BRIDGING THE TRANSPARENCY GAP IN SUSTAINABLE FINANCE

Advancing the Business Case for the Canadian Centre for Climate Information and Analytics (C3IA)

Smart Prosperity Institute

REPORT
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About Smart Prosperity Institute

Smart Prosperity Institute (formerly Sustainable Prosperity) 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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EXECUTIVE SUMMARY

Canada's private sector needs access to reliable and complete data in order to play its critical role in addressing climate issues and harnessing clean and resilient growth opportunities.

How Canada's companies and financial institutions approach climate-based issues and opportunities will ultimately shape long-term environmental, economic, and social development. Financial institutions, in particular, will play a central role in mitigating climate-related threats to businesses and assets while driving capital flows toward cleaner, more resilient energy, products, systems, markets, and solutions. To effectively meet this role, our financial system needs the tools to recognize, analyze, and right-price climate-related factors.

Access to reliable data – and the ability to translate that data into intuitive economic outcomes – is key to effective risk analysis and financial decision-making. While a range of voluntary climate disclosure standards are available and ample climate and energy data exist, the financial sector faces persistent challenges around information integrity, accessibility, completeness, and comparability. The resulting knowledge and information gaps are distorting market assessment and pricing of climate-related risk and opportunity, slowing progress on the low-carbon transition, and leaving Canada's financial system (and the people and businesses it influences) vulnerable to impacts.

Box 01

We are still at an early stage of understanding the full scope of potential financial implications from climate-related physical and transition risks, and the scale of available opportunity.

At a high level, *Physical Risk* encompasses the financial consequences of physical disruption and damage to infrastructure, worker health, and supply chains from an acceleration in climate-related severe weather events.

Transition Risk speaks to the broad impacts to asset valuations, risk profiles, legal risks, technological innovation, and competitiveness stemming from evolving climate and energy policies.

At the same time, we expect all low-carbon pathways to bring some degree of new or accelerated opportunities and competitiveness factors related to resource efficiency, clean energy, low emissions products/services, and climate resiliency. Canada's roadmap to a climate-resilient, low-emissions economy will require significant capital reallocation toward, and investment in, these future technologies and other solutions.

Experts Recommend Efforts Toward Best-in-Class Data and Information.

The Task Force on Climate-related Financial Disclosure (TCFD) and the Canadian Expert Panel on Sustainable Finance* alike are calling for heightened transparency as a first step toward a climate-resilient, low-emissions financial system. In its final report, the Expert Panel recommended forming a *Canadian Centre for Climate Information and Analytics* (C3IA) as a trusted single-stop source for authoritative climate data and information relevant to sustainable finance, and a platform for enhanced climate-related financial disclosures, analytics, and datasets.

In July 2020, the economic and fiscal snapshot reported $6M in funding to establish the Expert Panel's recommended Sustainable Finance Action Council (SFAC). The intent behind the SFAC is to create an axis for strategic focus, partnership, and knowledge exchange between public and private leaders in mobilizing sustainable finance activity and crystalizing Canada's future competitiveness plans. In its report, the Expert Panel flagged efforts to scope the C3IA – in structure and content – as one of the Council's top priorities.

The private sector is the best source of industry and market insight in scoping the C3IA. One of the foundational tasks in forming the C3IA is determining how to facilitate the development, dissemination, and verification of climate-related data coming largely from the private sector. That exercise requires an explicit understanding of the pervasive data challenges, and how a central hub might help address the issues. The Expert Panel spoke to data and analysis issues from its consultations but did not have the scope to dig deeper into specific pain points that could be addressed by the C3IA, nor build a business case for its development. This report from the Smart Prosperity Institute, made possible by support from Insurance Bureau of Canada, provides the necessary private sector analysis to develop that business case, summarizing key market challenges relating to climate data, and proposing solutions for the C3IA to consider.

Box 02

Benefits of Climate-Based Transparency through the C3IA

Resilience to physical and transitional risks from climate change (what isn't measured isn't managed)

Clarity on capital flows towards low-carbon and climate-resilient technologies, infrastructure, projects, and market products

Clarity on capital flows towards activities that misalign with Canada's mid-century goal of net-zero GHG emissions

Heightened opportunities for proprietary business analytics and products for sustainable investment

New Research in this Report Shows where and how we Need to Bridge the Data Gap in Sustainable Finance.

The research for this report provides targeted market context to those shaping the C3IA's public policy rationale, to help narrow focus to the issues of the highest benefit from a tightly governed and publicly supported data hub. The report synthesizes insights from a broad series of interviews with the financial community, including institutional investors, asset managers, and insurers, as well as specialty data providers, global standards organizations, and other experts.

* https://www.canada.ca/en/environment-climate-change/services/climate-change/expert-panel-sustainable-finance.html

INTERVIEWS AND CONSULTATIONS


RESEARCH APPROACH

The focus for our interviews was two-fold:

1) Defining the critical transparency gaps specific to sustainable finance in Canada. In our discussions with over 50 financial organizations, three key transparency-related pillars came forward as priority areas of focus for the C3IA:

Pillar 1 – Supporting TCFD Disclosures: Data and analytics to facilitate and speed up climate-related disclosures in line with the TCFD recommendations

Pillar 2 – Fostering Low-Carbon, Climate-Resilient Investments and Markets: Data and information to mobilize capital flows toward areas that will accelerate Canada's transition to a climate-resilient, low-carbon economy

Pillar 3 – Recognizing Physical Risk: Better tools to judge current and future exposure to physical climate-related risk

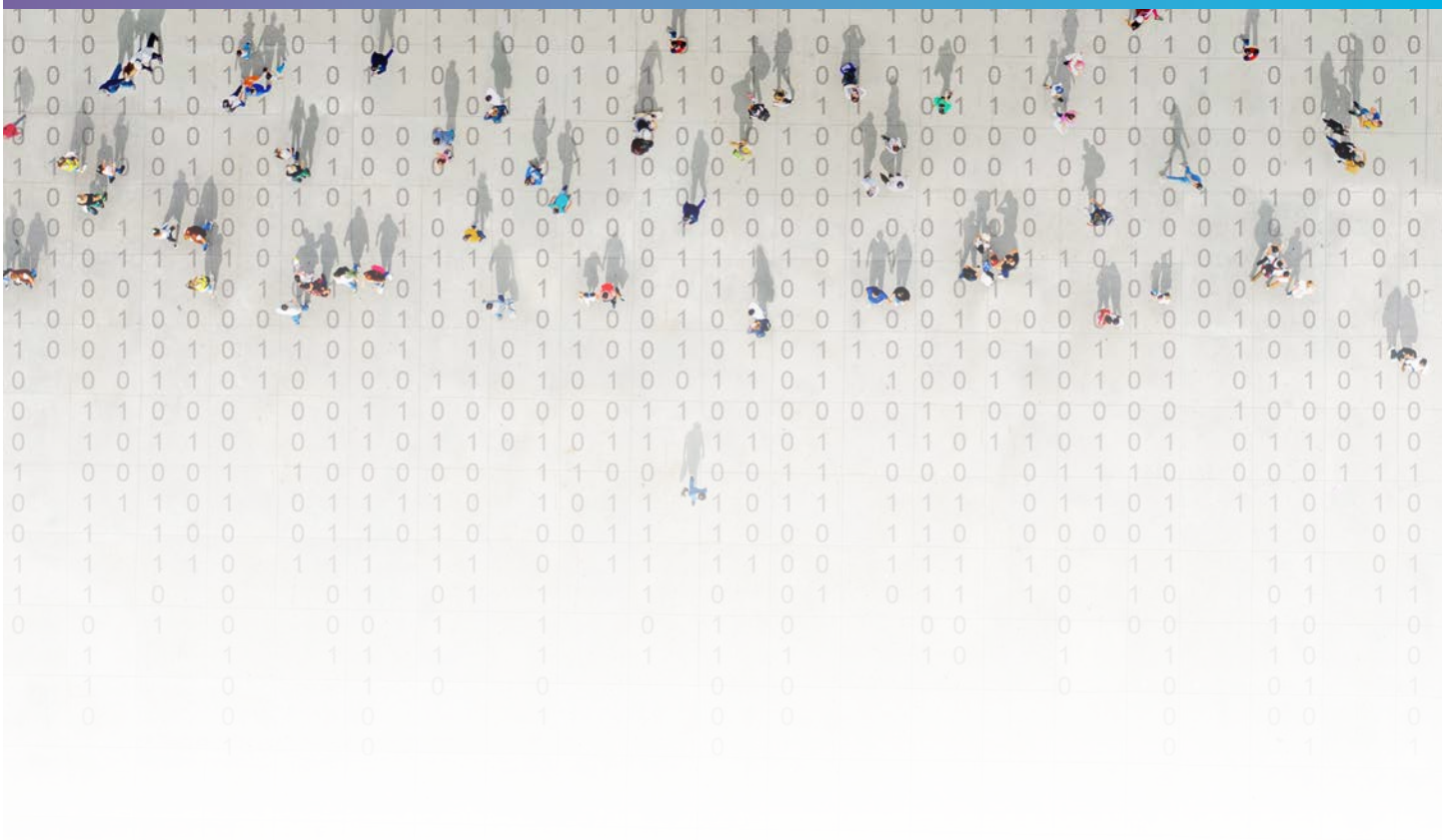
2) Scoping opportunities and roles for the C3IA to address the identified transparency gaps and build a robust data ecosystem to enable sustainable finance flows. Conceptually, the C3IA would promote, coordinate, synthesize, and disseminate data to meet the needs of its stakeholders, including those identified in this report. While the Hub's design is still an open question, five key characteristics stood out across interviews:

1. Accessibility should be easy, broad, and electronic.
2. Data – stemming from new and existing verified sources – should be accurate, reliable, consistent, and comparable.
3. Content should be user-driven (both in format and focus), interoperable, and aligned to international standards and best practices.
4. The Hub should harmonize with and complement other robust information portals such as the Canadian Centre for Climate Services; the Canadian Energy Information Portal; the Institute for Sustainable Finance at Smith School of Business, Queen's University; and the Intact Centre at the University of Waterloo (among others).
5. The intent should not be to displace the market for data and research providers, but rather to amplify and organize the information available to those resources as a means toward enhanced analytics and business tools.

