Climate-Related Risk Playbook
for Building Owners

Industrial Buildings

REALPAC CAGBC Canada Green Building Council

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Opening Message

Canada's industrial real estate sector is supported by logistics and distribution demand, including e-commerce fulfillment, supply chain reconfiguration, and population growth near major metro regions. For institutional owners, performance is increasingly driven by location and transportation access, building functionality (clear height, loading, power), and tenant credit, with the strongest rent growth and liquidity concentrated in modern, well-located distribution facilities, while older buildings face higher leasing and capital risk.

Understanding climate-related risks is essential for Canada's institutional industrial building owners in this environment - to remain competitive, protect tenants, and minimize compliance costs for emerging regulations.

Industrial properties face distinct decarbonization constraints due to varied building uses, tenant-controlled process loads, and lease structures that often place utilities directly with tenants. Many facilities have limited central building systems beyond heating and ventilation, meaning emissions and energy performance are heavily influenced by tenant equipment, operating hours, and plug and process loads. As a result, emissions reduction typically depends on base-building measures (envelope upgrades, high-efficiency heating, controls, and lighting), building electrification where feasible, on-site solar where suitable, and coordinated requirements and data sharing with tenants.

Governments at all levels are advancing requirements for building efficiency, resilience, and emissions reduction. These shifts, a growing demand for low-carbon, resilient buildings, and more frequent extreme weather are affecting property performance, capital needs, insurance costs, and long-term value. Protecting tenants and preserving durable cash flows will increasingly depend on proactive climate-related risk assessment and prudent action.

Initiatives aimed at improving building efficiency and reducing greenhouse gas emissions may require significant capital investment, making retrofit sequencing and long-term capital planning essential to preserving returns. In addition, insurance is increasingly reflecting climate exposure through rising premiums, tighter underwriting, and potential coverage constraints. These impacts can affect tenants, disrupt cash flow, and affect investor returns and the competitiveness of assets.

This playbook is intended to help industrial asset and investment managers understand, plan for, and manage climate-related risks across their portfolios.

We hope you find it a useful introductory resource as you navigate this important, fast-changing space.

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About This Playbook

Purpose

This playbook is intended to help industrial owners (particularly asset and investment managers) understand, plan for, and manage climate-related risks across their portfolios. These climate-related risks include not only physical risks from extreme weather events but also transition risks from regulatory and market changes that can affect financial performance.

REALPAC developed this playbook in collaboration with its members, the Canada Green Building Council (CAGBC) and JLL Canada, with support from Natural Resources Canada's Codes Acceleration Fund.

NOTE: CAGBC's Low-Carbon Transition Planning Guide is a distinct but complementary resource (also supported by NRCAN's Codes Acceleration Fund) that provides a staged, step-by-step "how-to" process for practitioners to develop and implement a carbon transition plan, including team roles, technical analysis, and implementation steps.

Context

Industrial building owners in Canada are impacted by the following:

- The National Energy Code for Buildings (NECB) and emerging regional high-performance building regulations and programs (e.g., provincial and municipal Building Performance Standards) that drive emission reductions from industrial buildings.
- New energy and emission reduction technologies that support building emission reductions from industrial buildings.
- Flooding, extreme heat, wildfires and windstorms.
- Sophisticated investors who are increasingly interested in understanding the risks and opportunities climate change presents to their buildings and portfolios.

Industrial buildings across Canada come in many forms. The extent to which they may be prepared for climate-related risks and opportunities varies based on a range of factors, including:

- Original Building Design & Equipment
- Building Age & Condition
- Investor(s) Profile & Investment Timeline
- Building Occupancy & Rents
- Building OpEx Costs
- Building Energy Performance (EUI)
- Building GHG Emissions Performance (GHGI)
- Carbon Intensity of the Regional Utility Grid
- Regional Physical Climate Risks
- Building CapEx Plans

Overview

The ***Introduction*** section provides an overview of climate-related risk fundamentals, a snapshot of current regulations, and an outline of considerations when proactively addressing climate-related risks at the portfolio vs asset level.

The ***Financials*** section presents climate-related risks through the lens of asset and investment managers, considering investment strategies, total returns, net operating income, capital expenditures and asset value.

The ***Technology & Operations*** section outlines the carbon transition planning process, the prioritization of emission reduction measures, regional electricity grid considerations, and carbon transition decision-making. This section also outlines the planning and decision-making process around physical risks.

INTRODUCTION

Climate-Related Risk Overview

The impacts of climate change on people and businesses are impossible to ignore. Climate-related risks refer to the potential negative effects of climate change on an entity. The Task Force on Climate-related Financial Disclosures (TCFD) identified two main types of risks:

PHYSICAL RISK

Physical risk is the risk of building damage and negative impact on tenants due to climate-related factors. Physical risk can be short-term (acute), such as damage from extreme storms, or longer-term (chronic), including threats from rising sea levels or increased temperatures.

- **Adaptation** refers to actions taken to proactively address the safety and comfort of tenants and reduce physical risk.

TRANSITION RISK

Transition risk is the risk of building obsolescence due to the shift to a low-carbon economy. Transition risks can result from factors such as changes in the regulatory landscape, reduced resource availability, increased insurance costs, potentially higher taxes and fines, and reputational and market shifts.

- **Mitigation** refers to actions taken to reduce greenhouse gas emissions and reduce transition risk.

KEY TAKE-AWAY

The changing climate presents both challenges and opportunities that may materially affect tenants and alter the risk-return profile of real estate organizations. The fundamental challenge for industrial asset and investment managers is to systematically identify, assess, and manage these risks.

Climate-Related Risk Management

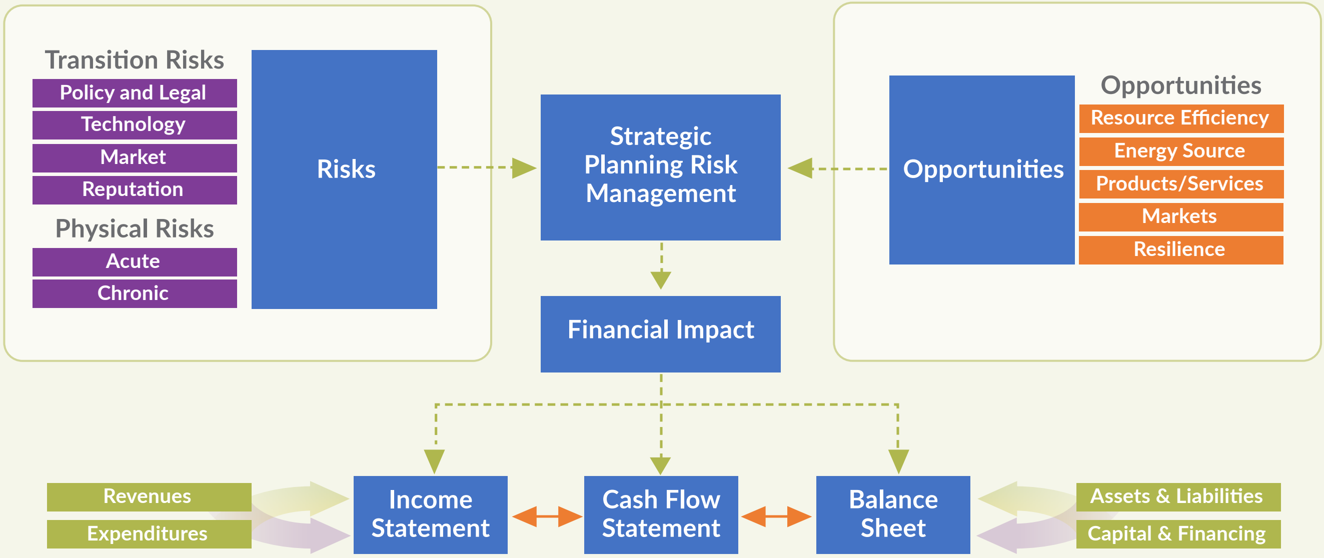
Climate-related risk management has emerged as a critical business imperative.

Commercial real estate owners need to consider shifting expectations of their tenants around GHG emissions and be proactive around ensuring their safety and comfort.

Commercial real estate owners also face increasing pressure from investors, lenders, and stakeholders to understand and report on their exposure to climate change impacts.

The framework below illustrates how climate-related issues translate into financial consequences.

Figure 1 Climate-Related Risks, Opportunities & Financial Impact[1]



Climate-related risks and opportunities flow through an organization's strategic planning and risk management processes to ultimately impact their financials: income, cash flow, and balance sheet. These impacts flow through to all the critical financial streams in the business: revenues, expenditures, assets & liabilities, and capital & financing.

As regulations evolve, staying ahead of new regulations can increase competitiveness and reduce the potential for penalties.

[1] Source: Recommendations of the TCFD Final Report; https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf

KEY TAKE-AWAY

Climate-related risk factors can significantly impact real estate financials through increased capital and operating expenditures, potential asset value impairment and regulatory penalties. Proactive decision-making to implement mitigation and adaptation measures strongly aligns with tenant needs and may offer competitive advantages and asset longevity.

Transition Risk – The Policy Landscape

Federal, provincial and municipal policies around climate change continue to evolve.

Understanding and responding to decarbonization policy signals can become a strategic advantage for forward-thinking industrial owners.

