul style="list-style-type: none"> <li>• Description of the process, or processes, it uses to identify, assess and prioritise climate-related risks;</li> <li>• Description of the process it uses to monitor and manage the climate-related risks and opportunities (including related policies, tools and metrics e.g., science-based risk-assessment tools); and</li> <li>• Information on the parameters it uses to manage risks (for example, data sources, the scope of operations covered, and the detail used in assumptions).</li> </ul>
<p>Describe how processes for identifying, assessing, and managing climate-related risks are <b>integrated</b> into the organization’s overall risk management</p>	<ul style="list-style-type: none"> <li>• Description of the extent to which and how the climate-related risk identification, assessment and management process, or processes, are integrated into the entity’s overall risk management process and the overall management process.</li> </ul>

## Metrics & Targets

Disclosure Requirements	Data Needed to Support Disclosures
<p>Disclose the <b>metrics</b> used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.</p>	<ul style="list-style-type: none"> <li>Information relevant to the TCFD/ISSB cross-industry metric categories (<i>GHG emissions, physical risks, transition risks, climate-related opportunities, capital deployment, internal carbon prices, remuneration</i>) which are relevant to entities regardless of industry and business model;</li> <li>Information relevant to TCFD/ISSB industry-based metrics, which are associated with disclosure topics and relevant to entities that participate within an industry;</li> <li>Information on other metrics used by the board or management to measure progress towards the targets set by the entity to mitigate or adapt to climate-related risks or maximize climate-related opportunities</li> </ul>
<p>Describe the <b>targets</b> used by the organization to manage climate-related risks and opportunities and performance against targets.</p>	<ul style="list-style-type: none"> <li>Information on metrics used to assess progress towards reaching the target and achieving its strategic goals;</li> <li>Information on the <b>specific target</b> the entity has set for addressing climate-related risks and opportunities;</li> <li>Information on whether this target is an <b>absolute target</b> or an <b>intensity target</b>;</li> <li>Information on the <b>objective of the target</b> (for example, mitigation, adaptation or conformance with sector or science-based initiatives);</li> <li>Information on how the target <b>compares with those created in the latest international agreement</b> on climate change and whether it has been <b>validated by a third party</b>;</li> <li>Information on whether the target was derived using a <b>sectoral decarbonization approach</b>;</li> <li>Information on the <b>period over which the target applies</b>;</li> <li>Information on the <b>base period</b> against which progress is measured; and</li> <li>Information on any <b>milestones or interim targets</b>.</li> </ul>
<p>Disclose and describe <b>Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions</b>, and the related risks.</p>	<ul style="list-style-type: none"> <li>Absolute GHG emissions generated during the reporting period, measured in accordance with the Greenhouse Gas Protocol Corporate Standard, expressed as metric tonnes of CO<sub>2</sub> equivalent, classified as Scope 1, Scope 2 emissions and Scope 3 emissions.</li> <li>GHG emissions intensity for each scope expressed as metric tonnes of CO<sub>2</sub> equivalent per unit of physical or economic output.</li> <li>For Scope 1 and Scope 2 emissions, disclose:             <ul style="list-style-type: none"> <li>the consolidated accounting group (the parent and its subsidiaries);</li> <li>associates, joint ventures, unconsolidated subsidiaries or affiliates;</li> <li>approach used to include emissions for the entities (for example, the equity share or operational control method in the Greenhouse Gas Protocol Corporate Standard); and</li> <li>reasons, for the entity's choice of approach.</li> </ul> </li> <li>For upstream and downstream emissions in its measure of Scope 3 emissions, disclose:             <ul style="list-style-type: none"> <li>categories included within its measure of Scope 3 emissions (to ensure understanding of which emissions have been included/ excluded in reporting);</li> <li>explain basis for measurement (when the entity's measure of Scope 3 emissions includes information provided by entities in its value chain); and</li> <li>state reasons for omitting (if Scope 3 emissions is excluded).</li> </ul> </li> </ul>