Box 03

What makes good data?

Data quality is generally assessed in the context of its purpose, but there are common attributes of high-quality data. These are: accuracy, completeness, conformance (in format and storage), consistency, relevance, comparability (across time and variables), validity, and granularity. Where possible, data should align with established global standards and include metadata about the information provided.



The Hub should also serve as a convener, forming working groups across government, academia, and the private sector to drive transparency and shared understanding.

Scoping C3IA-Driven Solutions

Across our interviews, we heard a call for the C3IA to help clarify, deliver and streamline data requirements and models for business, investment, and insurance-related decisions and disclosures. At the same time, the C3IA can strengthen information quality, relevance, and comparability. Below, we summarize specific opportunities under our **three defined transparency pillars**:

- **Supporting TCFD disclosures**
- **Fostering low-carbon, climate-resilient investments and markets**
- **Recognizing physical risk**

Box 04

Aside from supporting C3IA development, interviews pointed to an increased role for governments (at all levels) and industry regulatory bodies (such as the Ontario Securities Commission) in setting standards and requirements for private sector sustainable finance activity. Cited examples include accessible methodologies for climate-related financial disclosures; energy performance labeling for buildings; and green and transition-linked product definition, tracking, and verification.

SUMMARY OF SOLUTIONS TERMS OF REFERENCE FOR THE C3IA

Pillar 1: Supporting TCFD Disclosures

a) **Harmonizing and driving standardization around the most useful and widely used disclosure frameworks for scope 1 and 2 emissions.** While calculating emissions from fuel and energy consumption is straightforward, guidance on reporting scope and boundaries - coupled with standardized accounting metrics - would help align understanding and approach in a way that improves comparability and simplifies the reporting process for issuers and other actors of all sizes.

b) **Establishing a central repository of past and present greenhouse gas emissions (GHG), where emissions are reported in line with the standard methodologies discussed in Item a.** The repository would offer a cost-effective, uniform source for comparative analysis and datasets across variables and time horizons, while building an open historical dataset.

c) **Appointing working groups to drive progress on scope 3 emissions measurement, sector by sector.** Sector-based working groups, joining industry and experts, could hone key metric and data needs for scope 3 emissions measurement as a first step toward standardized guidance.

d) **Centrally showcasing and tracking published climate commitments and carbon pledges from Canada's private actors.** This resource would give a clearer overall and relative sense of ambition, impact, and progress on climate-related pledges across companies, industries, and the Canadian economy.

Box 05

Defining Scope 1, 2 and 3 Emissions

Scope 1: Direct emissions from a company's or organization's owned or controlled sources. The most obvious examples are emissions from on-site fuel combustion (e.g., gas boilers) or vehicle fleets.

Scope 2: Indirect emissions related to purchased electricity that the company or organization has some level of discretion over, including purchased electricity from on- and off-grid sources.

Scope 3: All other indirect emissions related to the company's or organization's activities, including those for which they do not have direct control. These are often the largest share of a carbon footprint, covering emissions related to supply chain aspects such as procured goods and services, transportation, or waste disposal.

e) **Issuing guidance for interpreting the central financial themes of leading global and country-level climate ambition scenarios, set in the Canadian context.** The shared visibility would help demystify the complexity behind policy-based scenarios and get everyone speaking the 'same language' regarding transitional risks.

f) **Helping sectoral working groups adapt the above guidance at the industry and regional levels.** Tailored industry- and regional-level scenarios would support more granular forward-looking financial analysis across Canada's key economic sectors.

Pillar 2: Fostering Low-Carbon, Climate-Resilient Investments and Markets

g) **Developing a sustainable finance 'taxonomy mapper' to compare project and product opportunities against domestic and international standards.** The mapper would offer a one-stop, streamlined view of existing country standards and conditions for green and transition-linked projects and products.

h) **Coordinating working groups to support the CSA's Taxonomy Technical Committee in developing a reporting framework to underpin Canada's transition taxonomy.** The C3IA could provide data-based support in fostering framework adoption and understanding, and in ensuring relevant information is captured and disseminated in a comparable and robust manner.

i) **Utilizing the C3IA as a tracking database for the environmental impact of Canadian-issued green, resilient, and transition-linked financial products.** This transparency would help promote the integrity of green financial products (e.g., green bonds and mortgages) – and their issuers – by providing the means to validate that capital is going toward activities with the intended environmental impact.

j) **Centrally itemizing all green, resilience, and transition-linked financial incentives offered by federal, provincial, and municipal governments.** Easier visibility into available issuance-based fiscal incentives for green, resilience, and transition-linked products may help kickstart supply and demand.

k) **Creating a central, one-stop repository and tracking platform for energy/GHG/resiliency metrics related to Canada's largest commercial, institutional, and multi-residential buildings**. The platform would allow financial actors to navigate rating methodologies and assess relative savings, demand, and resiliency between building types and locations, providing a baseline for investment and lending decisions on building improvements or purchases.

l) **Creating a centralized database of environment, energy, and resiliency standards, labels, and performance data from government-sponsored retrofit programs and utility-run energy efficiency programs.** Objective data on the results and benefits of government retrofit funding would help inform the business case for private retrofit investment and identify reliable investor-ready projects.

Pillar 3: Recognizing Physical Risk

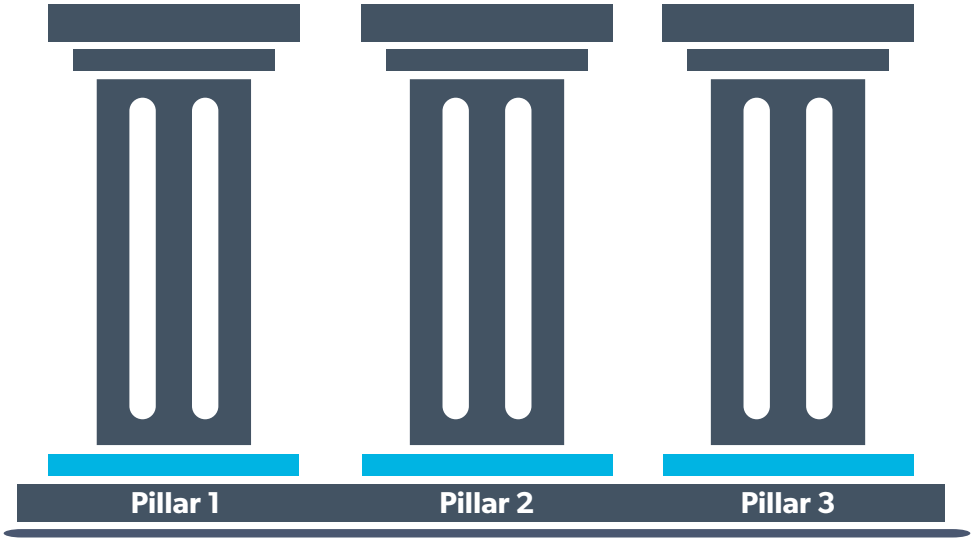
m) **Gathering, aligning, and disseminating up-to-date information on climate hazards.** As a first step, the C3IA should identify and highlight the results of government, expert, or academic research initiatives, to fill data gaps on the physical risks from climate change. Next, it would convene a working group to explore how to align and synthesize public and private sector information on climate hazards into financially useful information needed to facilitate strategic analysis and climate scenario modelling.

n) **Collecting and disseminating data on climate resiliency investments by municipalities and establishing a framework to price the value of climate risk mitigation in infrastructure decisions.** The C3IA should be the central repository for data detailing climate risk mitigation projects, as a foundation for exposure analysis needed to inform investment planning and underwriting decisions.

o) **Establishing a working group - involving leading insurers, asset owners, academics, think tanks, civil society, and governments – with the mandate to develop sector-specific stress testing methodologies and value-at-risk measures for forward-looking climate risk.** This would help lay the foundation for more granular and tailored scenario analysis and stress testing by individual financial actors.