The 2025 updates for the National Energy Code of Canada for Buildings (NECB) and National Building Code of Canada (NBC) include additional energy efficiency requirements and greenhouse gas emissions considerations applicable to the alterations of existing buildings. This and other relevant policies impacting transition risk are provided below.

Name	Mandatory/Voluntary	Benchmarking	Reporting	Performance
NATIONAL				
National Energy Code of Canada for Buildings (NECB) National Building Code of Canada (NBC)	Mandatory (after adoption by provinces)			Y
PROVINCIAL				
Building Benchmark BC	Voluntary	Y		
Ontario Energy and Water Reporting and Benchmarking	Mandatory	Y	Y	
Quebec Law on the Environmental Performance of Buildings	Mandatory (regulations in development)	Y	Y	Y
Efficiency Nova Scotia Energy Benchmarking	Voluntary	Y		
MUNICIPAL				
Transform TO Net Zero Strategy	Both mandatory and voluntary components	Y	Y	Y
City of Toronto Net Zero Existing Buildings Strategy	Both mandatory and voluntary components	Y	Y	Y
Montréal Roadmap for Zero-Emissions Buildings by 2040	Mandatory	Y	Y	Y

NOTE: A detailed scan of codes, standards and programs is also available on transitionplanningnow.ca.

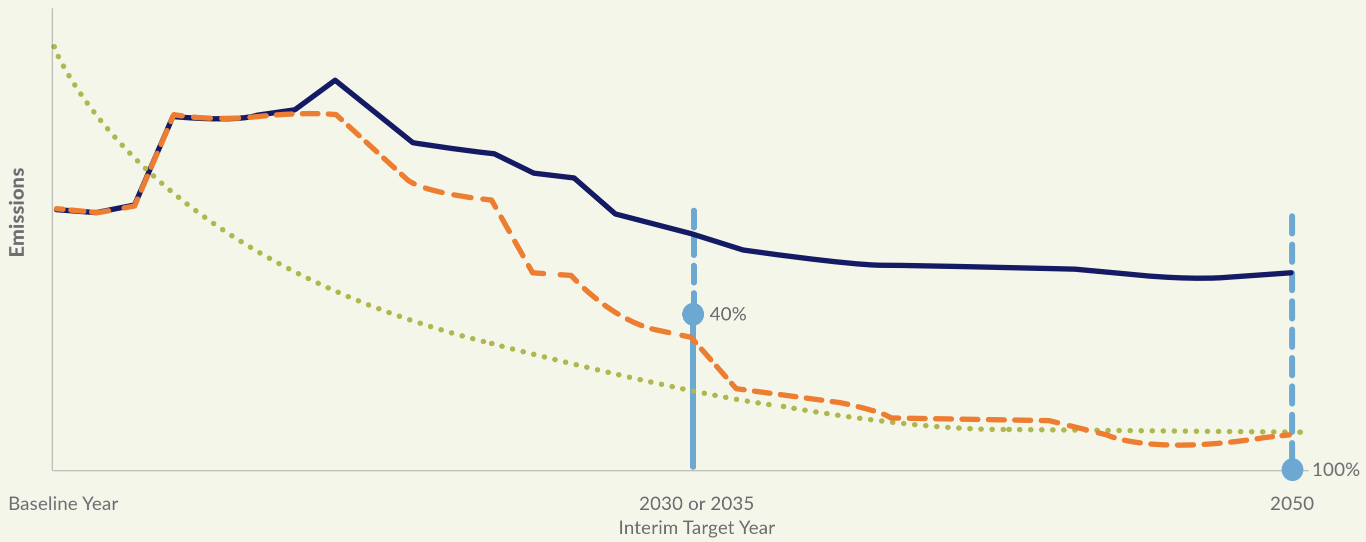
KEY TAKE-AWAY

Climate change policies at the federal, provincial, and municipal levels are evolving, increasing transition risk for industrial owners. Emerging policies include stronger energy-efficiency requirements in the 2025 National Model Code and National Energy Code, as well as mandatory building performance reporting in Ontario, Vancouver, and Montréal. Proactive investment in decarbonization can help buildings meet future requirements, reduce long-term operating costs and emissions, and protect or enhance returns.

Transition Risk Fundamentals

A fundamental starting point for managing transition risk is to identify an asset's Business-as-Usual (BAU) emissions pathway and then compare it to a Low Carbon Transition Pathway, as shown below.

Figure 2 **Emission Reduction Pathways Comparison**



The BAU scenario includes energy efficiency measures and "like-for-like" equipment replacements. Some carbon emission reductions are achieved through energy efficiency.

A Low Carbon Transition Pathway includes site-specific emission reductions based on measures prioritized to achieve an organization's internal financial and carbon-emission reduction targets. These measures are typically outlined in a Carbon Transition Plan (CTP).

Another emission reduction pathway that may be considered is a Paris Aligned Pathway (such as CRREM), which is a science-based, time-bound trajectory for reducing greenhouse gas emissions, consistent with the Paris Agreement goal of limiting global warming to well below 2°C, with efforts to limit warming to 1.5°C. This goal also forms the backbone of Canadian legislation to achieve net zero emissions by 2050 and informs efforts to develop and update building performance standards and codes.

Industrial asset and investment managers need to consider different emissions pathways when planning for their assets.

KEY TAKE-AWAY

A practical first step in managing transition risk is to establish an asset's expected emissions trajectory under a business-as-usual approach, then compare it to more ambitious pathways. This enables owners to assess the scale of emissions reductions required and to plan targeted measures to meet financial and decarbonization objectives.

Physical Risk Fundamentals

Commercial real estate owners should assess their properties' exposure to physical climate risks in the context of their broader asset management strategy.

Physical Risk Management includes (1) identifying which physical climate risks are insurable/uninsurable and have the highest probability of impacting value; and (2) implementing financially prudent measures to mitigate the identified physical climate risks.

The top physical climate risks for commercial real estate assets and portfolios across Canada are outlined below:[2]

Flood

- Major or minor flooding can lead to property damage, disruption to tenants, damage to critical equipment, and loss of life. Flooding types include coastal, river (fluvial) and rain (pluvial).

Wildfire

- Wildfires can cause property damage, disruption to tenants, and loss of life. Properties may face direct fire risk and/or indirect effects like smoke exposure.

Extreme Heat

- Extreme heat can affect building water supply, cause equipment failures, and adversely affect tenants.

Windstorm

- High winds can loosen the perimeter flashing of the roofs, leading to roof detachment or "peel off". Windborne debris can shatter windows. High winds increase the probability of water entering the building.

The assessment of physical climate risks is evolving beyond hazard identification toward understanding financial impacts on asset values, insurance costs, and capital planning. Despite uncertainty and variability across models, sufficient data exists to support more proactive, portfolio-level risk assessment and integration into decision-making.

NOTE: Planning for physical risk is now becoming part of the regulatory landscape; the 2025 update to the National Model Building Code now includes climatic data to help buildings prepare for shifts in extreme weather over the next 50 years.

[2] Source: REALPAC ESG Explainer: Physical Risk. https://realpac.ca/product/esg-explainer-physical-risk/

KEY TAKE-AWAY

Managing physical climate risk requires real estate owners to move beyond identifying site-level hazards toward understanding their financial implications for asset values, insurance, and capital planning. By assessing exposure to key risks such as flooding, wildfire, extreme heat, and wind, and implementing financially prudent mitigation measures, owners can integrate physical risk management into broader portfolio and investment decision-making

Addressing Climate-Related Risk

A range of key factors impact transition and physical climate risks at both a portfolio (top-down) and asset (bottom-up) level for industrial buildings.

PORTFOLIO LEVEL FACTORS VS **ASSET LEVEL FACTORS**

Investor Driven

- Investment Targets/Objectives (Financial, Climate)
- Investment Focus (Core vs. Value-Add)
- Investment Timeline
- Portfolio Performance
- Access to Capital
- Regulatory Requirements

Investor & Asset Driven

Portfolio Level Factors +

- Tenant Needs
- Building Age & Condition
- Building Occupancy & Rents
- Building OpEx Costs
- Building Energy Systems
- Building Energy Performance (EUI)
- Building GHG Emissions Performance (GHGI)
- Regional Utility Grid
- Regional Physical Climate Risks
- Building CapEx Plans

Examples of how these factors might impact an asset or investment manager's approach to climate-related risks include:

- An investment manager requests a physical climate risk assessment as part of the asset acquisition's due diligence process.
- An asset manager working for a pension fund supports carbon transition or physical climate risk capital investment at an aging asset with a long-term hold period to remain competitive with comparable buildings in the area.
- An asset manager sets a modest portfolio carbon transition strategy due to current capital scarcity, short-term policy uncertainty, and a short-term hold period.
- An investment manager cautions against carbon transition or physical climate risk capital investment in an asset that will be disposed of in the short term due to an insufficient value premium.

KEY TAKE-AWAY

Asset and investment managers need to take action to adapt to and mitigate climate-related risks, considering a range of asset- and portfolio-level factors.

Investment Strategy

Climate-related risk considerations for industrial buildings differ by investment type and across investment life cycle stages.