# Annex B: Detailed Summary Table of Data Availability, Reliability and Comparability

Summary Table of Data Availability, Reliability, and Comparability

Information, Data & Analytics Needed to Support Disclosures		Data Availability	Reliability & Comparability
<b>GHG Emissions</b>	<b>Activity Data</b> – activities that generate emissions from assets owned/controlled by the company (Scope 1), purchased energy (Scope 2), and upstream and downstream activities (Scope 3)	<b>Scope 1 and 2:</b> expected to be available for mainly large companies and not SMEs	N/A
		<b>Scope 3:</b> limited availability from value chain entities	Less reliable and comparable if broad proxies (physical or economic activity data) are used
	<b>Emissions Factors</b> – values used to convert source activity (e.g., kilowatt-hour of electricity, litres of diesel fuel) into GHG emissions	<b>Scope 1 and 2:</b> expected to be available	N/A
		<b>Scope 3:</b> Limited availability of supplier-specific emissions factors	Less reliable and comparable if broad emissions factors (industry averages) and third-party data are used
	<b>Global Warming Potential</b> – values used to convert different types of GHGs into equivalent tonnes of carbon dioxide (CO <sub>2</sub> e)	<b>Scope 1 and 2:</b> expected to be available	N/A
<b>Methodology and Assumptions</b> – used to calculate GHG emissions (except financed and insurance-associated emissions)	Available for Scope 1, 2 and 3 from the GHG Protocol, guidance documents, statistical agencies, data providers, etc. Application of Scope 3 methodologies and assumptions expected to improve over time	N/A	
<b>Financed and Insurance-Associated Emissions</b>	<b>Company/Investment/Asset Emissions</b> – emissions either directly reported by company or investee (verified or unverified) or estimated from physical or economic activities (based on relevant and credible emissions factors and/or global warming potential)	Available; either directly from borrower, insured or portfolio entities or through estimations or third-party data providers	<ul style="list-style-type: none"> <li>Available data may not be accurate enough to reliably calculate financed and insurance-associated emissions;</li> <li>Sector specific issues pose calculations challenges (e.g., difficult to obtain farm-level GHG emissions for agriculture sector);</li> <li>Time lags and restatements by borrower, insured or portfolio entities companies negatively affects data quality;</li> <li>Third-party data providers may use non-transparent methodologies to estimate financed and insurance-associated emissions</li> </ul>
	<b>Attribution Factor</b> – Data on the share of the outstanding amount of loans and investments of a financial institution over the total equity, revenue or debt of the company or project	Available; Application to improve over time	N/A
	<b>Data Quality Scores</b> – shows data quality based on source of data as part of five-step data quality scoring methodology developed by PCAF Standard per asset class — with '1' being the highest and '5' the lowest	Available; Application to improve over time	Comparability and reliability challenges exist as financial institutions interpret and apply PCAF's methodology differently, but is expected to improve over time as interpretation and implementation become standardized

Information, Data & Analytics Needed to Support Disclosures	Data Availability	Reliability & Comparability	
<b>Net-Zero / GHG Emissions Reduction Target</b>	<b>GHG Emissions</b> – Inventory of company-wide Scope 1, 2 and relevant Scope 3 GHG emissions to set net-zero or GHG emissions reductions target	Available; mainly for Scope 1 and 2 emissions and less for Scope 3 emissions (including financed and insurance-associated emissions)	Difficult to set reliable and comparable net-zero or GHG emissions targets without complete coverage of emission and relying on proxies
	<b>Sectoral Pathways</b> – Provides the link between the science of remaining carbon budget that can be emitted and the detailed steps that a specific sector/company can take to reduce GHG emissions to a particular level in a specified timeframe. Pathways can be used to set emissions reduction/net-zero targets with a specific ambition, such as to limit temperature rise (e.g., 1.5 degrees C)	Available; different approaches to assess transition pathways (both top-down and bottom-up)	Comparability and reliability challenges if data assumptions are inaccurate; different methodological approach to assessing transition pathways trade-offs create challenges in understanding the cause and effects relationship between sectoral actions and outcomes impacting target setting
	<b>Transition Plans</b> – Information on impacts, strategies, investments to support GHG emission reduction or net-zero transition (e.g., spending on energy savings initiatives, adopting renewable energy sources, use of carbon credits or offsets)	Available	Lack of clarity on application of existing guidance and frameworks may hinder development of reliable and comparable transition plans for both non-financial businesses and financial institutions
<b>Physical Risks</b>	<b>Physical Hazards Data</b> – Data and analytics on the types and impact of past (historical) and projected (forward-looking) extreme weather events (floods, storms, wildfires, etc.) and gradual changes in climate (projected sea-level rise, hazardous air-borne pollutants, etc.)	May not be available; Canada-specific sub-national/regional physical risk hazards and impacts data may not be obtainable at the spatial and temporal granularity required	N/A
	<b>Asset Specific Data</b> – Information on assets (e.g., value of asset, size, year of construction, construction material, etc.) and location of physical assets (e.g., firms' facilities) and value and supply chains (location of firms' suppliers and customers) at the most granular level possible	May not be available; preparing entities may not disclose own information; upstream and downstream supplier-level information may not be available	N/A
	<b>Adaptive Capacity</b> – Information and analytics on the degree of sensitivity to extreme weather events (e.g., firms' adaptation plans and resilience measures, data on how they coped with extreme weather events in the past)	May not be available; involves activities to reduce potential impact of physical risks in ways that are difficult to measure	N/A
	<b>Vulnerability Assessment</b> – Data and analytics to translate physical hazards into damage or loss for exposed assets	Available; requires more modelling and analytics	Requires significant expertise and human judgement as there is no easy way translate physical risks into economic impacts; reliance on third-party data providers who may use non-transparent proprietary methodologies, which may lead to unreliable and incomparable data for users