Box 06

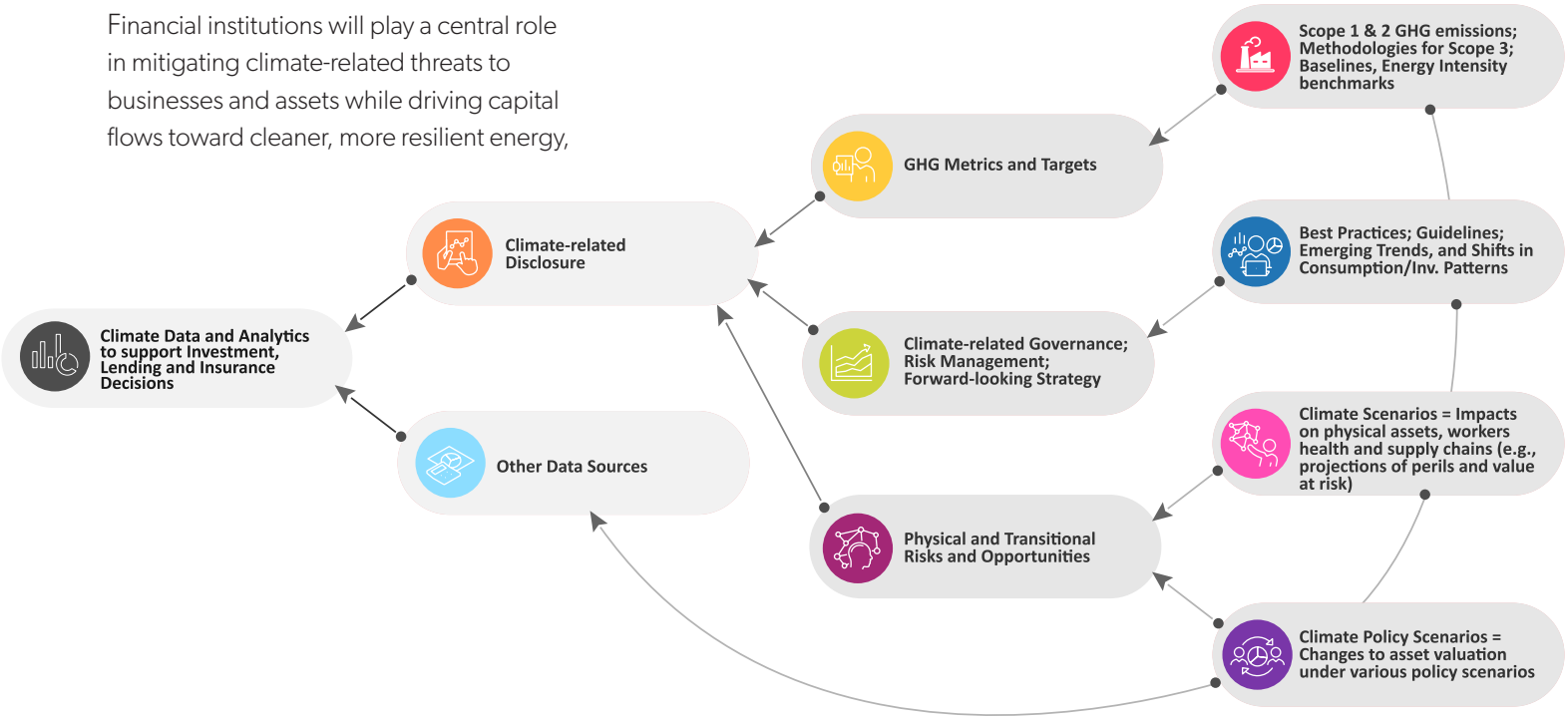
While the report focuses on data and disclosure, challenges in translating scientific information into practical financial analysis and decision tools were an equally prevalent discussion theme and an important early focus in building the C3IA's data foundation and exploring its use cases.



Pillar 1	Pillar 2	Pillar 3
Supporting TCFD Disclosure	**Fostering Low-Carbon Investments and Markets**	**Recognizing Physical Risk**
Common metrics and methodologies for GHG emissions	Simplified categorizations for green and transition-linked activities and investments	Collating financially-relevant information on climate perils
Transparency around climate targets and pledges	Tracking environmental impacts from green or transition-linked financial products (e.g., green bonds)	Transparency around climate-resiliency investments
Simplified analytics for forward-looking climate-scenario exercises	Transparency around the financial benefits from energy savings in the Building sector	Evaluating future financial risks from climate impacts

Figure 01

Financial institutions will play a central role in mitigating climate-related threats to businesses and assets while driving capital flows toward cleaner, more resilient energy,



PILLAR 1: SUPPORTING TCFD DISCLOSURES

Assessing the GHG Intensity of Assets and Portfolios

What we heard:

Improved disclosure-based transparency is a key building block to sustainable finance, as called for by the Task Force on Climate-related Financial Disclosures (TCFD). Many Canadian companies, investors, and federal Crown corporations are taking steps to implement the TCFD recommendations, and investors are using the framework to clarify their disclosure expectations for portfolio companies. TCFD disclosure allows investors and other stakeholders to assess the carbon intensity, climate risk exposure, and transition ambitions of issuers, to make informed decisions about their investment and lending pathways.

In its final report, the Expert Panel on Sustainable Finance recommended a phased-in approach to mandatory TCFD reporting, where expectations gradually increase as capacity, learning, and data quality improve. In Budget 2019, the Government of Canada endorsed a phased approach to adoption by major Canadian companies. It went on to make TCFD disclosure a condition for access to the Large Employer Emergency Financing Facility ("LEEFF") pandemic relief program[1], including reporting of how a company's strategy contributes to meeting Canada's 2050 net-zero commitment.

Notwithstanding the momentum around TCFD, both the quantity and quality of reporting in Canada needs to improve significantly. Climate-related disclosure remains voluntary in Canada, meaning companies decide how comprehensively they will report and with what frequency. We heard that pervasive data challenges and nascent technical guidance for certain disclosure aspects are creating barriers to broader and more in-depth reporting. Though many of the TCFD recommendations are (by design) straightforward and general to a broad stakeholder base, companies are challenged to deliver quality disclosures without more robust underlying data and tools.

Company- and activity-level GHG emissions are particularly salient to lenders and investors. Global financial institutions say they need a better quantitative view of activity-level, asset-level, and company-level GHG emissions to support decision-making and their own disclosure requirements. Ideally, companies would report their scope 1 and 2 GHG emissions directly. However, a 2019 survey by CPA found that only 15% of companies included in the study disclosed companywide GHG emissions in regulatory filings, despite 80% of companies reporting some type of GHG emissions data in voluntary reporting documents such as CDP submissions or annual sustainability reports.*[2]

Methodologies exist for companies looking to calculate their scope 1 & 2 emissions. The challenge is the level of discretion on what to report. For example, some companies will only report emissions from their primary facilities, excluding warehouses or transport terminals. Many only track energy-related emissions, while others include information on GHGs such as methane or hydrofluorocarbons. The lack of uniformity in tracking and reporting across companies, industries, and sectors makes apples-to-apples comparability hard. Meanwhile, historical emissions data is limited and calculated disparately, making it difficult to determine whether a company's emissions have increased or decreased over time.

* The study included 40 selected companies listed on the TSX from across 8 sectors.

Whether or not emissions are disclosed, financial players will often purchase third-party research data (e.g., MSCI, Sustainalytics, etc.) to get an indication of a company's footprint. Yet, many say the data is often estimated – not directly measured – raising questions on its representation (for example, it may not capture recent mitigation investments). Access to such data is costly for smaller firms.

The transparency challenges become amplified with Scope 3 emissions. Scope 3 emissions are not often included in carbon footprints today due to data gaps, scope uncertainty, and concerns about double counting. There are currently no clear precedents for capturing scope 3 emissions, despite it encompassing the lion's share of most business operations. Prominent companies, for instance, often tout their low scope 1 & 2 emissions footprints, not accounting for the enormous impact from their supply chain operations – from raw material extraction to manufacturing, transportation, and end-of-life recycling (see Amazon's calculations[*3]).

Ultimately, the quality of GHG disclosure comes down to the integrity of the methodologies used, the completeness of reporting, and the tracking procedures employed by the firm.

Potential Solutions

Harmonizing and driving standardization around the most useful and widely used disclosure frameworks for scope 1 and 2 emissions. The Expert Panel suggests that mandatory TCFD implementation begin with publicly listed companies and financial institutions over a certain size threshold. While calculating emissions from fuel and energy consumption is straightforward, guidance on reporting scope and boundaries for these early reporters - coupled with standardized accounting metrics - would help align understanding and approach in a way that improves comparability and simplifies the reporting process for follow-on issuers of all sizes.

Part of the problem is the voluntary nature of emissions reporting. If the C3IA could be a part of driving demand from investors and other powerful stakeholders, perhaps even helping government develop incentives for better reporting, this could go a long way in filling in the gaps and estimations we rely on today.

High-level examples of metrics to be standardized include:

- Emissions factors for all major fuel types used in Canada
- Emissions factors associated with electricity consumption in each province or jurisdiction, to calculate scope 2 emissions
- Guidance on reporting emissions from Canadian versus international operations
- Guidance on reporting boundaries, such as for joint ventures or acquisitions and mergers
- Guidance on how to report non-energy related GHG emissions
- For small and medium companies, emissions intensity estimates based on sector averages to supplement with company-specificinformation

Establishing a central repository of past and present GHG emissions, where emissions are reported in line with the standard methodologies discussed above. Under the Greenhouse Gas Reporting Program (GHGRP), Canadian facilities that emit over 10,000 tonnes of CO_2e per year must report their annual GHG emission to the federal government.[4] That information is publicly available and audited, yet few financial actors seem aware of it and questions remain as to how facility-level data rolls up to the company or portfolio level.

Interviewees noted that a centralized source of historical and current company- and activity-level GHG emissions would support more uniform and cost-effective trend analysis and indicative portfolio-related datasets. This information would help investors and companies know where they stack up relative to peers and other industries. The C3IA could also leverage existing historical emissions data from the GHGRP and other sources to develop company-level GHG profiles, and perhaps an associated emissions data verification mechanism.