INVESTMENT LIFE CYCLES	INVESTMENT TYPES: Core	INVESTMENT TYPES: Value-Add
Acquisition	**Buildings that...** • are energy efficient with lower energy intensity performance • have limited exposure to climate-related physical risks • require minimal capital investment to mitigate transition and physical risk	**Buildings that...** • are less energy efficient but have clear opportunities to improve performance • offer the opportunity to unlock unrealized potential through targeted capital investment in equipment upgrades
Asset Management	**Buildings that...** • carbon transition plans and physical risk assessments help drive *(minor)* capital investment • carbon reduction investments are phased and strategic • generally prepared for key physical risks (flooding, extreme heat)	**Buildings that...** • carbon transition plans and physical risk assessments help drive *(more significant)* capital investment • carbon reduction investments are phased and strategic • still preparing for key physical risks (flooding, extreme heat)
Disposition	**Buildings requiring only...** • low-cost improvements to protect asset value	**Buildings requiring only...** • higher cost improvements to protect asset values

NOTES: (i) Table is indicative only; (ii) Core identifies the desired state for assets, while Value-Add identifies the likely state for assets; (iii) Assets may include different attributes from each column, depending on the asset.

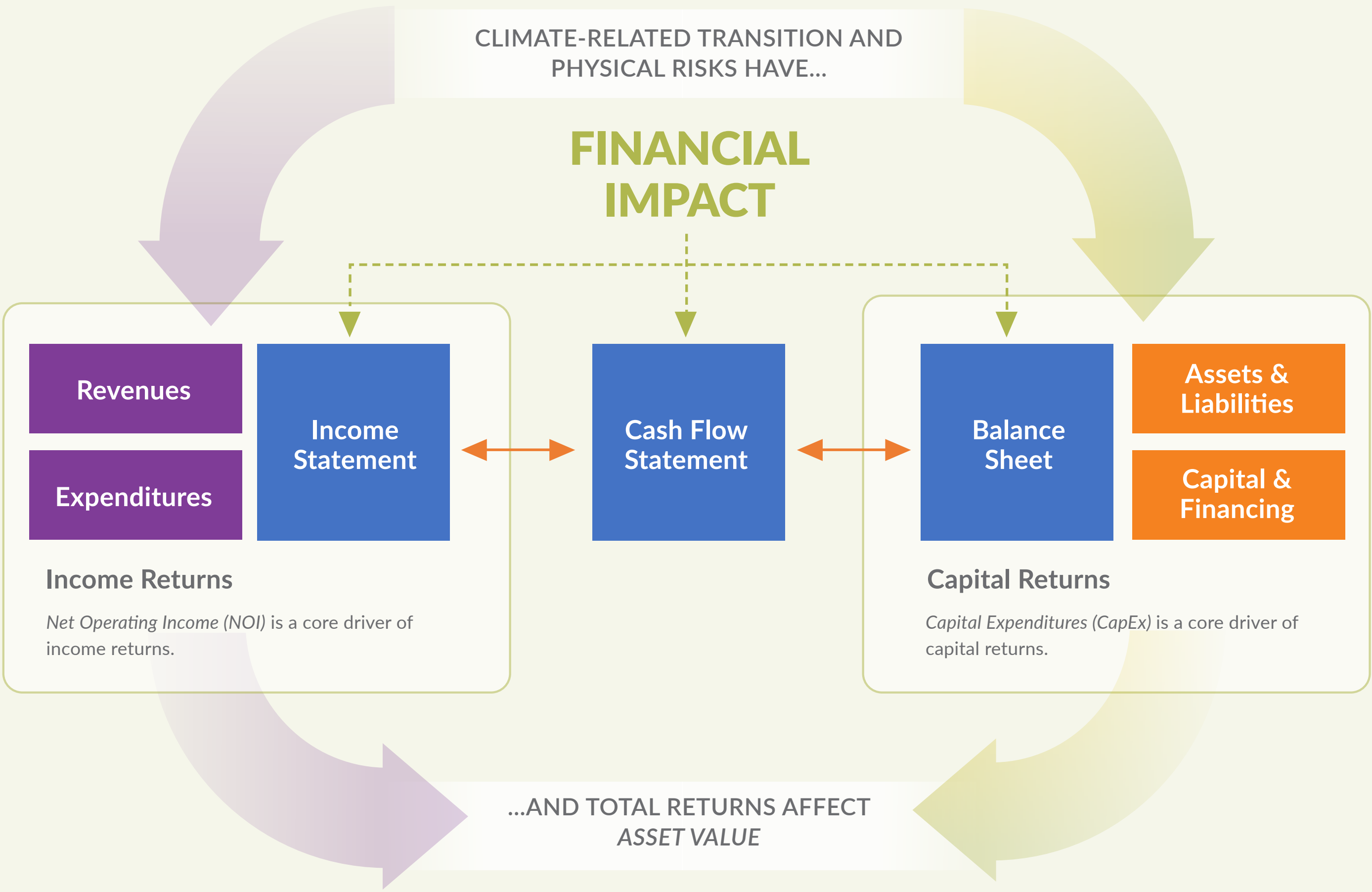
KEY TAKE-AWAY

Climate-related risks for industrial assets vary by investment strategy and life cycle stage, influencing how risks and opportunities are identified and managed. Core assets generally require limited, incremental investment to maintain resilience and performance, while value-add assets present greater exposure but offer opportunities to enhance value through targeted capital investment and upgrades.

Total Returns

Climate-related risks may impact income, capital and total returns for commercial real estate companies in a number of ways:[3]

Figure 3 Climate-Related Risks & Commercial Real Estate Companies



Additional details on Net Operating Income and Capital Expenditures are provided in the following sections.

[3] Adapted from source: Recommendations of the TCFD: Final Report https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf

Net Operating Income

Climate-related risk factors have a potential impact on tenant choices, income, and expenses, which have an impact on the property's yearly cash flow generation.

	PHYSICAL CLIMATE RISK		TRANSITION RISK	
	Potential Impact	**Value**	**Potential Impact**	**Value**
INCOME/CASH FLOW				
Gross revenue	Decreased rents due to building use issues or vacancy after an extreme weather event.	Decrease	Increased revenues from positive leasing outcomes linked to low/zero carbon or resilient performance.	Increase
	Decreased rents due to vacancies arising from tenant dissatisfaction.	Decrease	Decreased revenues from negative leasing outcomes linked to low/zero carbon or resilient performance.	Decrease
Other revenue	N/A	–	Additional income from electric vehicle charging stations.	Increase
Vacancy & Credit loss	N/A	–	N/A	–
EXPENSES				
Utilities	Increased costs for tenants from rising temperatures and heat events.	Decrease	Decreased costs for tenants from energy efficiency (e.g., electricity and gas).	Increase
Repairs & Maintenance	Increased costs for repairs due to weather-related damage.	Decrease	Increased maintenance costs if equipment replacement is deferred.	Decrease
Insurance	Increased premiums in high-risk zones, policy non-renewals.	Decrease	Increased premiums for higher carbon assets as insurers incorporate more granular climate and building-performance indicators into risk pricing.	Decrease
Real Estate Taxes	Increased property taxes in high-risk zones/areas, investing heavily in infrastructure upgrades (e.g., flood protection).	Decrease	Stringent carbon emission thresholds may hinder favourable assessment.	Decrease
Potential fines	N/A	–	Increased costs because of building performance standard fines (for high carbon-emitting assets).	Decrease
CAPITAL EXPENDITURES				
CapEx	May need to allocate funds for climate adaptation upgrades to protect against physical climate risks (see next page).	Increase/ Decrease	May need to allocate funds for electrification and energy/carbon emission reduction measures to meet regulatory/investor requirements (see next page)	Increase/ Decrease

NOTES: Value Increase: factors that create a potential upside in value (decreases in expenses or increases in revenue). **Value Decrease**: factors that can push the overall asset value downwards (increases in expenses or decreases in revenue).

Capital Expenditures (CapEx)

Physical and transition risks impact energy supply and building systems and require proactive CapEx measures to mitigate them.

PHYSICAL RISKS	TRANSITION RISKS	POTENTIAL OUTCOMES	Pro-Active CapEx Measures to Consider
		ENERGY SUPPLY	
Flood Extreme Heat (chronic - more hotter days) Windstorm	Grid capacity constraints Alignment with codes and regulations	Increased risk of power outages Increased demand for electrical capacity, utility limitations	Pursue infrastructure upgrades from your local distribution company to support building electrification. Implement or upgrade emergency power systems to maintain critical operations during electricity outages. Implement onsite renewable energy systems (e.g., rooftop solar) to realize cost savings and improve redundancy.
		HEATING, COOLING AND VENTILATION SYSTEMS	
Extreme heat (acute and chronic) Wildfire	Technology obsolescence Alignment with codes and regulations	Inadequate cooling capacity Outdated carbon-intensive HVAC units Poor indoor air quality, increased maintenance	Implement building electrical and cooling system upgrades. Implement electrification for heating (e.g., heat pumps) when HVAC equipment reaches end-of-life. Implement small backup natural gas boilers, in conjunction with electrification, to maintain redundancy for heating. Implement enhanced filtration systems with pressurization and monitoring capabilities. Review exhaust efficiency and emergency damper control to limit smoke infiltration.
		ENVELOPE, SITE AND LANDSCAPING	
Flooding Increased Precipitation (chronic) Windstorm	Physical upgrade constraints Structural modification limitations Alignment with codes and regulations	Accelerated façade deterioration and thermal failure of envelope Stressed drainage systems and waterproofing beyond design specifications Increased freeze-thaw cycles, snow loading	Flood-proof/elevate critical infrastructure if possible. Upsize stormwater infrastructure, reinforce foundations. Ensure robust sealing of the building envelope to prevent water intrusion. Retrofit roof-to-wall connections with hurricane ties. Reinforce roof slabs to bear heavier snow loads. Enhance thermal insulation, improve air sealing.

