INSTITUTIONAL INVESTORS FIND ALPHA IN CLIMATE RISK MATRICES: GLOBAL SURVEY FINDS
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The Intact Centre on Climate Adaptation (Intact Centre) is an applied research centre at the University of Waterloo. The Intact Centre was founded in 2015 with a gift from Intact Financial Corporation, Canada’s largest property and casualty insurer. The Intact Centre helps homeowners, communities and businesses to reduce risks associated with climate change and extreme weather events. For additional information, visit: www.intactcentreclimateadaptation.ca

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CITATION


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Institutional Investors Find Alpha In Climate Risk Matrices: Global Survey Finds
“Climate change is a risk, not only to our environment but to the long-term stability of our economy and global financial system. Investors need to understand the physical and transition risks climate poses to their portfolio companies.”

Sonia Baxendale
President and CEO, Global Risk Institute
Institutional Investors Find Alpha In Climate Risk Matrices: Global Survey Finds
The need to factor climate risk into portfolio management is clear – the outstanding challenge is “how?” Unfortunately, there is no standardized guidance regarding means to include physical climate risk into institutional portfolio management.

In response, this paper presents Climate Risk Matrices as a practical tool for institutional investors to integrate physical climate risk into portfolio management. In brief, a Climate Risk Matrix identifies the top 1-2 means by which extreme weather events (e.g., flood, fire, extreme heat, etc.) may negatively impact a specific industry sector, while identifying actions that a company within that sector could be expected to take to mitigate these risks.

The paper further describes results of an international survey focused on understanding the methods undertaken by portfolio managers to assess physical climate risk, the extent of formal training on physical climate risk received by the Boards of Directors, C-Suite officers and portfolio managers, and the utility of Climate Risk Matrices to aid portfolio managers in investment decisions.

The survey results confirm the need to improve translation of physical climate risk into financial valuations, while highlighting the utility of Climate Risk Matrices as a practical tool, consistent with TCFD, for application of climate risk assessment into portfolio management. The survey results also illustrate the need for scaling formal training on climate risk among Boards of Directors, C-Suite officers and portfolio managers.
The Intergovernmental Panel on Climate Change (IPCC), the United Nations body for assessing climate science, projects that global warming is effectively irreversible and that there will be an increase in the frequency, intensity and duration of extreme weather events, such as floods, droughts and heat waves, through the 21st century.\\(^i,ii\\)

Due in part to climate change, the cost of “physical climate risk” (i.e., natural disasters and extreme weather events) will continue to rise. Already, 2010-2019 was the costliest decade in the modern history of natural disasters, with total direct economic damages and insured losses tallying $2.98 trillion USD globally, $1.1 trillion USD higher than in the previous decade.\\(^iii\\) Notably, the insurance protection gap, which is the portion of economic losses not covered by insurance, was 69% in 2019, leaving governments, businesses and individuals “on the hook” to pay for the majority of damages and disaster recovery efforts.\\(^iv\\) Box 1 illustrates selected climate impacts across direct industry sectors.
Institutional Investors Find Alpha In Climate Risk Matrices: Global Survey Finds

• **Buildings** are increasingly more exposed to damages and/or destruction by floods, forest fires, and other extreme weather events (e.g., between 2005 and 2017, increased tidal flooding caused by sea level rise eroded $15.9 billion in relative property values for 28.6 million coastal properties in 18 states located in the East and Gulf Coasts of the US).v

• **Infrastructure services** are increasingly impacted by climate-related disruptions (e.g., by 2040, much of the continental US is projected to experience warmer summers and tripling of extreme-heat days, leading to a 6 to 18% increase in spending on residential and commercial electricity).vi

• **Crop production** is impacted by changes to harvests and production costs, affecting price, quantity and quality of farmed products (e.g., the European Environment Agency projects that climate change will lead to a decrease in crop productivity in southern Europe, where yields of non-irrigated crops like wheat, corn and sugar beet are expected to decrease 50% by 2050.). vii