* According to the company's numbers, Amazon's total carbon footprint for 2019 was 51.17 Mt CO2e. Scope 1 emissions were 5.76Mt, scope 2 emissions were 5.50Mt, and scope 3 emissions were 39.91Mt.

Box 07

Sustainability Reporting Frameworks and Standards

Several existing reporting frameworks provide voluntary standards and metrics to help support TCFD recommendations and other financial disclosure commitments. Each use different methodologies, questionnaires, and data collection approaches, and also aggregate and display results differently.

Clear-cut mapping of how these frameworks and standards fit together would avoid duplication and save resource costs for companies and investors, by eliminating the need to answer multiple questionnaires or interpret data from various sources. Some of these standard-setters are already working together to harmonize the corporate reporting landscape. The *Better Alignment Project* run by CDP, BRI, IIRC and SASB (see below) is a two-year initiative to align existing sustainability reporting frameworks, and other frameworks that promote further integration of non-financial and financial information, with the TCFD recommendations.

Taken together, these initiatives could help pave the way towards a common, comprehensive climate reporting framework for the financial sector.

Examples of global standards include:

GRI: The Global Reporting Initiative (1997) is the first and most widely used global standard for sustainable reporting, encompassing metrics that reach far beyond carbon.

SASB: The Sustainable Accounting Standards Board (2018) identifies a base set of financially material sustainability (ESG) topics and their associated metrics for 77 different industries.

CDSB: The Climate Disclosure Standards Board (CDSB) established a framework for companies to report environmental and climate change-related information in their corporate financial reporting.

PCAF: The Partnership for Carbon Accounting Financials is a global partnership of financial institutions working to implement a harmonized approach to assessing and disclosing GHG emissions associated with loans and investments, with an aim to set an open-source global carbon accounting standard for the financial sector.

CDP (formerly Carbon Disclosure Project): A UK-based not-for-profit that compiles reporting on climate change, water security, and deforestation from 8,400 companies as well as subnational governments. The CDP also offers an "environmental performance score" based on its reporting structure.

UNPRI: Funded by the United Nations under the Principles for Responsible Investment, the UNPRI helps investors incorporate ESG factors into their investment decisions, by requiring signatories to support sustainable actions and align reporting with TCFD recommendations. There are currently over 2,090 UNPRI signatories representing over $97 trillion in assets.

IIRC: The International Integrated Reporting Council (IIRC) is a global coalition of regulators, investors, companies, standard setters, the accounting profession, academia, and NGOs. The coalition aims to establish integrated reporting within mainstream business practice as the norm in the public and private sectors.

Appointing working groups to drive progress on scope 3 emissions measurement, sector by sector. There are currently no widely accepted methodologies for calculating scope 3 emissions, which capture essential supply chain functions. The C3IA could convene sector-level working groups of experts and industry (starting with priority sectors) to do deep-dive analysis on key metric and data needs for scope 3 disclosure and how to avoid overlap or double-counting, within an agreed common reporting framework. The exercise may lead to pilots that assess focal aspects such as emissions related to overseas shipping. All activities under this solution should connect to and build on other global work in this space.

Showcasing and Tracking Progress on Strategies and Targets

What we heard:

Companies and financial firms often articulate their plans for emissions reduction through climate or carbon pledges. According to the CPA's 2019 survey, 30% of companies included in the study cite climate-related targets aligned to TCFD recommended disclosure[†],[5] while others make public commitments through press announcements or collaborative forums.[6] Though a productive step forward, it is

[†] 30% of companies included in the study described key targets used by the organization to manage climate-related risks and opportunities and performance against targets including disclosures in one or more of the TCFD-recommended disclosure targets sub categories. CPA notes that "targets are often difficult to compare among companies or sectors because some companies based their targets on absolute emissions while others calculated their targets per square foot, among other measures".

not always clear what these strategies or pledges entail; how progress is tracked;‡ or how meaningful the commitment is relative to peers or broader global targets. For instance, adoption of, or investment in, renewable energy is a commonly reported target, but it may be difficult to see how the committed portion of renewable energy will impact a company's or institution's energy portfolio - or GHG emissions overall - and how that ratio compares to competitors.

Interviewees expressed a strong desire for fuller transparency into such targets and strategies. Yet, most agree that companies should be the ones to determine the scope and reasonableness of their objectives, based on their unique circumstances, rather than imposing blanket parameters. Likewise, progress verification or tracking should take a soft 'facilitative review' approach rather than anything resembling hard audits, so as not to dissuade ambition.

■ Potential Solutions

Centrally showcasing and tracking published climate commitments and pledges from Canada's private actors. An aggregated view of the voluntary commitments (and other associated disclosure data) made by Canadian businesses would allow organizations to showcase their actions and ambitions while giving the financial community and government insights into which facets of the economy are taking action on climate change, and to what relative degree. The C3IA could collaborate with data providers to help produce and disseminate company-level metrics* to help publicize progress and investment, and develop sector- or country-level indicative datasets to inform best practices and areas of need.

Box 08

UNFCCC's NAZCA model

The Non-State Actor Zone for Climate Action (NAZCA) was established in 2014 by the United Nations Framework Convention on Climate Change (UNFCCC) as a global database to showcase climate commitments and track progress on climate action. As a portal, NAZCA displays commitments from countries, cities, regions, companies, investors, and civil society organizations. It currently captures 26,975 actions from 18,119 actors taken across various themes and sectors, including 134 Canadian companies.

Companies and organizations can submit their climate actions directly to NAZCA, and data partners also collect and share information for certain types of commitments such as the Climate Disclosure Project (CDP) and UN Global Compact initiative. NAZCA categorizes these commitments into action types† and its user-friendly interface allows filtration of results based on sectoral themes like transport, energy, land use, water, human settlements, oceans, and industry.

This database offers a potential model for C3IA to follow in terms of data partnerships and an intuitive, open format. The C3IA could build on the NAZCA model by focusing specifically on commitments made in the Canadian context, and provide more granular detail on what actions and commitments mean to indicators of relevance to the financial sector, as well as their relative contribution to broader national or global climate ambitions.

* E.g. comparability to baselines, peer organizations, and science-based trajectories.
† E.g., bond issuances, internal carbon prices, emissions reductions, energy efficiency, cross-cutting themes, investment, policy establishment, renewable energy and resource consumption.
‡ E.g., emissions intensity, energy consumption per square foot, absolute reduction compared to a base year.

Going a step further, the C3IA could translate qualitative targets and pledges into absolute GHG terms such as scope 1, 2, 3 emissions intensity, or energy intensity, to ease comparability. For transition-linked goals, it could provide supplementary information and context on tracked metrics.

In terms of progress tracking and impact analysis, the C3IA could leverage initiatives such as the *Science-Based Targets* program to give companies and investors visibility into the level of sectoral ambition required under a 2°C pathway or to meet Canada's Paris commitments. Several interviewees also noted interest in the target-based 'temperature scores' produced by some data providers, which provide an objective snapshot of how a company, industry, or investor's objectives are contributing to climate change.

Data to Support Climate-Related Scenarios for Transitional Risks

What we heard:

Translating climate information into forward-looking financial scenarios is a particularly complex element of the TCFD recommendations – both for issuers and end-users. Many financial institutions are experimenting with climate change scenario analysis and stress testing. Yet few report on it due to concerns around the quality of the analysis, the considerable variation in results depending on assumptions used, and underlying uncertainty around future climate and energy policies. In the 2019 CPA survey, only 5% of companies included the results of their forward-looking scenario analysis in their financial disclosure.

Interviewees commented that a forward-looking view of a company's strategic resilience to various climate scenarios (or plans for enhanced resilience to such scenarios) is a critical indicator for investors and lenders. Many recognize that this can be challenging due to the inherent uncertainties discussed above, and are willing to accept more indefinite, qualitative scenario discussions for now. However, they noted that as guidance becomes increasingly available and understood, companies should begin to deliver more concrete, quantitative scenario planning, particularly in high-emitting sectors.

While country-level and global scenarios are available for reference, the level of subjectivity in interpretation and assumption-setting makes comparability nearly impossible. This past May, the Bank of Canada released a set of global climate scenarios as a first step in showing how climate change may impact the global financial economy.[7] Although a good starting point, there is need for more granular and Canada-specific scenarios. At the global scenario level, one can imagine the range of expectations for factors like oil prices, levels of carbon pricing, or stringency of environmental regulations.

Financial actors are increasingly turning to third-party consultants for help with climate scenario analysis. Yet, interviewees say that the modelling underpinning these exercises is not always easy to understand, and assumptions are rarely transparent. Many feel torn between performing complex exercises internally or being left with costly "black box" results from consultants. Furthermore, SMEs do not have the financial capacity to purchase the same quality of data or navigate complex reporting requirements without support.

Finance and business leaders need to collaborate toward explicit and granular sector-level guidance as a first step toward more confident and robust disclosures and analysis. There is significant competitive advantage to those who can interpret climate risk well and translate the information into the best value proposition for clients.

■ Potential Solutions

Issuing guidance for interpreting the central financial themes behind leading global and country-level climate ambition scenarios, set in the Canadian context. This guidance would speak to the various published climate policy and transition pathways (global and national), narrowing in on the financial metrics most relevant to the Canadian economy - such as shadow carbon price trajectories, impact on GDP, oil prices and relative energy-prices, and shifts in consumer demand and energy consumption. Creating a common baseline for interpretation would help demystify the complexity behind policy-based scenarios and get everyone speaking the 'same language' regarding transition risk.