KEY TAKE-AWAY

The capital costs and returns on investment for the above measures will vary widely. The challenge for industrial asset and investment managers is to carefully consider the risks and cost-benefits of CapEx mitigation measures to protect or enhance the asset's value.

Asset Value

Asset values in the market are influenced by what investors, owners and appraisers collectively believe about an asset's ability to generate future income, while considering the potential risks involved.

Climate-related risk considerations already factor into the market value of assets.

Figure 4 **Climate-Related Risks & Asset Values**

Net Asset Value = **Net Present Value of Future Cash Flows** + **Net Present Value of Exit Price** – **Net Present Value of Capital Expenditures**

- **Net Present Value of Future Cash Flows:** Consider when and how much investing in carbon-emission reduction technologies and climate resilient measures may reduce ongoing costs (OpEx and maintenance) and increase revenues (rent, occupancy, etc.).
- **Net Present Value of Exit Price:** Evaluate benefits of carbon-emission reduction strategies and physical risk adaptation measures against trade-offs of business-as-usual to improve pool of future buyers and exit price.
- **Net Present Value of Capital Expenditures:** Balance short-term and long-term priorities to optimize value of capital investments made now.

NOTE: 1) Climate-related risks may impact discount and terminal cap rates for industrial buildings, which would impact valuations.

Pricing climate-related risks, and incorporating them into appraisals, remains challenging due to evolving standards, the availability and comparability of data, and inconsistent views among investors, owners and appraisers.

This is likely to change over time, so prudent asset and investment managers should consider the climate-related risks that may potentially have an impact on the value of the assets they manage.

KEY TAKE-AWAY

Although climate-related risks are difficult to price consistently due to evolving standards and data constraints, they are increasingly influencing asset valuations through assumptions embedded in income, risk, and exit pricing.

Transition Risk – Carbon Transition Plans

A Carbon Transition Plan (CTP) focuses on finding effective ways to manage energy use and emissions within an owner's control and on developing a feasible plan to reduce them cost-effectively over time. The following stages apply.

Figure 5 Summary of Carbon Transition Plan Process[4]

[4] Source: Adapted from CAGBC Carbon Transition Planning Guide

Transition Risk – Carbon Transition Plans

Energy and emission reduction measures from the Carbon Transition Plan (CTP) are typically implemented in a prioritized sequence based on a range of considerations, as outlined below.

Figure 6 Energy & Emission Reduction Measure Sequencing

NOTES:

* Conduct a thorough investigation on loads during unoccupied hours to improve energy efficiency and reduce load.

** Evaluate the feasibility of ventilation heat recovery from exhaust. Innovative designs using the cooling loop for heat recovery have proven to be effective in reducing peak heating load requirements.

*** Engage local utility provider early to resolve possible challenges. Consider retaining small natural gas boiler systems for redundancy purposes.

KEY TAKE-AWAY

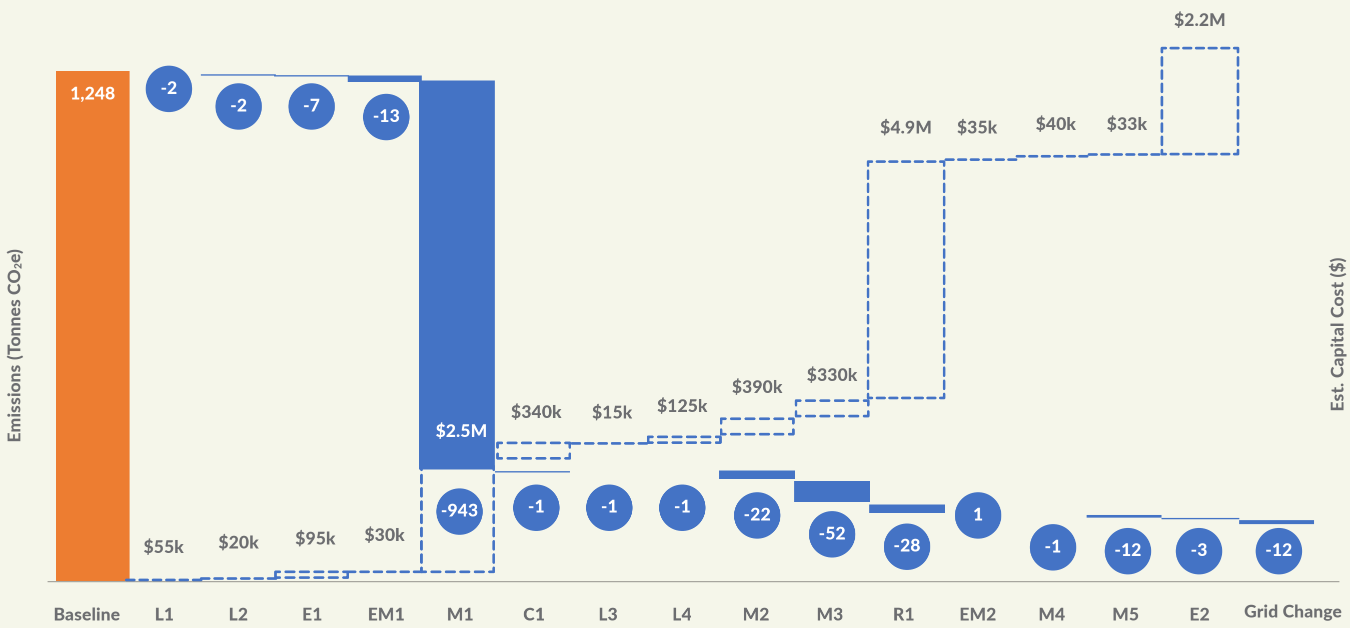
By prioritizing carbon-emission reduction measures and considering equipment life cycles, asset management teams can optimize capital allocation, operating cost savings, and emission reductions. Electrification of equipment at end-of-life represents the most significant opportunity to reduce emissions and transition risk – and is critically important given that regulatory and market forces are likely to increase transition risk over time.

Transition Risk – Balance Priorities: Case Study 1

Developing the business case to reduce emissions (and manage transition risks) involves analyzing the effects of energy/emissions reductions, cost increases and grid changes over time. These effects are often intertwined and sometimes in conflict, and need to be balanced when making decisions.

The case study below illustrates this challenge – based on a ~300,000 sq. ft. industrial building located in British Columbia, built in the early 2000s. Space heating is primarily provided by ceiling-mounted gas unit heaters (warehouse space) and gas-fired rooftop units (office).

Figure 7 **Comparison of Emission Reduction Potential & Estimated Capital Cost Increase**



ID	Measure Name	ID	Measure Name
L1	Replace Existing Fixtures with LED Fixtures with Ballasts	M2	Install Air Curtains on Loading Bay Doors
L2	Replace Exterior Lighting with LED	M3	Replace Existing Small Destratification Fans with More Effective Destratification Fans
E1	Conduct Thermal Imaging Assessment and Minor Repairs	R1	Rooftop Solar PV
EM1	Install Tenant Submeters	EM2	Install Electric Vehicle Chargers
M1	Replacing Existing Warehouse Gas Heaters with Package Rooftop Heat Pump Units	M4	Replace Domestic Hot Water Heaters with Air-to-Water Heat Pump Water Heaters
C1	Install Building Automation System	M5	Replacing Existing Office Area Rooftop Units with Electric Air Source Heat Pumps
L3	Add Photosensors to Exterior Lighting	E2	Add Insulation to Walls
L4	Install Lighting Occupancy Sensors		

Case Study 1 - Observations

Comparison of Emission Reduction Potential & Estimated Capital Cost Increase

Observations related to Case Study 1:

Emissions: The blue shaded bars above illustrate the carbon-reduction potential of the respective measures identified. ~75% carbon emission savings are projected for measure M1 by replacing the gas heating with electric alternatives.

Costs: Measure M1 also requires up to ~$2.5M capital investment, as the overlaid, dotted brown cost bars show. In this example measure E1 (roof upgrades) is double the cost, though carbon reductions are comparatively low.

Grid: Switching from gas to electricity when implementing measures M1 will not only increase electricity use/reduce gas use but also impact utility costs. There may be an increase in overall utility costs in regions where electricity costs are significantly more expensive than gas. Improved energy efficiency can help offset the wide fluctuations in natural gas costs and should also be considered.

Time: The recommendation is to phase the implementation of the measures to keep capital expenditures reasonable year over year. Measures should be aligned with equipment end-of-life.

Regulations: It is important to consider the thresholds and compliance timelines associated with emerging building emission performance standards (e.g., Toronto) when developing decarbonization capital plans.