Information, Data & Analytics Needed to Support Disclosures		Data Availability	Reliability & Comparability
<b>Transition Risks</b>	<b>Emissions Data</b> – Data and information on Scopes 1, 2 and 3 emissions	Available; mainly for Scope 1 and 2 emissions, limited availability of Scope 3 emissions	Incomplete GHG emissions measurement may lead to less reliable transition risk assessment
	<b>Net Zero or Emissions Reduction Targets and Sectoral Pathways</b> – Data and information on emissions reduction or net-zero targets (absolute and intensity-based) and sectoral pathways to show how emissions will be reduced over time	Available; but targets may not cover all scopes of emissions.	Incomplete coverage of targets and trade-offs in sectoral pathways assessment may lead to less reliable transition risk assessment
	<b>Transition Metrics</b> – Data and information which convert official-sector policies, shifts in consumer preferences and technology development into standardized metrics to measure transition risks	May not be available; Third-party providers may fill analytics gaps using their proprietary models	N/A
	<b>Preparedness for Transition</b> – Data and analytics on the degree of preparedness to transition to net-zero economy (e.g., firm’s transition plans, R&D and other transition-related investments, exposures to carbon pricing, etc.)		
<b>Scenario Analysis</b>	<b>Scenario analysis models and types</b> – Data and information on the model used and different types of scenarios used to make assessments	Available; both different types of scenarios and models	N/A
	<b>Scenario analysis inputs and assumptions</b> – Information about processes, assumptions, time horizons, outputs, and potential management responses to different scenarios	Business relevant inputs and tools are available, but there are gaps due to difficulty in obtaining customer or supplier-specific information, data mining limitations and non-availability of socio-economic input data;  For financial institutions, lack of granular and sectoral data from counterparties (entities which were financed) creates input gaps	Use of subjective judgement and/or expertise from external data providers to fill input gaps may lead to unreliable and uncomparable analysis