Issuers could use these baselines to develop their forward-looking risk disclosures - first as a qualitative discussion of key assumptions, then moving to a more detailed analysis of risk and asset impact. The financial institutions we spoke to noted that this type of guidance could help simplify forward looking disclosure, particularly for smaller firms, while also facilitating comparability between issuers. Most expect more robust quantitative analysis from larger companies (over a certain threshold) at this point, especially those exposed to a higher degree of transitional risk.

Helping sectoral working groups adapt the above guidance to the industry and regional levels, to support more granular forward-looking financial analysis.
The groups would work to build a knowledge base and find common ground on scenario pathways for key economic sectors (e.g., mining). They would then use broadly accepted modelling frameworks and assumptions to provide similar guidance as above in translating scenarios to financial outcomes, drilling down to sector- and regional-level GDP impacts, demand shifts, and consumption patterns.

Across each of these aspects, it is paramount that the assumptions used in metric development are transparent and defensible, and that underlying modelling datasets are cited and accessible. Scenario planning should take a 'goldilocks' approach to detail, ensuring datasets are usable and relevant to a particular industry or sector without limiting the ability for customization or introducing undue complexity.

Box 09

The Institute for Sustainable Finance at Smith School of Business, Queen's University is cooperating with industry partners and the government in developing a Climate Finance Data Lab (CF-DL), which will develop tools to aggregate, clean, and integrate existing climate emissions and financial data for ease of use for financial and economic decision-making, including risk assessment.

PILLAR 2: FOSTERING LOW-CARBON, CLIMATE-RESILIENT INVESTMENTS AND MARKETS

Data to Define and Classify Green, Resilient, and Transition-Linked Portfolios and Capital Allocations

What we heard:

A growing number of Canadian institutional investors are becoming outspoken in their desire to help accelerate the transition to a low-carbon, climate-resilient economy. Many are using ESG data to understand their overarching environmental footprints and mapping materiality factors across assets. As these institutions hunt for aligned market opportunities, with earmarked capital on hand, many find it hard to distinguish green or transition-linked activities and assets from others. Renewables are fairly straightforward, but other activities - such as transition initiatives by large industrial sectors - are less so. The message was clear across interviews that a clear and authoritative sustainable finance taxonomy (classifying framework) to define, label, and verify green and other sustainability-linked activities is a likely precondition for mainstream market activity.

Meanwhile, Canadians are becoming increasingly interested in whether their investment activities align with climate-conscious pathways or fast-growing low-carbon solutions. A view into how much capital is invested in these areas – and how – helps policymakers, industry, and investors better understand the magnitude of physical and transitional risks in the Canadian economy, and the extent to which asset valuation and risk profiles might shift as a result. While this visibility is especially critical to decision makers, it also helps individual and retail investors better understand where their savings are going.

Recognized sustainable finance taxonomies exist, most notably the EU Taxonomy* and Climate Bonds Initiative†. Other countries (such as China) and institutions (Moody's) are defining internal taxonomies. In Canada, a transition-linked taxonomy is currently underway, coordinated by the Canadian Standards Association (CSA Group). The framework provides a unique opportunity for Canada to pave the way for innovative financing solutions for vital energy- and carbon-reduction initiatives that do not pass the standard green test. These capital solutions are essential in facilitating transition and sustainability measures by our energy-intensive sectors, for example, which make up a significant share of our GDP.

Box 10

With clearer labeling, banks could produce robust comparative reporting on green, resilient, and transition-linked assets for their shareholders and design new consumer investment and lending products linked to low-carbon, climate-smart opportunities. In particular, the conditions to financially evaluate the value in resilience and adaptation could lead a more attractive borrowing cost for 'climate friendly' investments, in turn, driving demand.

* The European Commission Technical Expert Group was the first mover in deliver a Sustainable Finance taxonomy. The group screened activities across a wide range of sectors to identify low-carbon activities (such as zero-emissions transport) as well as transition activities (like iron and steel manufacturing) to compile a framework that identifies the parts of a business that have a significant positive impact on climate. In the end, the taxonomy includes 67 activities across eight sectors that can contribute to climate change mitigation. Under a phased-in mandate, EU companies must increasingly disclose the share of their business/CapEx/assets and align to the taxonomy.

† Which classifies green assets and activities according to science-based principles.

Though we are progressing in defining sustainable finance, questions remain as to overlaps and gaps in scope, and how to address follow-on reporting and product tagging approaches.

■ Potential Solutions

Developing a sustainable finance 'taxonomy mapper' to compare project and product opportunities against domestic and international standards. Working closely with the CSA's Taxonomy Technical Committee, the C3IA could collate and cross-reference current and anticipated global frameworks by their underlying metrics. The mapper would give financial institutions a one-stop view of existing country-based standards and conditions for green and transition-linked projects and products, for opportunity assessment and portfolio tagging. Canadian companies could use the tool to evaluate the carbon exposure and intensity of their projects relative to global standards and best practices, to inform mitigation efforts and disclosure.

Where possible, the tool would include supportive underlying metrics. The mapper would give information on the project or activity's categorization across various green or transition-linked taxonomies, with associated criteria or threshold metrics.

Coordinating working groups to support the CSA's Taxonomy Technical Committee in developing a reporting framework – aligned to the TCFD framework – to underpin Canada's transition taxonomy. The Hub could provide data-based support in driving framework adoption and understanding, and in ensuring that relevant information is captured and disseminated in a comparable and robust manner.

Data to Capture the Impact of Green, Resilience, or Transition-Linked Products

What we heard:

Green bonds (and now loans[8*]) are gaining momentum in Canada. According to the Climate Bonds Initiative, Canadian green-linked debt totaled C$9.3 billion in 2019; a 63% increase from 2018. Yet, our growth is not at the scale of other countries like the US, China, or France. And our market shows a bias for provincial bonds over corporates, signaling that credibility and verification are paramount for this new asset class.[†]

Figure 02

Canada's 2019 green debt volume summary categorized by issuer type.

Type of Debt Instrument	Issuer Type	Amount Issued in 2019 (CAD)
Green bonds	Financial Corporate	$3.58 bn
Green bonds	Non-Financial Corporate	$1.24 bn
Green bonds	Development Bank	$504.22 mn
Green bonds	Government-Backed Entity	$525.45 mn
Green bonds	Local Government	$2.91 bn
Green loans	PPP Credit Facility[‡]	$492.27 mn
	Total	**$9.25 bn**

Source: Climate Bonds Initiative's green debt database. Amounts were converted from USD to CAD using Bank of Canada's Average Annual Exchange Rate for 2019.

* HSBC issued a Green Loan Principles-Aligned loan worth $71.5 million in July 2020, a first of its kind in Canada.
† Canada's 2019 issuance was 60% public ($4.3 B) and 40% corporate ($2.9 B).
‡ According to the Climate Bonds Initiative, in 2019 Mobilinx Hurontario General Partnership (Mobilinx) - Infrastructure Ontario issued a green loan in Canada. Based on the CBI's methodology, this non-financial, public-private partnership (PPP) issuer is a credit facility in Canada; hence, the debt classification was seen as a green loan and not as a green bond. Furthermore, according to Mobilinx's green bond fact sheet, approximately 65% of its issuance was classified as a project finance loan, with the remainder being medium- and long-term bonds. Source: https://www.climatebonds.net/files/files/2019-10_CA_Mobilinx_Hurontario_General_Partnership.pdf

Interviewees echoed two key barriers to broader investment in sustainable finance products in Canada: (i) insufficient issue premiums, and (ii) a lack of standards for measuring environmental impact or additionality* for investors. Financial actors say that low reporting on actual environmental impact or specific use of proceeds for Canadian green bonds causes concerns about greenwashing. Many would like more transparency into what incremental benefits these bonds are producing over business-as-usual projects, or how they compare to other financial products. Most say the same for impact loans.

A stronger empirical baseline for Canada's growing market for green and related products would give investors necessary visibility into an issuer's track record, and a sense of whether their articulated climate ambitions are reflected at the product or service level. This trust is key to accelerated market activity.

■ Potential Solutions

Utilizing the C3IA as a tracking database for Canadian-issued green, resilience, and transition-linked finance products and their environmental impacts. Tracking would go beyond traditional league tables, which rank products based on issuance or underwriting, to providing specific environmental impact metrics associated with issued products. Impact analysis could also include case studies on how to use a lifecycle assessment (LCA) approach to track changes to both direct and indirect emissions.

This transparency would help promote the integrity of green and related financial products (such as green bonds and mortgages) *and* their issuers, by providing the means to validate that capital is going toward activities with the intended environmental impact. It lets companies signal their transition commitment to investors and other stakeholders, which is becoming a key competitive differentiator. Meanwhile, the data would give policymakers a complete view of the nature and growth of Canada's sustainability-linked market and industry activities, to inform future policies and support programming.

By design, the database would serve as an experiential reference point for new generations of sustainability-linked instruments. It could help inform a comparative labeling framework for 'qualified'† products as well as starting guidance for issuing new thematic instruments. Guidance would leverage inputs from Canada's established and repeat issuers, as well as medium-scale issuers with access to relevant expertise.

Centrally itemizing all green, resilience and transition-linked financial incentives offered by federal, provincial, and municipal governments. As noted by the Expert Panel, temporary issuance-based fiscal incentives for green, resilience and transition-linked products may help kickstart supply and demand. If such incentives emerged, the C3IA could help centrally relay program specifications and criteria in understandable terms for businesses, and potentially provide guidance and support to businesses navigating application requirements.