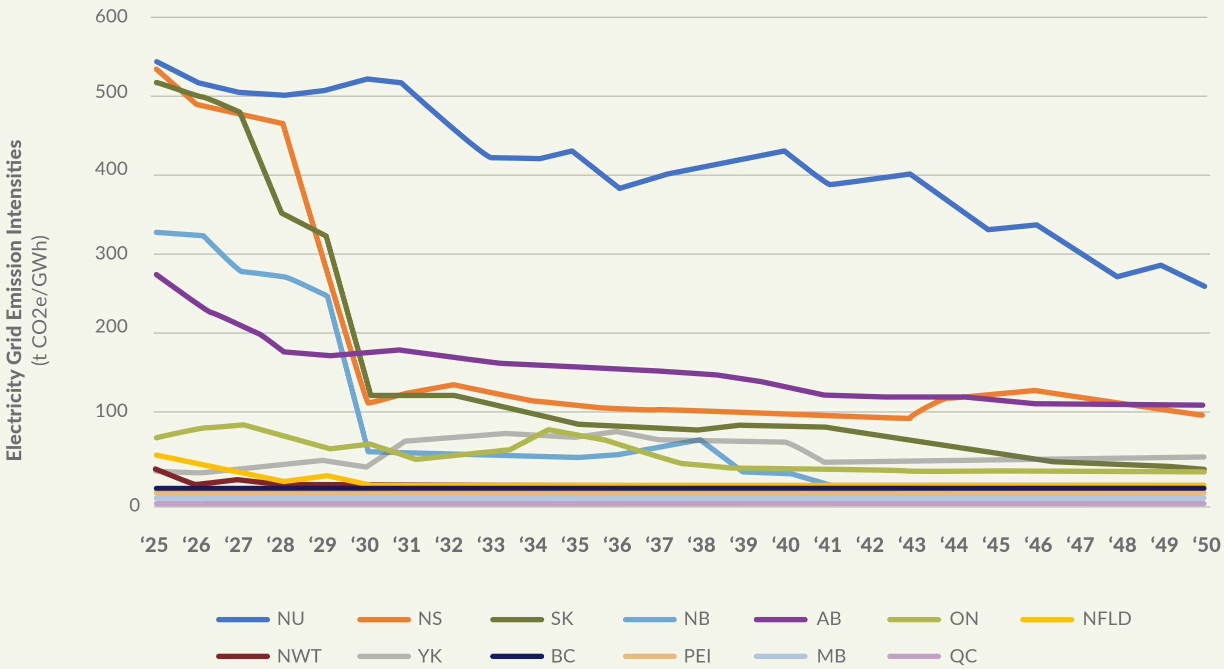
KEY TAKE-AWAY

Developing a credible emissions-reduction business case requires balancing carbon-reduction potential with capital costs, energy price impacts, and timing considerations. While electrification measures can deliver meaningful emissions reductions, they may increase electricity costs and require significant upfront investment, underscoring the importance of phased implementation aligned with equipment life cycles. Careful analysis of these trade-offs over the investment horizon is essential to effectively manage transition risks and support informed capital planning.

Transition Risk – Regional Electricity Grids

A building's carbon reduction strategy is informed by the emissions of its utility grid. As asset managers or investors consider fuel-switching solutions, there is interest in understanding how the shift to electrification will impact the building's emissions profile over time. The graph below illustrates how the electricity grids are projected to decrease emissions over the next 50 years in the different provinces/territories across Canada.

Figure 8 Projected Electricity Grid Emissions Intensity (2025 – 2050)[5]



Why does it matter if your building is in a low/medium/high carbon grid?

As the graph above illustrates, significant emission reductions are expected in the regions with electricity grids that are currently considered medium-/high-carbon emitters. In these regions electrifying now yields more modest results, where on-site renewables and more efficient technologies, such as geo-exchange, may be considered. In low-carbon grids, early electrifying now eliminates the majority of building carbon emissions from heating and hot water systems, while reducing utility costs over the long term.

[5] Source: Government of Canada's Greenhouse Gas Emissions Projections https://data-donnees.az.ec.gc.ca/data/substances/monitor/canada-s-greenhouse-gas-emissions-projections/

KEY TAKE-AWAY

In low-carbon grid regions, early electrification offers immediate environmental benefits, regulatory compliance, and potential cost savings through strategic implementation – making it a clear strategic advantage with minimal downside risk. In high-carbon grid regions, early electrification offers long-term emission benefits but requires careful evaluation of short-term financial impacts and risks associated with grid carbon emission reduction timelines.

Transition Risk – Electricity Grids: Case Study 2

The case study presented below aims to shed further light on how the interlinked aspects of emissions and operating costs are impacted in the different low/medium/high carbon electricity grids. The case study assumes that heating equipment is at end-of-life today, triggering an immediate investment decision.

The following four carbon transition scenarios are compared across a 25-year timeline: The analysis assumes that carbon pricing will be reintroduced in some form beyond 2035, in alignment with the trend of building performance standards (BPS) and regulations globally.

1

BAU

Business-as-usual like-for-like replacement

Operating costs are expected to increase from 2035 onwards due to carbon pricing.

2

Delay Electrification:

Implement energy efficiency measures now, delay electrification until next equipment replacement in 2045

Energy efficiency measures initially reduce operating costs, however, they increase again in 2035 as a result of carbon pricing. Operating costs are reduced again when electrification solutions are implemented in 2045.

3

Electrify Now:

Implement electrification now, delay energy efficiency measures until 2035

The decision to fuel switch now optimizes carbon reduction, but operating costs increase due to the "spark gap", or the difference between the cost of electricity relative to natural gas. Operating costs fall when energy efficiency measures are implemented in 2035.

4

Maximize Emission Reductions:

Implement electrification, energy efficiency measures now

Energy-efficiency and electrification measures are implemented as soon as possible and result in the lowest total operating costs over the 25-year time horizon (even though operating costs increase in the short term).

KEY TAKE-AWAY

In all three electricity grids (low, medium and high carbon), total operating costs over the 25-year time horizon are minimized by implementing electrification and energy efficiency measures now (Scenario 4).

NOTE: This case study considers operating costs and GHG emissions only; capital equipment and financing costs are important additional considerations for evaluating the scenarios listed.

ONTARIO (LOW CARBON GRID) – EMISSIONS & OPEX COSTS

In Ontario, the decision to electrify heating systems presents compelling immediate carbon emission reduction benefits that strongly favor early action. Electrification can eliminate over 90% of a building's total emissions from space heating and domestic hot water systems, delivering substantial decarbonization impact from day one. It may also help building owners avoid potential Building Performance Standard (BPS) fines in major markets like Toronto, where regulatory frameworks are increasingly mandating carbon emission reductions.

Teams may also consider the "dual-fuel" approach (balancing electricity/natural gas use) to minimize immediate operational cost increases while still offering some transition risk mitigation and also providing peace of mind to owners by having redundant systems in place.

Regulation: Toronto is developing a building emissions performance standard, which will include industrial buildings. It is important to consider the thresholds and compliance timelines associated with standards like these when developing capital plans. Deferring action can expose assets to compressed compliance timelines and higher future retrofit costs, as regulatory requirements and market expectations are increasingly focused on improved building performance.

Figure 9

Emission Reduction Pathways in Ontario

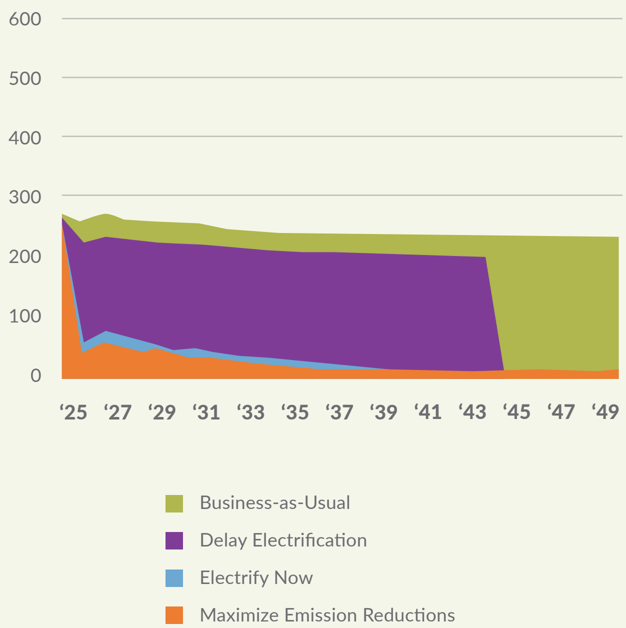
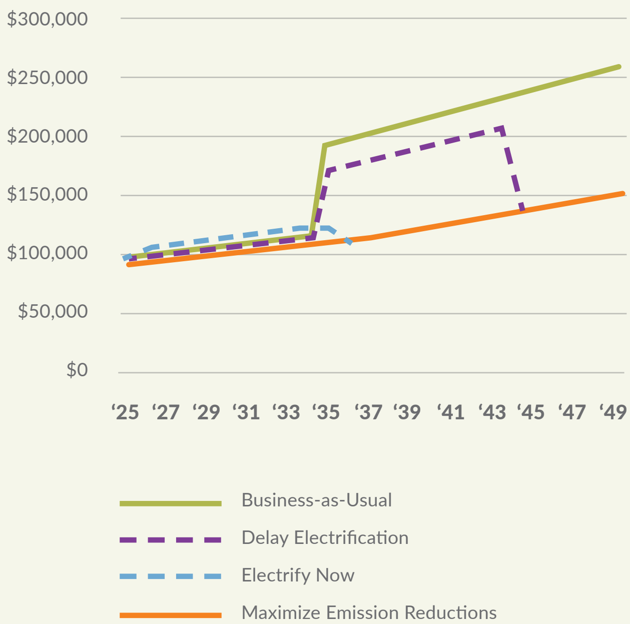


Figure 10

OpEx Cost Pathways in Ontario



NOTE: Ontario utility costs are assumed at $0.12/kWh for electricity and $0.03/ekWh for gas. Natural gas carbon cost is assumed at $300/ton starting in 2035 with 2% annual inflation. The analysis is based on a 180,000 sq. ft. building and assumes electrification investments of $4M, energy efficiency measures at $200K, and business-as-usual equipment replacement at $1.5M, reflecting the significantly higher upfront capital required for fuel-switching compared to efficiency improvements or like-for-like replacements.