• **Fisheries** will be impacted due to changing marine and freshwater conditions, ocean acidification, invasive species, and pests (e.g., cold-water fish habitat in Southern Ontario, Canada is projected to decline 67% by 2025; and arctic char populations could decline by 40% by 2100).viii

• **Fixed income investments** can also be impacted by natural disasters and extreme weather events, leading to municipal, state and sovereign credit rating downgrades and plummeting value of debt (e.g., following Hurricane Harvey in 2017, Moody’s downgraded Port Arthur in Texas, from A1 to A2 due to its “weak liquidity position that is exposed to additional financial obligations from the recent hurricane damage, that are above and beyond the city’s regular scope of operations”). ix

**BOX 1. EXAMPLES OF PHYSICAL CLIMATE CHANGE IMPACTS THAT CAN AFFECT ASSET VALUATION AND PORTFOLIO PERFORMANCE**

[Image of a firefighting scene]
Recognizing that physical climate risks often translate to material losses, the global financial community emphasizes the need for climate risk disclosures and integration into portfolio management. For example:

- **The Task Force on Climate-Related Financial Disclosures (TCFD)**, the Sustainability Accounting Standards Board (SASB), and Canada’s **Expert Panel on Sustainable Finance (EPSF)** have instructed investors of their fiduciary duty to assess, disclose and incorporate climate risk into portfolio management. x, xi, xii

- **The Network of Central Banks and Supervisors for Greening the Financial System (NGFS)** noted that climate risks are a source of financial risk that will affect all agents in the economy (households, businesses, governments) across all industry sectors and all geographies, and called on central banks to integrate climate risk factors into own portfolio management decisions. xiii

- **The International Monetary Fund** found that investors are currently falling short on pricing physical climate risk and advocated for better climate risks disclosures and stress testing. xiv

- **Security commissions** began to issue guidance relative to material climate change risk disclosures by issuers, pointing to the possibility of mandated disclosures in the near future. xv, xvi

- **Judicial systems** have accepted climate change and the risks it presents as self-evident, uncontroversial and beyond reasonable dispute, so it would be nearly impossible for Boards of Directors to dismiss climate change risk - courts require directors to inform themselves about the material facts, while evaluating and seeking advice about the information presented to them. xvii

However, characterization of physical climate risk is a process that requires in-depth technical knowledge of potential impacts that vary widely across different geographies and sectors. While there are technical frameworks for assessing climate risks, such as Infrastructure Canada’s Climate Lens approach xviii and the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, xix climate risk assessments are being undertaken in a piece-meal manner. Furthermore, there is no standardized guidance regarding the practical inclusion of physical climate risk into institutional portfolio management, on an industry-by-industry basis.

"There is no standardized guidance regarding the practical inclusion of physical climate risk into institutional portfolio management, on an industry-by-industry basis."

Institutional Investors Find Alpha In Climate Risk Matrices: Global Survey Finds
Institutional Investors Find Alpha In Climate Risk Matrices: Global Survey Finds
A concept that has been developed to fill the identified gap in guidance relating to physical climate risk is that of sector-specific Climate Risk Matrices (CRMs). These matrices identify top 1 to 2 physical climate risks that portfolio managers should prioritize as most material to affect performance of companies within a given industry sector. These impacts reflect the expert advice of operations officers or similarly experienced subject matter experts within industry sectors – based on their collective experience, these practitioners are best positioned to identify a short list of material means by which flood, drought, wildfire, wind or other hazards may convey risk to companies within a specific industry sector. For each physical climate risk impact, a risk mitigation action is suggested within a CRM. Prioritized physical climate risk impacts and risk mitigation actions presented in CRMs, provide a practical format for portfolio managers, as responsible fiduciaries, to recognize physical climate risk.