Box 11

Obvion N.V.

A great example of model pre- and post-issuance reporting in the green bond market is Obvion, a private Dutch residential mortgage provider owned by Rabobank. In 2016, Obvion issued the world's first fully "green" residential mortgage backed securities (RMBS), done under its GREEN STORM framework, where the use-of-proceeds were directed to mortgages for green residential properties and home energy improvements.

From the start, Obvion has aligned with the Netherlands' national Energy Agreement for Sustainable Growth strategy, and the assets it funds represent the top 15% of the energy ratings in the country. But the unique characteristic of this issuer is its detailed and frequent reporting to investors on independently verified GHG reductions and impacts from green investments, to give confidence that intended outcomes were achieved.‡

* For example, would the same level of investment or activity have taken place in the absence of green labelling.

† Qualified products add an environmental benefit component to traditional banking, investment, or insurance products and services. [1] For example, in Canada, BMO offers a WWF Canada Mastercard, where a portion of every dollar goes towards conservation funding [2] or a carbon-offset program offered by Doconomy for credit card purchases [3]. Existing sustainable finance product (like a green bond) should ideally undergo more rigorous qualification criteria versus that that applied to a newer generation of products.
[1] https://sustainablefinance.pt/wp-content/uploads/2018/03/bcsd-Green-Financial-Products-and-Services.pdf
[2] https://wwf.ca/donate/bmo-wwf-canada-mastercard
[3] https://www.doconomy.com/en

‡ http://pubdocs.worldbank.org/en/554231525378003380/publicationpensionfundservicegreenbonds201712-rev.pdf

Meanwhile, the government could consider a disclosure requirement tied to issued incentives and filter results into the product database discussed above, to help build Canada's data foundation on qualified product characteristics and outcomes.

Standard Labeling for Commercial and Institutional Buildings as a First Step Toward Broader Product Labelling

What we heard:

Transparency into the GHG intensity and climate resilience of large Canadian buildings is essential in developing the business case for sustainable buildings and helping investors manage their long-term asset risk and carbon footprints. Akin to vehicle fuel efficiency and nutritional labeling, a uniform view of the relative energy efficiency, carbon intensity, and climate durability of Canada's largest buildings is an essential aspect of investor and consumer awareness and change.

There are currently no mandatory labelling requirements for commercial or institutional buildings, apart from Ontario's Energy and Water Reporting and Benchmarking.* Various voluntary initiatives exist in the public and private sectors, including Efficiency Nova Scotia's Energy Benchmarking Pilot Program[9] and Canada's Green Business Council's voluntary disclosure challenge, which has data on over 700 buildings. Yet, these initiatives need to be scaled up and results centralized for ease of access and comparison. Comparative standards for environmental performance† dominantly apply to top-end buildings, and information is not widely reported, including for those that have undergone retrofits.

Box 12

There are more than 220,000 office buildings, warehouses, and non-food retail stores in Canada, and many more multi-residential buildings. Together with residential housing, these assets are responsible for 13% of Canada's annual GHG emissions (92 million tonnes per year)+ excluding electricity-based emissions.[2] This footprint grows every year, particularly from commercial dwellings.x Much of this stock will remain operational for decades and will either increase in liability as it ages and climate impacts accelerate, or serve as a model for net-zero-GHG design or retrofits built to optimize operations and meet evolving consumer demands.

Interviewees say that performance standards and mandatory labelling would allow investors to assess the carbon and energy intensity of their real estate portfolios, and could drive the market for retrofit improvements. This transparency would also help inform climate and energy policies in the building sector, and help building owners and investors judge their exposure to transition risk in line with such policies. For example, an interviewee noted that the legislated Energy Performance of Buildings Directive in

* The regulation was introduced in 2018 and requires mandatory reporting for buildings greater than 50,000 square feet.
† E.g., LEED, ENERGY STAR.
+ Canada's National Inventory Report 2020; Table 2-12 Details of Trends in GHG Emissions by Canadian Economic Sector; Buildings.
x Which would bring the figure closer to 15%+(2017 figures from National Energy Use Database and National Inventory Report 2019)

the European Union, which is acting to scale up renovations and retrofits, helped elucidate the transition risk facing many of the physical assets in their portfolio.

Asset owners and developers say they need better information on three areas related to a building's performance:

1. Relative energy requirements and the potential return from energy efficiency savings (using a standardized tool like the Energy Star Portfolio Manager);
2. Environmental design, including embodied emissions in building materials; and
3. Climate resilience (e.g., flood and fire mitigation measures) to assess physical risk exposure.

■ Potential Solutions

Creating a central, one-stop repository and tracking platform for energy/GHG/resiliency metrics related to Canada's largest commercial, institutional, and multi-residential buildings. The platform would draw and store results from all existing building-related reporting programs and collect year-over-year performance metrics. It would not duplicate existing efforts, but would work with other platforms and experts to collect cross-country data into a user-friendly, verified, and consistent format. Where possible, the C3IA would incorporate information on a building's climate-resiliency, by gathering data on mitigation measures taken against perils such as storms, sea-level rise, wildfires, or flooding.

Eventually, more provinces may choose to move forward on mandatory energy ratings and disclosure for large buildings, as advised by the Expert Panel's Recommendation 13.2. The C3IA could steward the development and publication of efficiency standards and benchmarking tools to support those programs. A uniform approach would build comparability and trust while reducing the administrative burden of reporting.

Where possible, the platform would supplement performance data with relevant investment information, to translate metrics into decision-useful financial terms such as average utility costs. This would allow financial actors to navigate ratings methodologies and assess relative savings and demand between building types, as a baseline for investment decisions on building improvements or purchases.

As time goes on, the C3IA could work on disseminating climate-related information from product labelling beyond buildings, helping shed light on the GHG intensity of other infrastructure, commodities, or even consumer products.

Box 13

Green buildings can save owners money through reduced energy and water consumption and lower long-term operating and maintenance costs. They can also increase worker productivity or resident health. Data to depict the rate of return from these benefits against upfront costs is central to the retrofit business case.

Data from Retrofit Programs to Support the Business Case for Green and Resilient Buildings

What we heard:

Done well, building retrofitting* offers a cost-effective, return-generating way to reduce energy use and GHG emissions while enhancing climate resilience. Yet, decision-makers say they do not have the data elements needed to validate the business case for investment in green and resilient buildings, and retrofitting existing buildings in particular.

Examples of key data gaps noted in interviews include:

- Design and construction costs relative to traditional buildings;
- Evidence that green buildings attract higher demand from tenants and command higher rents and sale prices;
- Data on operating costs compared to traditional buildings;
- Calculation of payback period for a capital investment;
- Evidence that supports positive impacts on workplace or tenant productivity and health;
- Standards and labels for resiliency objectives; and
- Impacts on transitional risk mitigation, such as improved compliance with new codes and standards.†

* E.g., efficiency upgrades and improved building operations.
† For example, the City of Vancouver is working on thresholds for energy performance, with implications on the ability to continue operating-buildings that do not meet criteria.

To add to the complexity, different buildings have different characteristics that lead to different costs and savings. On top of that, individual projects are usually too small for investors to assess in detail.

The government (at multiple levels) offers various incentives and programs for enhancing building energy efficiency. In fact, there are 260 energy efficiency and alternative energy programs across Canada today.[10] These include utility and third party-run programs, such as the PowerSmart initiative under BC Power, as well as community-based financing offered through the federal Green Municipal Fund.

The public sector has a key opportunity to get more out these programs, by adding a disclosure element to collect data on energy savings and other upgrade-related benefits. The compiled data would help paint a tangible picture of program benefits while crystalizing the value proposition for private retrofit financing, including the potential for innovation and cost efficiency through economies of scale.

■ Potential Solutions

Creating a centralized database of environment, energy, and resiliency standards, labels, and performance data from government-sponsored retrofit programs and utility-run energy efficiency programs, to support strategic analysis by Canada's business community. Evidence of the results and benefits of government retrofit funding would help prove the business case for private investment and inform the qualities of reliable, investor-ready projects. Furthermore, it could catalyze the development of a residential green mortgage market, should performance data be kept evergreen.

Box 14

As an example, the C3IA could partner with the Green Building Council and Green Business Certification Inc. to incorporate the Investor Confidence Project framework into its database, while integrating existing program data from other initiatives like BOMA Canada*.

The database would store project-linked metrics of relevance to businesses and investors. An established framework such as the Investor Confidence Project could provide the model for what ex-ante, and ex-post information to include, such as baseline energy, emissions and resiliency data; projected savings; design and construction; operation and maintenance; and measurement and verification.[11]

This objective view of potential cost savings and return on investment – paired with a better indication of what constitutes an investable project - is key to accelerated private sector market demand.

It would also provide a practical foundation for performance benchmarks, which are an essential decision tool for the financial sector. Meanwhile, the data could lend itself to aggregation and securitization of project opportunities into scaled investment vehicles for institutional investors.