ALBERTA (MID-CARBON GRID) - EMISSIONS & OPEX COSTS

As the Alberta electricity grid has already undergone significant carbon emission reductions, the decision to electrify heating systems still presents compelling immediate benefits that strongly favor early action. This benefit will grow significantly as the grid is projected to aggressively reduce more carbon emissions over the next five years.

Electrification requires high upfront capital and will lead to short-term increase in operating cost. Aligning the investment with equipment end-of-life (EOL) provides the most financially prudent decarbonization pathway. Delaying energy/emission reduction action may expose assets to financial penalties through emerging Building Performance Standards.

Regulation: Alberta currently doesn't have a province-wide building performance standard for existing industrial buildings. However, voluntary benchmarking and disclosure programs in major cities such as Calgary and Edmonton, along with growing market expectations, can act as early indicators of future regulatory requirements. Waiting for mandatory compliance requirements to be finalized may increase the likelihood of stranded assets.

Figure 11

Emission Reduction Pathways in Alberta

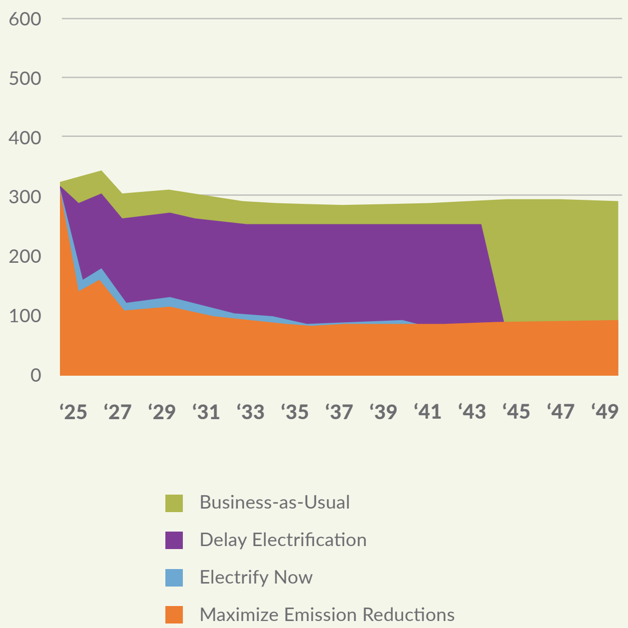
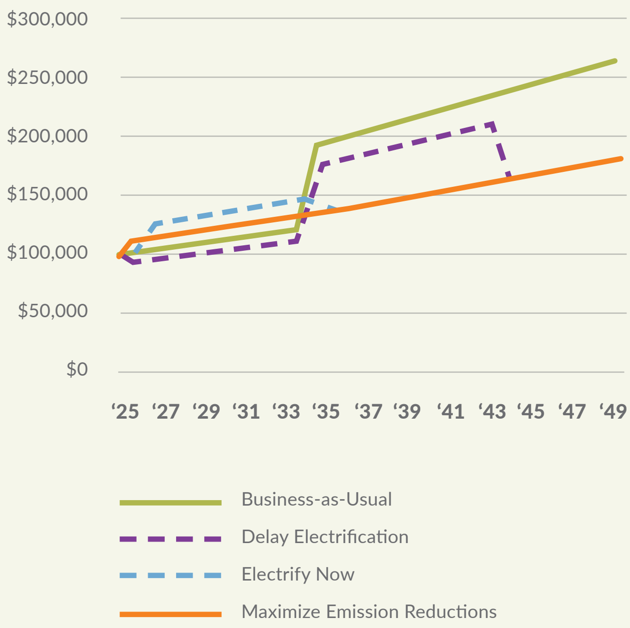


Figure 12

OpEx Cost Pathways in Alberta



NOTE: Alberta utility costs are assumed at $0.15/kWh for electricity and $0.02/ekWh for gas. Natural gas carbon cost is assumed at $300/ton starting in 2035 with 2% annual inflation. The analysis is based on a 180,000 sq. ft. building and assumes electrification investments of $4M, energy efficiency measures at $200K, and business-as-usual equipment replacement at $1.5M, reflecting the significantly higher upfront capital required for fuel-switching compared to efficiency improvements or like-for-like replacements.

SASKATCHEWAN (HIGH CARBON GRID) - EMISSIONS & OPEX COSTS

In high-carbon electricity grids like Saskatchewan, the decision to electrify heating systems presents a complex strategic challenge. While immediate electrification with some technologies may result in higher emissions in the near term (until 2030), analysis of longer-term cumulative emissions associated with maintaining gas systems demonstrates that early electrification delivers higher total emission reduction over the equipment life cycle.

The success of early electrification is heavily reliant on the grid's carbon emission reductions proceeding at projected timelines. Any delays in provincial clean energy deployment could undermine the anticipated carbon emission reductions at the site level and leave buildings with higher operating costs and limited environmental benefits. On the other hand, electrification minimizes transition risk and positions the asset well relative to buyer, investor and lender expectations, protecting asset value.

Regulation: Formal building performance requirements for existing industrial buildings in Saskatchewan remain limited. Waiting until the regulatory requirements are fully defined can leave buildings outdated, less competitive, and less attractive to investors and lenders.

Figure 13

Emission Reduction Pathways in Saskatchewan

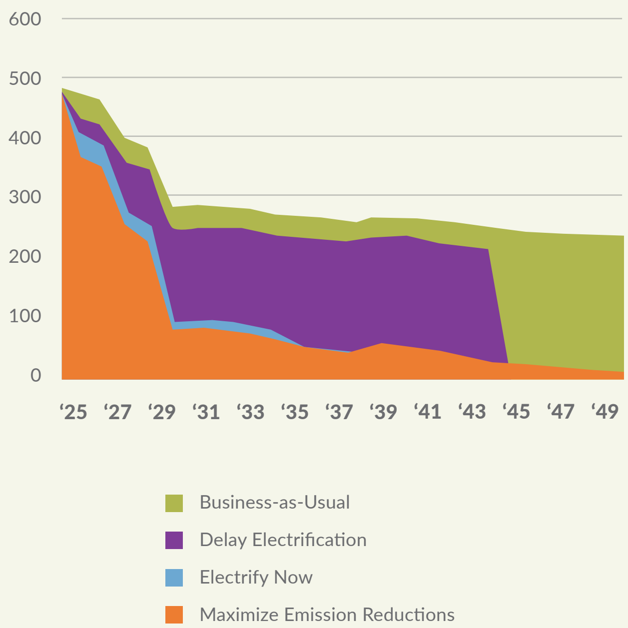
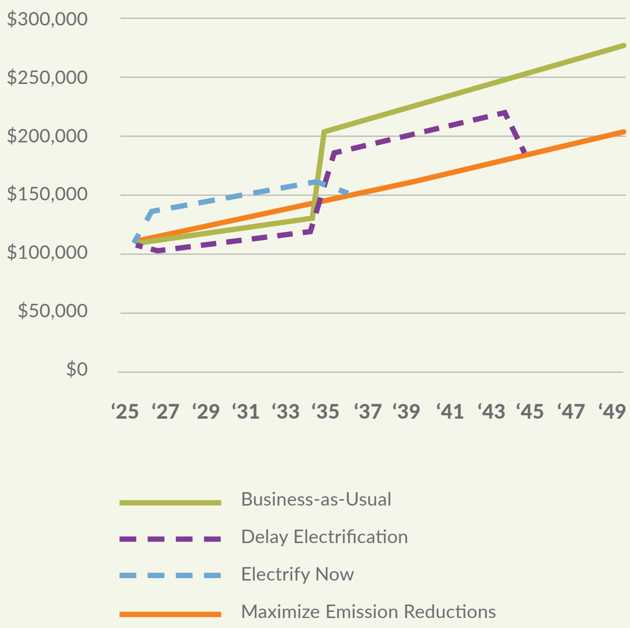


Figure 14

OpEx Cost Pathways in Saskatchewan



NOTE: Saskatchewan utility costs are assumed at $0.16/kWh for electricity and $0.02/ekWh for gas. Natural gas carbon cost is assumed at $300/ton starting in 2035 with 2% annual inflation. The analysis is based on a 180,000 sq. ft. building and assumes electrification investments of $4M, energy efficiency measures at $200K, and business-as-usual equipment replacement at $1.5M, reflecting the significantly higher upfront capital required for fuel-switching compared to efficiency improvements or like-for-like replacements.

Transition Risk – Break-Even Analysis: Case Study 3

This case study provides a simplified break-even analysis for a ~350,000 sq. ft. industrial building located in Alberta, built in the late 1990s. The break-even analysis considers the following pathways:

- **Business-as-Usual** replaces equipment as needed with equivalent, standard replacements as per the capital plan, no optimization of existing systems or any consideration for low-carbon alternatives.
- **Carbon Transition** incorporates low carbon measures based on maximizing energy efficiency, replacing gas heating with electric, and replacement of equipment with low carbon alternatives at end of life. This results in 96% of operational emissions being reduced by 2050.