CRMs have been developed for two industry sectors – Electricity Transmission & Distribution (T&D) and Commercial Real Estate (CRE). The matrices were designed with the following features in mind:

- **user-friendly** (i.e., information in the matrix can be easily understood by any portfolio manager);
- **scientifically well-informed** (based on expert advice from subject matter experts);
- **predisposed to frequent updating** (e.g., every five years) to ensure relevancy of guidance, and
- **available for use almost immediately** (i.e., tools that require years to develop will be “too little too late”).

The T&D CRM (referenced in the survey described subsequently) is presented in Table 1.
### Table 1: Climate Risk Matrix for Canada's Electricity Transmission and Distribution Sector

<table>
<thead>
<tr>
<th>Key Climate Risk Impacts</th>
<th>Flood</th>
<th>Fire</th>
<th>Wind Storms</th>
<th>Ice and Snow Loading</th>
<th>Thawing Permafrost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood-induced high-water levels result in inadequate electrical clearances below lines that are hazardous to the public</td>
<td>Fire along transmission corridors can cause outages if corridors are not adequately cleared of brush</td>
<td>Vegetation/tree contacts with transmission lines can cause arcing, fires and outages</td>
<td>T&amp;D lines and structures can collapse under heavy ice loading</td>
<td>Thawing of permafrost can displace transmission tower foundations, causing structural collapse and outages</td>
<td></td>
</tr>
<tr>
<td>Mitigation Measures</td>
<td>Ensure structures are tall enough to ensure safe clearances under foreseeable flood levels, or that lines are installed underground</td>
<td>Conduct patrols (visual inspection of utility equipment and structures) in fire prone areas</td>
<td>Clear vegetation along transmission corridors</td>
<td>Install visual monitors to detect ice loading before ice loads build, boost current to melt ice (i.e., shorting the line)</td>
<td>Modify structures/designs to readily permit adjustment of towers when line patrols identify permafrost thaw displacement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clear vegetation along transmission corridors</td>
<td>Install anti-galloping devices on conductors and ensure structures are designed to withstand winds</td>
<td></td>
</tr>
</tbody>
</table>
In 2019, the Intact Centre on Climate Adaptation, the Stanford Global Projects Center and the Global Risk Institute administered an international survey, titled “Integrating Climate Risk into Institutional Portfolio Management” to 50 institutional investors. The purpose of the survey was two-fold: first, to assess the degree to which physical climate risk is currently integrated into portfolio management and investment analyses, and second, to test the practical utility of Climate Risk Matrices in assisting portfolio managers with integrating physical climate risk into portfolio management.

The survey was undertaken between October 1 and October 31, 2019. Of the 50 invited institutions, 13 participated (Table 2), representing just over $2 trillion USD of assets under management. These institutions collectively met the following criteria:

- Assets under management: range in size from “small”/$7 billion to “large”/$500 billion;
- Diversity of fund management organizations/mandates: pension funds, property & casualty and life & health insurance companies, and university endowment funds; and
- Geographic representation: North America, Australia and Europe
Survey questions were designed to invite feedback relative to three aspects of analysis:

1. **Existing frameworks for climate risk assessment** used by portfolio managers;
2. The extent of **formal climate risk training** received by Board members, C-Suite officers and portfolio managers; and
3. The **utility of Climate Risk Matrices (CRMs)** in helping portfolio managers to integrate physical climate risks into their investment conversations and decisions.

Relative to assessing the utility of CRMs for enhanced portfolio management, survey participants were asked to share feedback on the CRM developed for Canada’s Electricity Transmission and Distribution presented earlier (Table 1). The survey questions and summary of responses are presented in Table 3.
Key takeaways relating to the three areas of analysis are described below.

4.1 Existing Frameworks for Climate Risk Assessment

The survey revealed that while the majority of respondents (62%) have not yet translated physical climate change impacts into financial valuation of assets, the majority (54%) indicated that they viewed physical climate risks as a “very high” or “somewhat high” material issue. Qualitative survey responses pointed to two key factors impeding financial valuation of assets from the standpoint of physical climate risk:

1. Lack of decision-friendly climate data disclosure by the issuers; and
2. Lack of standardized best practices for integrating climate risk into portfolio management.