* http://bomacanada.ca/wp-content/uploads/2020/07/BOMA-Resillience-Single-Pager-v2.pdf

PILLAR 3: RECOGNIZING PHYSICAL RISK

Addressing Asymmetric Access to Information on Climate-Related Physical Risks

What we heard:

With Canada warming at twice the global average, accelerating climate-related hazards such as floods, droughts, storms, forest fires, and sea-level rise will continue to pose consequences for which many of us are not prepared.[12] Canadians are experiencing growing financial losses as a result of climate change events, and these will intensify (*see next section*). Yet, authoritative information on these perils is not readily available in Canada, leaving the average person unaware of the potential threat to their property, businesses, or our national economy more broadly. Better tools are needed to help communities, property owners, and financial owners and lenders assess and respond to associated risks. For instance, it is clear that the chances of what was once a 1-in-100-year flood are increasing – but how should Canadians and their governments adapt and build resilience to such an impending threat?

While the government is working on updating flood hazard mapping for Canada, it is not yet clear when it will be finished (and how it will stay evergreen), how the output will align with the flood mapping presently used by the private sector, and whether it will capture future conditions or just current hazard levels. Meanwhile, data and information on other climate-related events - such as droughts, windstorms, coastal erosion, and forest fires - are just emerging in Canada. For example, there was no historical precedent for the devastating impacts of the Fort McMurry wildfire. While wildfires were known to cause significant losses, global models underestimated boreal wildfire risk, and no one was fully prepared for the magnitude of property damage that this one event caused.

Box 15

The Costs of Climate Change

It is hard to find clear baseline data on past climate-related events, and harder still to find complete data on associated financial losses. Insurance Bureau of Canada publishes insurance-related losses from major events through a private sector aggregator called Cat-IQ*, but other costs (e.g., loss of income, sectoral impacts, supply chain impacts, or health-related costs) are much less understood. A 2015 study† found that well-documented, direct impacts to physical assets (e.g., buildings and their contents) are often coupled with undocumented financial losses due to business interruptions and employment impacts. Both of these consequences show secondary impacts such as changes to consumption patterns and inter-industry upstream purchases.

Visibility into the full cost of past peril-related events would help underscore the imperative for accelerated climate action and enhanced policy ambition. As a first step, the C3IA could begin collecting this data from climate events as they occur across Canada.

* Source: IBC Facts Book, PCS, CatIQ, Swiss Re, Munich Re & Deloitte
† http://assets.ibc.ca/Documents/Studies/IBC-The-Economic-Impacts.pdf

Box 16

A 2019 report by the Federation of Canadian Municipalities (FCM) and Insurance Bureau of Canada (IBC)† estimates a financing need of $5.3 billion per year to help adapt infrastructure (including buildings, dikes, and roads) to physical climate risks. This highlights the level of public infrastructure at risk – both to physical damage and rising costs – and the urgent need for better transparency to inform procurement and budgetary decisions, and explore innovative private financing solutions to close the (ever-widening) financing gap.

The insurance sector is relatively advanced in projecting and pricing physical risks through catastrophe risk modelling, and are global leaders in identifying opportunities to reduce exposure to these accelerating climate risks*. Canadian insurers are at the forefront of understanding and predicting how risk profiles will evolve with climate change and how it may impact long-term business models. The property and casualty (P&C) insurance and reinsurance industry assesses the evolving cost of climate risk through historical weather-related catastrophe claims (e.g., wildland fires, hail and windstorms). In the last decade, insured damages related to natural catastrophes have risen from an average $400 million per year to over $1 billion annually ($1.9 billion in 2018).[13]

The increasing demand for insurance can only be met if the Canadian (and global) insurance market can underwrite these new risks, and if risks are mitigated to insurable levels. Without solutions to these pressures over the long-run, Canadian homes and business owners will face reductions in coverage and escalating premiums. Risk assessment and mitigation are, therefore, of fundamental importance. In fact, this 'hardening' in the Canadian commercial insurance market is already underway, and climate losses are a primary contributing factor. The bottom line: to keep insurance affordable, climate risk needs to be better understood and managed.

Other financial actors are becoming interested in physical risk data and value-at-risk metrics to inform resilience-related planning and products. Many asset owners and lenders recognize climate change as one of the greatest systemic risks to their investment portfolios and want to better understand how physical risks (flood, hail, wind, wildfire) may manifest across different asset classes. Potential threats to the built environment are the most well understood, but impacts to sectors such as agriculture, forestry, or transportation networks are becoming more salient.

Public data on regional climate-related temperature and precipitation trends is available through the *Canadian Centre for Climate Services,*[14] and Canada is updating its open-source digital terrain mapping. But there are still gaps in the quality and age of this foundational data. Private sector analysts remain challenged to translate high-level or outdated government data into tangible current and future risk terms.

While many third-party data providers provide peril projections, the level of detail required for model accuracy is often not sufficient. Interviewees expressed concerns about the quality of underlying physical data used by modelers and noted a trade-off between cost and granularity. Interviewees also conveyed concerns on the "black box" approach to results, where underlying data and methodologies are generally not transparent, particularly where physical data are not available and proprietary algorithms are relied upon to determine risk.

Given that there is no timeline for completion on the federal government's efforts to update flood hazard modeling, and the commitment only extends to floodplain mapping – not urban (pluvial) or coastal modelling – the insurance industry has, since 2015, attempted to bridge the data gap by contracting the development of national models from private offshore sources, and this remains the most commonly used data to support underwriting and stress testing. However, the data does not always align with any existing government modelling, which is confusing to consumers.

* Physical climate *hazards* refer to the physical parameters which dictate where a peril is likely to occur (e.g. for flooding that would be topography, soil type, hydrological source) whereas exposure refers to the level of risk that built infrastructure faces in reference to that peril. Exposure factors in the value of that infrastructure, and accounts for measures taken to defend against that peril. Insurance underwriting is based on exposure and not just hazards alone.

† Federation of Canadian Municipalities (FCM) & Insurance Bureau of Canada (IBC). (February 20, 2020). Investing in Canada's Future: The Cost of Climate Adaptation at the Local Level. Retrieved from https://data.fcm.ca/documents/reports/investing-in-canadas-future-the-cost-of-climate-adaptation.pdf

The private nature of physical risk data provided by consultants is causing asymmetric information across the financial sector. Asymmetric access to information can distort market perception and pricing, which impedes the financial sector's ability to make informed decisions about climate risk. It also raises public policy and equity concerns about everyday Canadians being unnecessarily unaware of their increasing vulnerability to climate-related impacts, including to their residential properties. Insurance companies often have more information on a property's climate risk exposure than the homeowners themselves. This is also a weighty issue for smaller businesses that do not have the finances to invest in physical risk assessments.

Picture source (TODD KOROL / REUTERS)

Box 17

High River Flood

In 2013, the town of High River, Alberta (pop 13,600) was flooded when a nearby river overflowed. Over 430 RCMP officers deployed rescue efforts, and 3,328 homes suffered flood damage, including 558 deemed not fit for future habitation. Following the flood, the Province bought out hundreds of homes in floodway zones, to be demolished.

The incident highlighted homeowners' limited knowledge on their degree of coverage against climate-related perils. After the event, there was widespread confusion by residents who had wrongly assumed that their insurance plans covered overland flooding. That year marked one of the costliest for flooding incidence across Canada, sparking a wave of demand for overland flood protection, which the insurance industry responded to with new coverage.

Since the 2013 flood, High River has implemented their "Build it Back Better" plan, investing over $200 million in flood mitigation and protection. This included construction of 7 km of berms and dikes along the Highwood river, with an additional meter of freeboard protection, and a new community floodgate*. High River is now known as one of the most well-protected communities in Canada. Its residents are insured against overland floods at significantly reduced rates, due to the new resilience investments.

It is unfortunate that it took a devastating event to spur these changes. Arming our communities with better data and guidance on forward-looking modelling would enable preemptive risk assessment and resilience planning, to avoid unnecessary loss. Provinces and municipalities can then use financial tools like resilience bonds to invest in protection.

* https://highriver.ca/app/uploads/2020/04/Flood-Mitigation-Strategy-Build-it-Back-Better.pdf

Without better information on climate-related physical risks, the Canadian financial sector cannot build or incentivize resilience. With trusted information on climate perils and associated physical risks, financial actors can assess investment, lending, and insurance implications, and take necessary steps to manage risks and invest in solutions.

A business, for example, may borrow money to implement control measures if they know that sea-level rise is becoming an issue for its properties. Lenders may be more willing to issue debt if they are better informed of the return through prevention of loss. With adequate data, Canadian banks may express early interest in 'resilient' mortgages, which offer preferential rates for properties deemed to have a lower risk of default (e.g., in low-risk flood areas; resilient construction; wildfire-adaptive measures; etc.) – incentivizing Canadians to think carefully about how they build, and where they locate, their homes.

The bottom line - greater transparency on physical risks is an essential foundation for resiliency planning and risk pricing relating to our assets, communities, business models, and supply chains. In that, a clearer understanding of where and why risk profiles differ across locales helps support sustainable financial and physical investment decisions by developers, mortgage providers, and everyday Canadians.

Box 18

The US Federal Emergency Management Authority (FEMA) provides metrics to homeowners – or prospective homebuyers -- to help inform their perceptions of physical climate and other risks. For example, FEMA explains that the likelihood of a flood during a 30-year mortgage is magnified by 26% for a 1-in-100-year flood and by almost 96% for a 1-in-10-year flood for homeowners in certain high-risk flood zones*. This gives insight to the increased risk exposure to the homeowner, but also the financial sector's (e.g. mortgage provider's) risk of stranded assets. Such transparency could help inform municipalities facing a potential reduction in property values, and corresponding revenue losses in terms of property taxes -- which indirectly affects municipal credit ratings and infrastructure financing†. It would also help inform public policy related to home buyouts in vulnerable areas+.