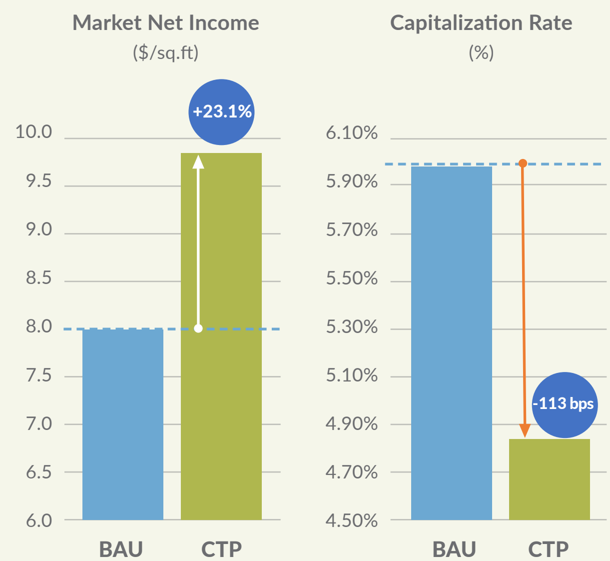
The case study utilizes market construed estimates and assumptions for the key financial metrics of the asset including vacancy, market rents, and cap rates. Regulated building emission performance standard requirements are not considered, given that they are not yet in place. The analysis seeks to focus only on the required shifts in market net income or the capitalization rate (yield) in order to 'break-even'.

The break-even analysis below identifies what is required for the carbon transition pathway to yield the same profitability as the business-as-usual pathway by estimating how much more market net income is required or how much the capitalization rate needs to shift. This provides a way in which to recognize the implications of the investment and consult with appropriate market professionals to determine, if CAPEX investments were made, whether the rental uplift or capitalization rate adjustment could be achieved for the asset in the local market.

INPUTS		
Aspect	Parameter	Details
Asset Features	Asset class	Industrial
	Size (GLA)	~350,000 sq.ft.
	Market	Alberta
	Date of Construction	Late 1990s
Capitalization Approach	Capitalization Rate	6.0%
	Baseline Asset Value	$45M
	Market Net Income	$2.7M

INTERVENTIONS		
Scenario	CapEX	CapEX Differential
Business-as-Usual Pathway	$560k	Baseline
Carbon Transition Pathway	$10.56M	+$10M

Break-even Requirements
(Capitalization Approach)



NOTES:

1) Example is illustrative only.
2) The ability to achieve the margins need to be tested in the individual markets to validate whether a rent increase may or may not be possible or adjustment to the capitalization rate may be feasible in the local market.
3) When building performance standards are introduced in this jurisdiction for industrial buildings, they could introduce penalties for non-compliance, which would limit the required rent increases or the cap rate compression needed to break even.

KEY TAKE-AWAY

This high-level analysis serves to illustrate the concepts of a simplified break-even analysis, recognizing that the market of today is not the market of tomorrow.

Two examples of how an additional $10M electrification investment could break even is for:

(i) building revenues to increase by 23.1% (via rent increases or vacancy reduction) OR

(ii) the exit cap rate to compress by 113 basis points.

Ultimately, decision makers need to anticipate potential future changes across key variables and perform detailed value-based modelling to examine time frames and opportunities to drive the best financial outcomes for the asset.

Transition Risk – Decision-Making

Taking a proactive approach to transition risks is important to protect the value of assets.

Decision points or triggers for developing or updating transition risk strategies may include the following.

TRANSITION RISK

Physical Building Conditions

- Equipment has reached end-of-life or failed

Financial Considerations

- Increases/volatility in energy costs
- Availability of incentives or preferential financing for carbon reduction projects
- Introduction of climate-related risk considerations in asset appraisals

Regulatory & Policy Changes

- Introduction of Building Performance Standards (e.g., energy or GHG thresholds)

Strategic Business Considerations

- Change in asset's investment type/stage

KEY TAKE-AWAY

When a trigger event occurs, it presents an opportunity to protect or enhance the value of an asset, consistent with your investment strategy.

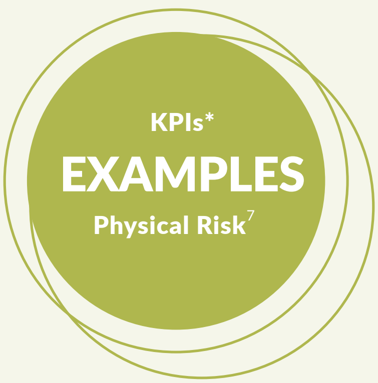
Physical Risk – Planning

Physical Risk Assessments (PRA) have become a best practice for asset and investment managers to evaluate and plan for climate-related risks for buildings or portfolios. The following stages apply:[6]

Figure 15 **Summary of Physical Risk Assessment Process**

- Review regional and site-specific climate risk data
- Evaluate building vulnerability to hazards
- Develop strategies and cost estimates for mitigation measures

Physical Risk Plans go beyond PRAs and are emerging as a best practice for higher-risk assets. They prioritize adaptation actions and are ideally integrated with capital plans.



- Area of properties located in 100-year flood zones, by property sector (SASB IF-RE-450a.1)
- Area of properties where finished floor elevation is above 100-year flood levels, by property sector
- % of portfolio with sufficient cooling capacity
- % of portfolio with completed physical climate risk assessments
- Physical risk score for asset/portfolio **
- Climate Value at Risk (CVaR), $ ***

NOTES:

* Some KPIs listed are for internal use only.

**Varies widely across physical climate risk analytics providers, based on different (i) hazards included or excluded; (ii) data description and source(s); (iii) nature of model; (iv) inclusion of physical and financial property-level information; (v) government, municipal, and asset-level risk mitigation considerations; and (vi) scenario analyses, time, and baseline assumptions.

*** This metric is presented in the context of physical risk only and can vary across physical climate risk analytics providers based on the points above.

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[6] Adapted from source: ASTM E3429-24 Standard Guide for Property Resilience Assessments - https://store.astm.org/e3429-24.html

[7] Source: REALPAC ESG Explainer – Physical Climate Risk Fundamentals

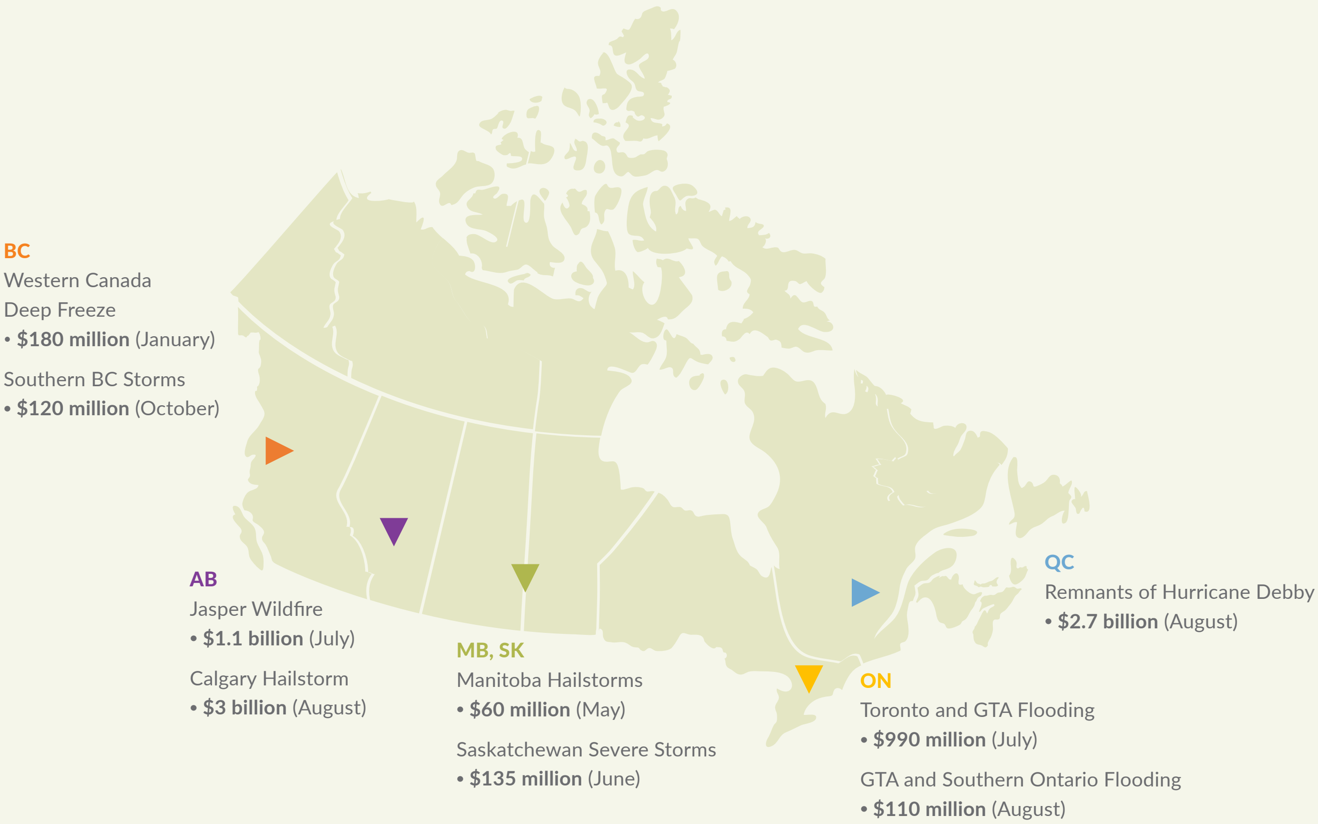
KEY TAKE-AWAY

Physical Risk Assessments are a best practice in commercial real estate, providing a structured and systematic approach to identifying and evaluating climate-related hazards and vulnerabilities across buildings and portfolios. The results of these assessments support the development of plans that include monitoring and reporting through defined KPIs that track exposure to physical climate risks.