In relation to these two factors, CRMs offer an eloquent solution, as they succinctly outline the most material physical climate risks and risk mitigation measures that should be disclosed by companies within specific industry sectors.

4.2 Formal Training on Climate Risk

The survey indicated that there is a general lack of formal training of Board Members, C-suite officers and portfolio managers relating to climate risk, which may compound the difficulty in integrating physical climate risk into institutional portfolio management:

• 46% of survey respondents indicated that either “none” of their Board Members received formal training on climate risk, or they were not sure about the extent of climate risk training received by the Board Members;

• 23% of survey respondents indicated that their Chief Strategy Officers received no formal training on climate risk, and 31% indicated that they were not sure about the extent of climate risk training received by the Chief Strategy Officers;

• 31% of survey respondents indicated that their Chief Investment Officers received no formal training on climate risk, and 15% indicated that they were not sure about the extent of climate risk training received by the Chief Investment Officers; and

• 46% of survey respondents indicated that either “none” of their portfolio managers received formal training on climate risk, or they were not sure about the extent of climate risk training received by portfolio managers.
There is an evident need to scale training on climate risk among institutional investors to help them meet the directives outlined in the Task Force on Climate-Related Financial Disclosures, the Sustainability Accounting Standards Board, and Canada’s Expert Panel on Sustainable Finance.

4.3 Utility of Climate Risk Matrices

A notable 85% of survey respondents indicated that **CRMs** would be useful in providing portfolio managers with actionable insights into industry-specific physical climate risks. The same percentage indicated that the level of detail provided relating to the key climate risks was appropriate. However, most respondents (62%) would welcome greater detail regarding mitigation measures.

The survey results indicate that development of a suite of **CRMs** for a broader range of industry sectors and geographies would assist institutional investors in appropriately integrating physical climate risk into their portfolio management.

### TABLE 3: “INTEGRATING CLIMATE RISK INTO INSTITUTIONAL PORTFOLIO MANAGEMENT”
**SURVEY RESULTS, 13 RESPONDENTS**

<table>
<thead>
<tr>
<th>SURVEY QUESTIONS</th>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part 1: Existing Frameworks for Climate Risk Assessment</strong></td>
<td></td>
</tr>
<tr>
<td>1. Has your organization translated climate risk impacts into financial valuation of assets (e.g., through Ratio Analysis, Discounted Cash Flow Analysis, “Rules of Thumb” valuations, Economic Value Added Analysis, Options Pricing models, etc.)?</td>
<td><img src="chart1" alt="Bar Chart" /></td>
</tr>
<tr>
<td>2. How much weight does your institution attach to the materiality analysis of climate risks applied to portfolio management?</td>
<td><img src="chart2" alt="Bar Chart" /></td>
</tr>
<tr>
<td>3. Has your organization performed a materiality analysis to determine if any of the following climate risk factors may influence the performance of assets in portfolios?</td>
<td><img src="chart3" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>
### SURVEY QUESTIONS

4. For climate risk factors deemed to be material, please indicate the broad categories of industry sectors to which portfolio managers in your organization apply climate risk assessment.

<table>
<thead>
<tr>
<th>Industry Sectors</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>77%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>77%</td>
</tr>
<tr>
<td>Utilities</td>
<td>54%</td>
</tr>
<tr>
<td>Consumer Staples</td>
<td>46%</td>
</tr>
<tr>
<td>Industrials</td>
<td>46%</td>
</tr>
<tr>
<td>Information</td>
<td>38%</td>
</tr>
<tr>
<td>Technology</td>
<td>38%</td>
</tr>
<tr>
<td>Consumer Discretionary</td>
<td>38%</td>
</tr>
<tr>
<td>Financials</td>
<td>31%</td>
</tr>
<tr>
<td>Materials</td>
<td>31%</td>
</tr>
<tr>
<td>Communications</td>
<td>23%</td>
</tr>
<tr>
<td>Services</td>
<td>8%</td>
</tr>
<tr>
<td>Health Care</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>0%</td>
</tr>
</tbody>
</table>

5. If your organization integrates climate risk into portfolio management, what is the source of expertise?

- Internal expertise only: 8%
- External expertise only: 8%
- Both internal and external expertise: 69%
- None of the above: 15%

6. If your organization utilizes internal expertise for integrating climate risk into portfolio management, what inputs do you use (indicate all that apply)?