# Endnotes

- 1 Government of Canada. (2022). *Sustainable Finance Action Council*. <https://www.canada.ca/en/department-finance/programs/financial-sector-policy/sustainable-finance/sustainable-finance-action-council.html>
- 2 ISSB. (2023). *IFRS - ISSB issues inaugural global sustainability disclosure standards*. <https://www.ifrs.org/news-and-events/news/2023/06/issb-issues-ifrs-s1-ifrs-s2/>
- 3 TCFD. (2017). *Recommendations of the Task Force on Climate-related Financial Disclosures*. Financial Stability Board. <https://www.fsb-tcfd.org/recommendations/>
- 4 ISSB. (2022). *Exposure Draft IFRS S2 Climate-related Disclosures*. International Sustainability Standards Board. <https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards-issb/english/2023/issued/part-a/issb-2023-a-ifrs-s2-climate-related-disclosures.pdf?bypass=on>
- 5 CSA. (2021). *51-107—Consultation Climate-related Disclosure Update and CSA Notice and Request for Comment Proposed National Instrument 51-107 Disclosure of Climate-related Matters* (p. 74). Canadian Securities Administrators. [https://www.osc.ca/sites/default/files/2021-10/csa\\_20211018\\_51-107\\_disclosure-update.pdf](https://www.osc.ca/sites/default/files/2021-10/csa_20211018_51-107_disclosure-update.pdf)
- 6 OSFI. (2023). *Guideline B-15 Climate Risk Management*. Office of the Superintendent of Financial Institutions. <https://www.osfi-bsif.gc.ca/Eng/fin-if/rg-ro/gdn-ort/gj-Hd/Pages/b15-dft.aspx>
- 7 CAPSA. (2022). *Environmental, Social and Governance Considerations in Pension Plan Management*. Canadian Association of Pension Supervisory Authorities. <https://www.capsa-acor.org/Documents/View/1914>
- 8 US SEC. (2022). *Enhancement and Standardization of Climate-Related Disclosures*. United States Securities and Exchange Commission. <https://www.sec.gov/files/33-11042-fact-sheet.pdf>
- 9 GFANZ. (2022). *Recommendations and Guidance Financial Institution Net-zero Transition Plans*. Glasgow Financial Alliance for Net Zero. [https://assets.bbhub.io/company/sites/63/2022/06/GFANZ\\_Recommendations-and-Guidance-on-Net-zero-Transition-Plans-for-the-Financial-Sector\\_June2022.pdf](https://assets.bbhub.io/company/sites/63/2022/06/GFANZ_Recommendations-and-Guidance-on-Net-zero-Transition-Plans-for-the-Financial-Sector_June2022.pdf)
- 10 FSB. (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Financial Stability Board. <https://www.fsb.org/wp-content/uploads/P070721-3.pdf>
- 11 NGFS. (2021). *Progress report on bridging data gaps* [Technical Document]. Network for Greening the Financial System. [https://www.ngfs.net/sites/default/files/medias/documents/progress\\_report\\_on\\_bridging\\_data\\_gaps.pdf](https://www.ngfs.net/sites/default/files/medias/documents/progress_report_on_bridging_data_gaps.pdf)
- 12 SPI. (2020). *Bridging The Transparency Gap in Sustainable Finance: Advancing the Business Case for the Canadian Centre for Climate Information and Analytics (C3IA)*. Smart Prosperity Institute. <https://institute.smartprosperity.ca/sites/default/files/SPI-Sustainable-Finance-Report.pdf>
- 13 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>;  
FSB. (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Financial Stability Board. <https://www.fsb.org/wp-content/uploads/P070721-3.pdf>
- 14 Members of the SFAC Data and Disclosure TEGs have identified and broadly agreed with these five disclosure types during stakeholder consultations.
- 15 NGFS. (2021). *Progress report on bridging data gaps* (p. 52) [Technical Document]. Network for Greening the Financial System. [https://www.ngfs.net/sites/default/files/medias/documents/progress\\_report\\_on\\_bridging\\_data\\_gaps.pdf](https://www.ngfs.net/sites/default/files/medias/documents/progress_report_on_bridging_data_gaps.pdf)
- 16 TNFD. (2023). *The TNFD Nature-related Risk and Opportunity Management and Disclosure Framework Final Draft—Betav0.4*. Taskforce on Nature-related Financial Disclosures. [https://framework.tnfd.global/wp-content/uploads/2023/03/23-23882-TNFD\\_v0.4\\_Integrated\\_Framework\\_v7.pdf](https://framework.tnfd.global/wp-content/uploads/2023/03/23-23882-TNFD_v0.4_Integrated_Framework_v7.pdf)
- 17 As identified in TCFD's *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures* and ISSB's *IFRS S2 Climate-related Disclosures*.
- 18 GHG emissions intensity refers to volume of emissions relative to an economic or physical unit of activity.
- 19 Greenhouse Gas Protocol. (2004). *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (p. 116). <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>
- 20 Scope 3 Category 15 GHG emissions i.e., financed and insurance-associated emissions are covered separately on **page 13**.
- 21 Schmidt, A. (2022, February 23). *New data reveals two-thirds of surveyed small businesses concerned over navigating climate action*. SME Climate Hub. <https://businessclimatehub.org/new-survey-reveals-small-business-barriers-climate-action/>
- 22 Proxy data is data from a similar activity that is used as a stand-in for the given activity. Proxy data can be extrapolated, scaled up, or customized to be more representative of the given activity (e.g., partial data for an activity can be extrapolated or scaled up to represent 100 percent of the activity). However, generally, emissions factors for Scope 1 and location-based Scope 2 GHG emissions are expected to be available.
- 23 Saush, A. (2023, January 25). *Solving data challenges to reduce scope 3 emissions*. Environment Analyst Global. <https://environment-analyst.com/global/109053/solving-data-challenges-to-reduce-scope-3-emissions>
- 24 Cox, E., & Herman, C. (2022, October 28). *Tackling the Scope 3 challenge*. <https://www.pwc.com/gx/en/services/sustainability/climate/scope-three-challenge.html>
- 25 Greenhouse Gas Protocol. (2004). *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*. <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>
- 26 PCAF. (2022). *The Global GHG Accounting and Reporting Standard for the Financial Industry*. [Second Edition]. Partnership for Carbon Accounting Financials. <https://carbonaccountingfinancials.com/en/standard>
- 27 Weighted average carbon intensity refers to financial institutions' portfolio's exposure to emissions-intensive companies and assets, expressed as volume of emissions per borrower or investee revenue.

