

Climate Change Adaptation

A Study in Risk Management

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Themes

- ↔ Climate change as a risk
- ↔ Potential impacts and implications
- ↔ Risk Management considerations
- ↔ Stakeholder expectations
- ↔ Management strategies

Approach

Climate change presents potential risks to organizations and individuals. As such it needs to have effective risk management strategies applied - this is not only a stakeholder expectation but also a business imperative.

Context



- ↷ climate is changing and will continue to change for centuries,
- ↷ a warming world will be accompanied by **increasing intensity, frequency, duration and geographic extent** of extreme weather and climatic conditions,
- ↷ current infrastructure is often designed based on past climate and risk that may not be representative of future climate risks,
- ↷ impacts associated with climate change and weather extremes have the potential to adversely affect infrastructure, reliability and societal wellbeing,
- ↷ to successfully adapt, the expected changes must first be understood.

By recognizing the potential risks and opportunities today, appropriate strategic decisions can be made to ensure continued effectiveness.

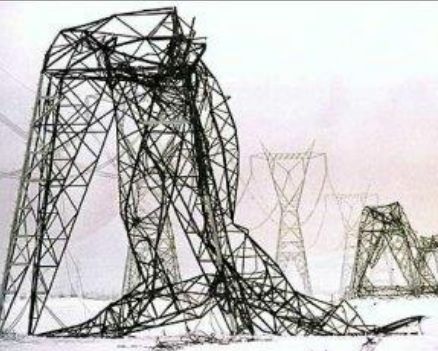
Observed Impacts

Changes to the **frequency, intensity, duration or range** of extreme weather events can significantly impact the built environment.

These events can involve the hydrosphere (floods), cryosphere (ice jams), or lithosphere (landslides).

Examples:

- ↔ Precipitation
- ↔ Storms
- ↔ Temperature (mean and extreme)
- ↔ Rising Sea Level
- ↔ Changes to lake and river levels and timing of peak flows
- ↔ Constraints on water availability
- ↔ Reduced extent and duration of ice cover
- ↔ Emergence or re-emergence of vector and rodent borne disease.



Direct and Indirect Impacts

Climate change & extreme weather can have direct & indirect impacts on infrastructure.

Direct Impacts: simple cause & effect relationship e.g. ice accretion & lightning strikes on overhead conductors, wind damage.

Indirect Impacts: relationship between cause and effect separated by intermediate events e.g.

- ↔ warmer climate may lead to
 - ↔ longer growing season - leads greater need for vegetation management,
 - ↔ issues with ice road integrity - leads to shorter access windows and issues with supply and maintenance,
 - ↔ spread of vector borne disease.
 - ↔ warmer water – issues with cooling, algal blooms, BOD, rates of chemical Rx.
- ↔ precipitation overwhelming riverine and urban drainage systems resulting in flooding.



Adaptation Process Considerations

“Organizations manage risk by **identifying** it, **analyzing** it, and then **evaluating** whether the risk should be **modified** by risk treatment. Throughout this process they communicate and consult with stakeholders and **monitor** and **review** the risk and the controls that are modifying the risk in order to ensure that no further risk treatment is required.”

(source: ISO 31000 page v)



Adaptation Goals

May include ensuring that risks associated with asset reliability, performance, operating costs, replacement and renewal are effectively managed.

Can be achieved by managing current impacts, and increasing resiliency.



Risk management should be integral to policy development, and practices such as business and strategic planning, and change management.

“The organization should identify sources of [climate change] risk, areas of impacts, events and their likely causes and potential consequences. The risks are based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives.” (source: ISO 31000 p17)



Adaptation

- ↷ involves taking actions designed to reduce risk to acceptable levels,
- ↷ enhances resilience, preserves assets and addresses issues of premature aging.
- ↷ Climate change risk should be managed like any other risk, and captured by existing corporate risk management processes. (ERM)

Risk Treatment - Steps



Risk Identification: risks & their relationships are identified and characterized.

Risk Impact Assessment: Assess the probability & consequence associated with each risk (or opportunity). Assessment can be quantitative, semi-quantitative or qualitative.



Risk treatment: implement one or more options to mitigate the risk. Cyclical process of assessing risk controls, determining the acceptability of residual risks, generating new risk treatment if residual risks are not tolerable; & assessing the effectiveness.



Monitor & Evaluate: evaluate the effectiveness of controls, & monitor factors that influence the risk profile.



Small Changes Large Impact

“Changing climate threatens our ability to design, operate and maintain infrastructure that is sustainable for the duration of its service life. Small increases lead to escalating infrastructure damage [for example] a 25% increase in peak wind gusts results in a 650% increase in building damage.”

(David Lapp Engineers Canada).



Expectations and Implications

Potential implications are far reaching for example:

- ↔ achievement of organizational objectives
- ↔ Financial
 - ↔ National Roundtable on the Environment and Economy estimates that by 2050 the annual national climate change damage costs will be \$21-43B.
 - ↔ \$1 today = \$9-38 worth of future damage avoidance.
- ↔ Regulatory
- ↔ Insurance
- ↔ stakeholder expectations

Summary

- ↔ Projected future extremes may challenge existing infrastructure design, reliability and societal wellbeing.
- ↔ Regardless of strategies to reduce the expected magnitude of climate change, adaptation measures will be required.
- ↔ Adaptation can reduce vulnerability, especially when it is integrated into key sector risk management strategies.
- ↔ Many strategies are anticipated to align with sound business planning and can likely be implemented either at low cost and/or high benefit/cost ratio.
- ↔ effective climate change risk management is a business imperative.

Risk



Summary/Conclusion

- ↷ Climate change & extreme weather risk - just another risk to be managed.
- ↷ A lot of information & experience, including models & response strategies, exists today.
- ↷ Clear direction from senior management is required.
- ↷ An understanding of future projections is required – (quantitative or qualitative).
- ↷ Where the accountability to manage the fundamental risk lies outside the organization's jurisdiction, consider actions that those with accountability could take to mitigate your risk.
- ↷ In those instances that the life expectancy of the vulnerable equipment is near term, it may suffice to compare the design against current climate.