- Self-reported information by the issuer: 69%
- Management consultant reports: 62%
- Analyst reports: 54%
- Media reports: 46%
- Other: 38%
### Part 2: Formal Training on Climate Risk

#### 7. Please indicate how many Board Members within your organization have received formal training on climate risk.

![Bar chart](chart1)
- All
- Less than Half
- Unsure
- None

#### 8. Please indicate whether Chief Strategy Officer within your organization has received formal training on climate risk.

![Bar chart](chart2)
- Yes
- Not applicable / Not Sure
- No

#### 9. Please indicate whether Chief Investment Officer within your organization has received formal training on climate risk.

![Bar chart](chart3)
- Yes
- Not applicable / Not Sure
- No

#### 10. Please indicate how many Portfolio Managers within your organization have received formal training on climate risk.

![Bar chart](chart4)
- All
- More than half
- Less than half
- None / Not Sure

#### 11. Does your organization employ an in-house Climate Scientist, who assists portfolio managers?

![Bar chart](chart5)
- Yes
- No
### Part 3: Utility of Climate Risk Matrices

12. From the perspective of portfolio management, would industry-specific Climate Risk Matrices, such as the one illustrated in Table 1, be useful to portfolio management?

- Yes: 85%
- Not Sure: 15%

13. Relative to “Key Climate Risk Impacts” outlined in Climate Risk Matrix (first row), please indicate whether the level of detail should be expanded, kept the same, or reduced?

- Expanded: 15%
- Kept the same: 85%

14. Relative to “Mitigation Measures” outlined in Climate Risk Matrix (second row), please indicate whether the level of detail should be expanded, kept the same, or reduced?

- Expanded: 62%
- Kept the same: 38%
As TCFD admonishes, time is not a luxury for institutional investors to integrate physical climate risks into portfolio management. Climate Risk Matrices (CRMs) offer a practical, accessible and user-friendly method to address outstanding challenges.

The growing magnitude of extreme weather events guarantees to challenge businesses across all industry sectors and geographies, obligating them to mitigate the unrelenting impacts of floods, fires, heat waves, storm surges and other natural disasters.

As the survey highlights, as responsible fiduciaries the need to account for physical climate risk is appreciated by institutional investors. However, incorporating physical climate change impacts into financial valuation of assets is a challenge exacerbated by a lack of decision-friendly climate data disclosure by issuers and lack of standardized practices to integrate climate risk into portfolio management.

Climate Risk Matrices offer a practical, accessible and user-friendly method to address these outstanding challenges. By combining the skill sets of investors and subject matter experts (for example, industry associations and standards-setting intuitions), the scaled production of Climate Risk Matrices, across all sectors and geographies, could begin today.

The expansion of formal climate risk training for Board members, C-suite officers and portfolio managers is required if physical climate risk is to be incorporated into well-informed investment decisions and conversations with issuers.

These two actions combined will provide a practical way for institutional investors to transform their general appreciation of the importance of climate risk, into climate risk-informed financial valuations and investment decisions, as advised by the Task Force on Climate-Related Financial Disclosures, the Sustainability Accounting Standards Board, and Canada’s Expert Panel on Sustainable Finance.
REFERENCES


xix Public Infrastructure Engineering Vulnerability Committee. About PIEVC. http://pievc.ca/about-pievc


xxi Ibid.
“Every company, investor, & bank that screens new & existing investments for climate risk is simply being pragmatic.”

Jim Yong Kim
President of the World Bank