- 28 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 29 Time lags may affect data quality depending on timing of collection of total equity, revenue or debt of company or project.
- 30 ISSB. (2022). *Exposure Draft S2 Climate-related Disclosures—Scope 3 greenhouse gas emissions* (Staff Paper Agenda Reference 4B). <https://www.ifrs.org/content/dam/ifrs/meetings/2022/october/issb/ap4b-climate-related-disclosures-scope-3-greenhouse-gas-emissions.pdf>
- 31 Tang, K., Shrimali, G., & Christiaen, C. (2023). *Data Quality Considerations for Estimating Financed Emissions*. Oxford Sustainable Finance Group. <https://www.smithschool.ox.ac.uk/sites/default/files/2023-01/Data-Quality-Considerations-for-Estimating-Financed-Emissions.pdf>
- 32 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 33 PCAF. (2022). *The Global GHG Accounting and Reporting Standard for the Financial Industry*. [Second Edition]. Partnership for Carbon Accounting Financials. <https://carbonaccountingfinancials.com/en/standard>
- 34 At the time of writing, methodological guidance is available for seven asset classes for financed emissions: listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, motor vehicle loans and sovereign debt. For insurance associated emissions, they are available for two segments: commercial lines and personal motor lines.
- 35 Disclosure or net-zero/GHG emissions reduction targets from publicly listed companies in Canada depend on the finalization of the CSA disclosure requirements.
- 36 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 37 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 38 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 39 While transition plans are assessed from a disclosure perspective for the purposes this report, there are additional data needs to determine whether a transition plan is credible (e.g., likelihood of achieving targets; reliance on future innovation and technologies; treatment of carbon offsets; assessing progress in different context including mergers and acquisitions, etc).
- 40 TCFD. (2021). *Metrics Targets and Transition Plans Consultations*. Task Force on Climate-related Financial Disclosures. [https://assets.bbhub.io/company/sites/60/2021/10/October\\_2021\\_Metrics\\_Targets\\_and\\_Transition\\_Plans\\_Consultation\\_Summary\\_of\\_Responses.pdf](https://assets.bbhub.io/company/sites/60/2021/10/October_2021_Metrics_Targets_and_Transition_Plans_Consultation_Summary_of_Responses.pdf)
- 41 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 42 There are other impacts associated with climate change beyond business activities, for example, on health and well being of employees and clients. While these are important considerations, this is outside the scope of this analysis.
- 43 FSB. (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Financial Stability Board. <https://www.fsb.org/wp-content/uploads/P070721-3.pdf>
- 44 ISF. (2022). *Partial Disclosure: Assessing the state of physical and transition climate risk disclosure in Canada*. <https://smith.queensu.ca/centres/isf/pdfs/ISF-partial-disclosure-paper.pdf>
- 45 Examples of relevant physical hazards may include, but not limited to, floods, wildfires, extreme weather, extreme heat, drought and water scarcity.
- 46 GFANZ. (2022). *Draft Recommendations for the Development of the Net-Zero Data Public Utility*. Glasgow Financial Alliance for Net Zero. <https://assets.bbhub.io/company/sites/63/2022/09/Development-of-the-Net-Zero-Data-Public-Utility-September-2022.pdf>
- 47 There are other impacts associated with climate change, for example, on health and well being of employees and clients, which may be important considerations for insurance companies (i.e. life insurance). However, this is outside the scope of this analysis.
- 48 These models may also be in their early development stages, which might affect their reliability and effectiveness.
- 49 FSB. (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Financial Stability Board. <https://www.fsb.org/wp-content/uploads/P070721-3.pdf>
- 50 NGFS. (2021). *Progress report on bridging data gaps* [Technical Document]. Network for Greening the Financial System. [https://www.ngfs.net/sites/default/files/medias/documents/progress\\_report\\_on\\_bridging\\_data\\_gaps.pdf](https://www.ngfs.net/sites/default/files/medias/documents/progress_report_on_bridging_data_gaps.pdf)
- 51 FSB. (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Financial Stability Board. <https://www.fsb.org/wp-content/uploads/P070721-3.pdf>
- 52 TCFD. (2020). *Guidance on Scenario Analysis for Non-Financial Companies*. [https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD\\_Guidance-Scenario-Analysis-Guidance.pdf](https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD_Guidance-Scenario-Analysis-Guidance.pdf)
- 53 FSB. (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Financial Stability Board. <https://www.fsb.org/wp-content/uploads/P070721-3.pdf>
- 54 Schmidt, A. (2022, February 23). *New data reveals two-thirds of surveyed small businesses concerned over navigating climate action*. SME Climate Hub. <https://businessclimatehub.org/new-survey-reveals-small-business-barriers-climate-action/>
- 55 Ideally, the time horizons for short-term, medium-term and long-term needs to be defined and standardized by regulators, standard setters and/or other relevant stakeholders to address comparability issues.



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