Potential Solutions

Gathering, aligning, and disseminating up-to-date information on climate hazards. This would include convening a working group to define how the C3IA can develop a comprehensive, authoritative, and forward-looking evergreen repository of climate hazards. There are two phases to this solution: The first would focus on developing shared access to common hazard data across the financial sector. The C3IA would convene a working group to collect and publish the results of government, expert, or academic initiatives to identify and fill data gaps on physical risks from climate change. This would include updated flood maps and any publicly available information on other climate-related perils such as wildfires, drought, storms, coastal erosion, and storm surge. Data format would consider translatability into financial- and business-relevant terms.

As a second phase, the working group would focus on the issue of climate *risk* data, as a function of hazard-based exposure. For this, a C3IA working group would explore how to synthesize public and private sector information on climate hazards into financially useful information - such as impacts on development planning, resiliency retrofits for buildings, and the vulnerability of supply chains and transport hubs. This working group would work to identify the near-term climate threats most salient to Canada's financial community.

As a first project, the C3IA working group could develop an interactive risk tool linking flood maps to physical assets in the built environment, to enable location-based asset risk assessment. Sub-groups could narrow in on risk pricing and developing value at risk metrics for investors and lenders. Linking value at risk to asset- or sector-based climate risk is not straightforward for the financial community, and there are data gaps and modelling inconsistencies on significant risk factors such as definition of flood return periods.‡

Collecting and disseminating data on climate resiliency-related investments by municipalities. Just as there is limited data on the financial implications of climate impacts, there is also a knowledge gap related to the steps being taken to build resilience at the municipal level (e.g., flood prevention, storm sewer backup, erosion control, and wildfire prevention

* https://www.fema.gov/media-library-data/20130726-1539-20490-0241/nfip_sg_unit_3.pdf
† https://www.ucsusa.org/sites/default/files/attach/2018/06/underwater-analysis-full-report.pdf
\+ https://www.cigionline.org/sites/default/files/documents/Policy%20Brief%20No.103_0.pdf
‡ Accounting methods to price physical climate risk will help further the development of high-grade data on physical climate risk, and demand for data on climate hazards will likely grow as financial valuation methods to price physical climate risk mature (see Pillar II).

strategies). Better information on these investments would help inform risk exposure (and mitigated risk exposure) and incent investment planning and underwriting decisions.

Data to accurately price climate resilience could result in an array of preferential products and rates (e.g., insurance premiums or resiliency bonds) for actions that mitigate physical asset risk*. These incentives would apply to residential homes, but also commercial and industrial buildings built or renovated to be more climate durable.

Developing Forward-Looking Scenario Indicators and Stress Testing Tools for Climate-Related Perils

What we heard:

Historical trends are poor indicators of future risks from climate perils. Simplified access to accurate and transparent data on future climate hazards is necessary for effective adaptation and resilience. Yet, generally speaking, future scenario analysis on physical risks is less advanced than transition risk. The C3IA is well placed to advance understanding and awareness in this area.

Today, climate scenario testing is done differently by every financial actor examining this risk. Some use internal analysis, most use third-party data providers. Many are unclear on how hazards change over time, and some are not equipped to assess or stress-test climate-related physical risks at all. This is problematic for municipalities who may, for example, unknowingly permit. development on flood-prone land or disturb natural infrastructure that is essential to controlling flood risk or erosion.

As noted earlier, when communities or other actors take measures to reduce their physical risks and build resilience, the investments are not always captured in datasets. This also applies to forward-looking modelling exercises. It is difficult to produce or understand physical risk projections related to climate change – or map those projections to meaningful value at risk indicators – without a clear indication of what resilience-based measures have already taken place.

Finally, the horizon for physical risk projections is often too long for financial analysis. Much of the financial community is concerned about how perils may impact physical assets and business models in the short- to mid-range (5-15 year) time horizon. The insurance sector is confident in its ability to judge short-term (1-3 year) risk based on historical events and the escalation of past trends. But the development of robust mid-term risk projections (5-25 years) would be invaluable to other financial players, including institutional investors, shareholders, mortgage lenders, commercial banks, local governments, and urban planners.

■ Potential Solutions

The C3IA could strike a working group – involving leading insurers, asset owners, academics, think tanks, civil society, and governments – with the mandate to develop sector-specific stress testing methodologies and value at-risk measures for forward-looking climate risk. This would help lay the foundation for more granular and tailored scenario analysis and stress testing by the private sector. For example, the working group should address the divergence in pluvial/urban flooding models and identify ways to provide standard methodologies and frameworks for individual organizations developing their own scenario analyses.

As a first project, a C3IA working group could develop pilot flood scenarios for assessing value-at-risk in the building sector (residential and commercial properties) based on the acceleration of flooding events over time (e.g., one-in-100-year floods becoming more frequent). The C3IA should also address the uncertainty of forecasting future flood exposure based on climate projections, specifically at the local level. Interviewees stressed the need for more granular data (e.g., down to the street or other specific area) to produce credible future risk exposure values†.

C3IA working groups could then move to similar physical risk analysis for other sectors or regions, such as agriculture, forestry, or mining. Working groups would identify material industry-specific perils and develop associated climate scenarios. The analysis would lay out impacts over the short, medium, and long-term to support resilience-based lending and investment decisions in these sectors. An important element to each of these pilots would be to determine what viable risk mitigation solutions exist across industries, and the relative degree of risk reduction provided by each. That insight would support expectations and planning by industry and finance and help validate the business case for resiliency-related investment.

* Such as using stronger roofing material or installing back-water valve.
† The data provided by ECCC's CMIP5 Multi-Model Ensembles of precipitation projects are at least 10 km in resolution.

CONCLUSION

Financial institutions will play a central role in mitigating climate-related threats to businesses and assets while driving capital flows toward cleaner, more resilient energy, products, systems, markets, and solutions. To do so, our financial system needs a way to understand and assess the financial impact of climate change, now and in the future.

Across dozens of interviews, experts echo that a lack of transparency is distorting economic activity away from the best available solutions for climate change. Access to necessary climate-related data and decision tools is a critical foundation for better disclosure-based transparency, informed lending and investment decisions, and financial resilience to the physical impacts of climate change. With a more cohesive view of risk and opportunity, and common language and tools for assessment, Canada's financial sector can begin charting the path towards a thriving low-emissions, climate-resilient economy.

The impetus for this research is to shed light on the financial sector's specific pain points and data needs in this respect, and to draw out targeted opportunities for solutions through the Expert Panel's proposed C3IA. As the Sustainable Finance Action Council looks to establish the scope and build the terms of reference for the C3IA, we hope it will consider the frameworks and solutions identified in this paper. We offer this as a place to start, informed directly by the C3IA's most likely end users, understanding that further outreach will be needed to determine how best to serve these needs; including an engagement process that explores governance, roles, data partnerships, and action plans to advance each pillar. Through this process the public and private sectors can bridge the transparency gap together and advance Canada's climate ambitions.

APPENDIX - LIST OF INTERVIEWS

Emilie Mazzacurati	427
Carolina Gallo	ABB
Brian Minns	Addenda Capital
Martin Grosskopf	AGF
Toni Gravelle, Erik Eng, Miguel Molico & Craig Johnston	Bank of Canada
Thomas Hassl	BMO
Bill Linton	Boards of TMX Group (TSE: X), Empire Company (TSE: EMP.A), and CSL Group
Akua Schatz	Canada Green Building Council
Tessa Hebb	Carleton Centre for Community Innovation
Emily Kreps	CDP
Alan Meng; Krista Tukiainen	Climate Bonds Initiative
Gigi Dawe & Davinder Valeri	CPA
Michel Leveillee	CPDQ
Richard Manley	CPP Investment Board
Jonathan Foley	Desjardins
Maria Mets & Sylvain Chateau	FTSE Russell
Mike Thiessen	Genuscap
Siobhan Cleary, Alyson Genovese & Piya Baptista	Global Reporting
Alyson Slater	Global Risk Institute
Kyrke Gaudreau, Marco Iacampo, Anders Rasmusson	Green Municipal Fund
John Cook	Greenchip
Erik Landry	GRESB
Neil Pegram	GRESB
Chris Guthrie	Hilldale Investments
Dana Krechowicz	HSBC
Hyewon Kong	IMCO
Brandon Blant	Intact
Kathryn Bakos	Intact Centre on Climate Adaptation
Maria Lombardo	Invesco
Aaron Bennett	JFL Global
John Hoeppner	Legal & General Investment Management America
Margaret Eve Childe	Manulife
Lara Zizzo and Joy Williams	Mantle 314
Milla Craig, Stephen Kibsey & Bob Walker	Millani
Burcu Guner	Moodys
Jamie Bonham	NEI
Eli Angen	OTPP
Emily Partington	Quinn & Partners Inc.
Melanie Adams	RBC
Maia Becker	RBC
Michael Brooks & Kristopher Kolenc	Realpac
Amy Graham	RSA Group
Nicolai Lundy & David Parham	SASB
Peter Johnson	Scotiabank
Kevin Ranney	Sustainanalytics
Tang Trang	TD Insurance
Rob Wesseling	The Co-operators
Andrew Hall	TMX
Eric Usher, Layalee Ramahi, David Carlin	UN Environment Programme Finance Initiative
Morgan Slebos	UNPRI
Edward Baker	UNPRI
Jo Westwood & Kurt Horne	Vancity
David Greenall	Viridigreen
Hasan Cerhozi	Vigeo Eiris

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