TRANSITIONING FROM RHETORIC TO ACTION: INTEGRATING PHYSICAL CLIMATE CHANGE AND EXTREME WEATHER RISK INTO INSTITUTIONAL INVESTING

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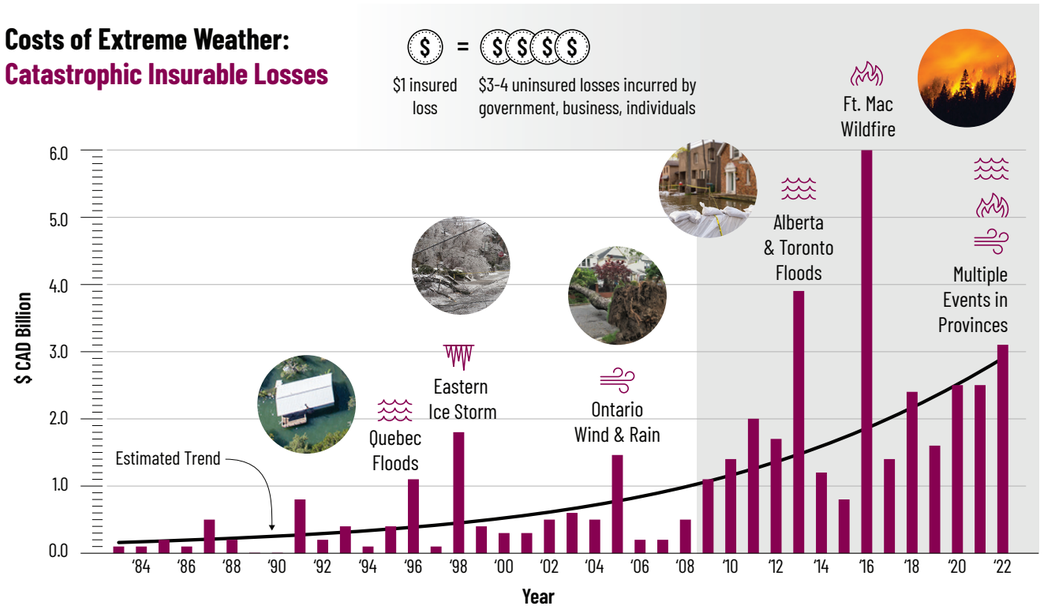
Due to escalating impacts of climate change and extreme weather events, investors must incorporate climate risk into portfolio management. This report provides a framework that will act as **a**) a **template** for companies to self-evaluate their management of physical climate risk, and **b**) an industry-wide **benchmark** to compare company efforts that reduce risks within an industry sector.

Growing Costs of Climate Change

Many companies fail to consider the financial impacts that physical climate risks have on their business. Catastrophic insured losses associated with extreme weather in Canada ranged from $250-$450 million per year from 1983-2008. Losses increased to approximately $2 billion per year from 2009-2022.

Costs of Extreme Weather:
Catastrophic Insurable Losses



Source: IBC, 2023; CatIQ, 2023 Note: claims have been normalized for inflation ($2022) and per capita wealth accumulation.

Climate Risk Matrices (CRMs)

Six CRMs are profiled in the report:

Each CRM offers industry-specific standardization and is a practical tool to:

1. prioritize the top means by which climate-related events may negatively impact business continuity, and
2. identify actions investors should expect a company to take to mitigate prioritized risks.

Key elements (a-d) reflect pillars from the International Sustainability Standards Board and Task Force on Climate-Related Financial Disclosures Framework.

a. Governance
The organization's governance around climate-related risks and opportunities can be informed by the CRM.

b. Strategy
CRMs represent the actual climate-related risks and opportunities that can inform an organisation's business strategy and financial planning.

Wind Electricity Generation CRM

Key Climate Risk Impacts

Wind	Cold Temperature	Ice Accumulation	Lightning	High Temperature
! Highly variable wind speed (<15km/h or > 80km/h) results in decreased turbine productivity. ! Optimal wind speed range would be 20km/h - 60 km/h.	! Extreme cold temperatures (below -20°C) requires turbine shutdown resulting in zero productivity. ! Cold temperatures (-10°C to -20°C) cause turbines to slow resulting in decreased productivity.	Severe icing causes turbine blade imbalance requiring shutdown resulting in zero productivity.	Severe lightning strikes result in material damage to turbine blades negatively influencing productivity.	High temperatures (> 50°C) accelerate battery decay and reduces productivity.

Risk Reduction Measures

! Ensure turbines are adjusted based on current variable wind speeds to ensure proper pitch of blades.	! Below -20°C, shutdown turbines to prevent equipment failure and limit/reduce need for maintenance activities. ! Between -10°C and -20°C, turbines should be heated to ensure mechanical systems function well.	Utilize deicing systems, anti-icing materials and mechanisms to reduce occurrence of shutdown.	Install surge arresters to prevent damage.	Utilize component cooling systems to reduce occurrence of shutdown.

Maintenance Measures

Ensure turbine manufacturers adhere to the "recommendations for preventative maintenance" as a critical minimum response.

Plan for replacement of aging turbines (> 15 years) to ensure continued high-level performance.

Urgent corrective maintenance is crucial to reduce failure of turbines - site maintenance workers should reside within commuting distance from the turbines (less than one day) and specialized technicians should be located within a day drive of the site.

Key Questions and Responses to Determine Readiness to Mitigate Physical Climate Risk

1. What percentage of total unavailability (productivity loss) is due to wind issues?	*Excellent response* : < 20%	*Poor response*: > 20%
2. What percentage of total unavailability (productivity loss) is prevented due to heating turbines during extreme cold temperature events?	*Excellent response* : > 80%	*Poor response*: < 80%

Key Questions and Responses to Determine Readiness to Mitigate Maintenance Risk

1. What is the average age of the turbine fleet?	*Excellent response* : 5-13 yrs *Good response* : 13-18 yrs	*Poor response*: >18 yrs (plan for replacement should be available)
2. What is the turbines fleet's annual availability (productivity) percentage (assumption: a maintenance program is available)?	*Excellent response* : > 80% *Good response* : 60%-80%	*Poor response*: < 60%
3. How quickly are companies responding to technical issues (i.e., how quickly can maintenance technicians arrive on site to resolve technical issues)?	*Excellent response* : < 1 day *Good response* : 1-2 days	*Poor response*: > 2 days

c. Risk Management
Processes used to identify, assess, and manage climate-related risks.

d. Metrics and Targets
Metrics and targets to identify, assess, and manage relevant climate-related risks and opportunities.

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The financial community should lead the development of CRMs for all 77 industry sectors as recognized by the Sustainability Accounting Standards Board. This will enable investors, and financial market participants, to price climate risks and investment opportunities. For details, see the **TRANSITIONING FROM RHETORIC TO ACTION: INTEGRATING PHYSICAL CLIMATE CHANGE AND EXTREME WEATHER RISK INTO INSTITUTIONAL INVESTING** report on the Intact Centre on Climate Adaptation website.