Physical Risk – Extreme Weather Events

Extreme weather-related events are increasing across Canada, and the associated damage to assets is increasingly impacting property value. The image below highlights the 2024 insured catastrophic losses that occurred because of severe weather across Canada.[8]

Figure 16 Insured Catastrophic Losses Across Canada (2024)



Insured damage estimate increased from $3.1 billion+ in 2023 to $8.5 billion+ in 2024. The Intact Centre determined that the cost of extreme weather amounts to the following in catastrophic insurable losses:[9]

$1 insured loss

$3-4 uninsured losses incurred by government, business, individuals

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[8] Adapted from source: https://www.ibc.ca/news-insights/news/2024-shatters-record-for-costliest-year-for-severe-weather-related-losses-in-canadian-history-at-8-5-billion

[9] Source: https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2023/10/UoW_IntactCentre_2023_CRM_Infographic.pdf

KEY TAKE-AWAY

Extreme weather events are becoming more frequent and severe across Canada, driving a sharp increase in insured catastrophic losses and materially impacting property values. The rise in insured and uninsured losses highlights the growing financial significance of physical climate risk for real estate assets.

Physical Risk – Decision-Making

Taking a proactive approach to physical risks is important to protect the value of assets.

Decision points or triggers for developing or updating physical risks strategies include the following:

PHYSICAL RISK

Physical Building Conditions

- Tenant concerns around extreme heat (due to insufficient cooling capacity)
- Flooding/drainage issues associated with more frequent storms

Financial Considerations

- Shifts in insurance availability/ premiums
- Availability of incentives for adaptation projects
- Introduction of climate-related risk considerations in asset appraisals

Regulatory & Policy Changes

- Increased property taxes or new building requirements in high risk zones (e.g., flooding)

Strategic Business Considerations

- Change in asset's investment type/stage

KEY TAKE-AWAY

When a trigger event occurs, it presents an opportunity to protect or enhance the value of an asset, consistent with your investment strategy.

GLOSSARY OF TERMS

Adaptation: Adjusting or changing in response to new circumstances or challenges. In the context of climate change, adaptation involves taking action to manage the current and future impacts of changing environmental conditions.

Capitalization Rate (Cap Rate): A key financial metric used to evaluate commercial real estate investments, calculated by dividing a property's Net Operating Income (NOI) by its current market value or acquisition cost. Expressed as a percentage, cap rate represents the expected annual return on investment assuming an all-cash purchase. Higher cap rates typically indicate higher risk and potentially higher returns, while lower cap rates suggest lower risk and more stable investments. Cap rates are commonly used for property valuation, investment comparison, and market analysis across different asset classes and geographic markets.

Carbon Transition Plan: A strategic roadmap outlining how a real estate portfolio or individual asset will reduce greenhouse gas emissions and achieve low-carbon operations. The plan typically includes baseline measurements, reduction targets, decarbonization strategies (energy efficiency, fuel switching, renewables, sustainable practices), timelines, and progress monitoring.

Carbon Risk Real Estate Monitor (CRREM): A European research initiative and online tool that provides science-based carbon reduction pathways for commercial real estate portfolios. CRREM establishes decarbonization trajectories aligned with the Paris Climate Agreement's 1.5°C warming limit.

Decarbonization: In the context of buildings, this term refers to reducing or eliminating carbon dioxide emissions and other GHGs produced by a building.

Deep Retrofit: A comprehensive and extensive renovation or upgrade of a building's systems, equipment, and envelope with a focus on energy efficiency and decarbonization.

End-of-Life Equipment Replacement: The replacement of equipment or systems that have reached the end of their useful life, or are no longer efficient or effective, often with newer, more energy-efficient/low-carbon alternatives.

Energy Efficiency: The ratio between the useful output and the input energy. Increasing energy efficiency means using less input energy while achieving the same output.

Energy Performance: The measurement or assessment of a building's energy efficiency and other energy-related criteria, such as minimizing environmental impacts and costs. This performance is typically evaluated based on energy consumption or usage patterns.

Energy Use Intensity (EUI): The sum of all site energy (not source energy) consumed on-site (e.g., electricity, natural gas, district heat), including all process loads, divided by the building modelled floor area (i.e., kWh/m^2 or GJ/m^2).

Exit Value: Worth or financial value of an asset or investment if it were to be sold.

Fossil Fuel Heating Systems: Heating systems that combust coal, oil, or gas to create heat.

Fuel Switching: The practice of changing the type of fuel used for energy generation or consumption, typically from fossil fuels to lower-carbon alternatives, such as electricity and biofuels.

Greenhouse Gas Intensity (GHGI): Carbon dioxide equivalents emitted per unit (of energy, product, material, etc.). This is typically expressed by unit of floor area in buildings (i.e., $kgCO2e/m^2$).

Heat Recovery: The process of capturing and reusing waste heat generated from processes or building systems to improve energy efficiency and reduce energy consumption.

Incremental Capital Cost (ICC): The capital cost for each measure or bundle relative to the associated business-as-usual (BAU) case. Typically, the capital costs do not account for financial incentives and rebates because these incentive and rebate amounts are variable, changing year over year and by location.

Life Cycle: In the context of buildings, this term refers to the full cycle of stages that a building goes through over the course of its life, ranging from conceptualization and design to construction, occupancy, and eventual deconstruction/demolition.

Life Cycle Assessment (LCA): A method to evaluate the environmental impacts of a product, process, or service throughout its entire life cycle, from raw material extraction to end-of-life. It assesses resource use, emissions, and waste at each stage, and quantifies environmental impacts directly attributable to a material, product, building, or piece of infrastructure throughout its life cycle.

Like-for-Like Replacement: A capital expenditure strategy where existing building systems or equipment are replaced with functionally equivalent items of similar specifications and performance, maintaining the status quo rather than upgrading.

Low Carbon Systems: Energy systems that produce fewer GHG emissions compared to conventional or high-carbon alternatives. These systems typically rely on low-carbon energy sources and have higher energy efficiency.

Mitigation: Reducing the severity or likelihood of an adverse outcome. In the context of climate change, mitigation involves taking action to lower greenhouse gas emissions, helping limit the severity of future climate impacts.

Net Present Value (NPV): A calculation made for each measure or bundle to assess whether it provides a positive return on the initial investment. The NPV calculation is the sum of all positive and negative cash flows for an investment over the analysis period. The NPV calculation discounts future cash flows to determine their equivalent present value according to the chosen discount rate. The NPV calculation includes the ICC, the difference in utility costs relative to the BAU building, and incremental replacement costs that would normally occur within the timeframe of analysis.

Net Operating Income (NOI): A property's annual income after deducting operating expenses but before debt service, taxes, and capital expenditures. Calculated as gross rental income minus vacancy and operating costs. Essential metric for property valuation, cap rate calculations, and CRE investment analysis.

Operational Carbon: Carbon emissions associated with energy use and the release of refrigerants during regular building operations.

Payback Period: The number of years it would take to break even on the initial investment through operating energy cost savings. This metric can either discount future cash flows by recognizing the time value of money or can be a simple payback looking at the initial investment over the first-year energy cost savings using current utility costs. The smaller the payback period, the better the investment.

Performance: In the context of buildings, refers to the measurement of a building or system in terms of energy efficiency, indoor environmental quality, occupant comfort, carbon emissions, and other relevant factors.

Rate of Return: The discount rate that would be required to set the net present value to zero over the analysis period. This is useful for estimating the profitability of investments.

Renewable Energy: A source of energy that is replenished through natural processes or by using sustainable management policies such that it is not depleted at current levels of consumption. Renewable energy generation systems, such as solar panels or wind turbines, can reduce a building's emissions from grid electricity and contribute to meeting the need for additional electrical power.

Retrofit: The process of upgrading a building with new materials, equipment, and controls. Building retrofits can improve energy efficiency and reduce operational carbon emissions.

Rooftop Solar: A renewable energy technology that converts sunlight directly into electricity using semiconductor cells and is installed on rooftops to reduce energy costs, lower carbon emissions, and enhance property value. Can be owned, leased, or operated under power purchase agreements.

Total Return: A comprehensive investment performance measure combining income generated (rental income, dividends) and capital appreciation over a specified period, expressed as an annualized percentage. Provides complete picture of CRE investment performance for portfolio benchmarking and cross-asset comparisons.

TCFD: Task Force on Climate-Related Financial Disclosures - a G20 Financial Stability Board initiative launched in 2015 that created a widely used framework for climate-related financial disclosure, helping standardize and popularize the term "climate-related risks" (including physical and transition risks).

Zero Carbon Building: A highly energy-efficient building that produces on-site, or procures, carbon-free renewable energy or high-quality carbon offsets in an amount sufficient to offset the annual carbon emissions associated with building materials and operations.

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Financial support for the program/report is provided by the Natural Resources Canada (NRCan) Codes Acceleration Fund.

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March 2026