



The Business Imperative of Climate Change for Municipalities

Climate Change Liability

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About Zizzo Strategy

Climate Change is Re-defining Risk Management, Legal Liabilities and Business Imperatives

Multi-disciplinary Strategic Consulting Firm

Law & Policy,
Engineering,
Accounting &
Science

Extensive Networks
with leading climate
scientists and
climate adaptation
experts

Understanding
critical issues

Recognized by
global leaders as a
trusted advisor on
climate-related
issues

Climate risks and opportunities are top of mind

- Extreme weather events in Canada are intensifying, highlighting the financial and social cost of climate change.
- Global temp has already increased by $\sim 1^{\circ}\text{C}$
- Global leaders are calling for a fundamental shift toward a financial system that will support a sustainable, climate-resilient economy.
- The transition will be shaped by changes to investor behaviours, policy and technology.
- Winners and losers will emerge.

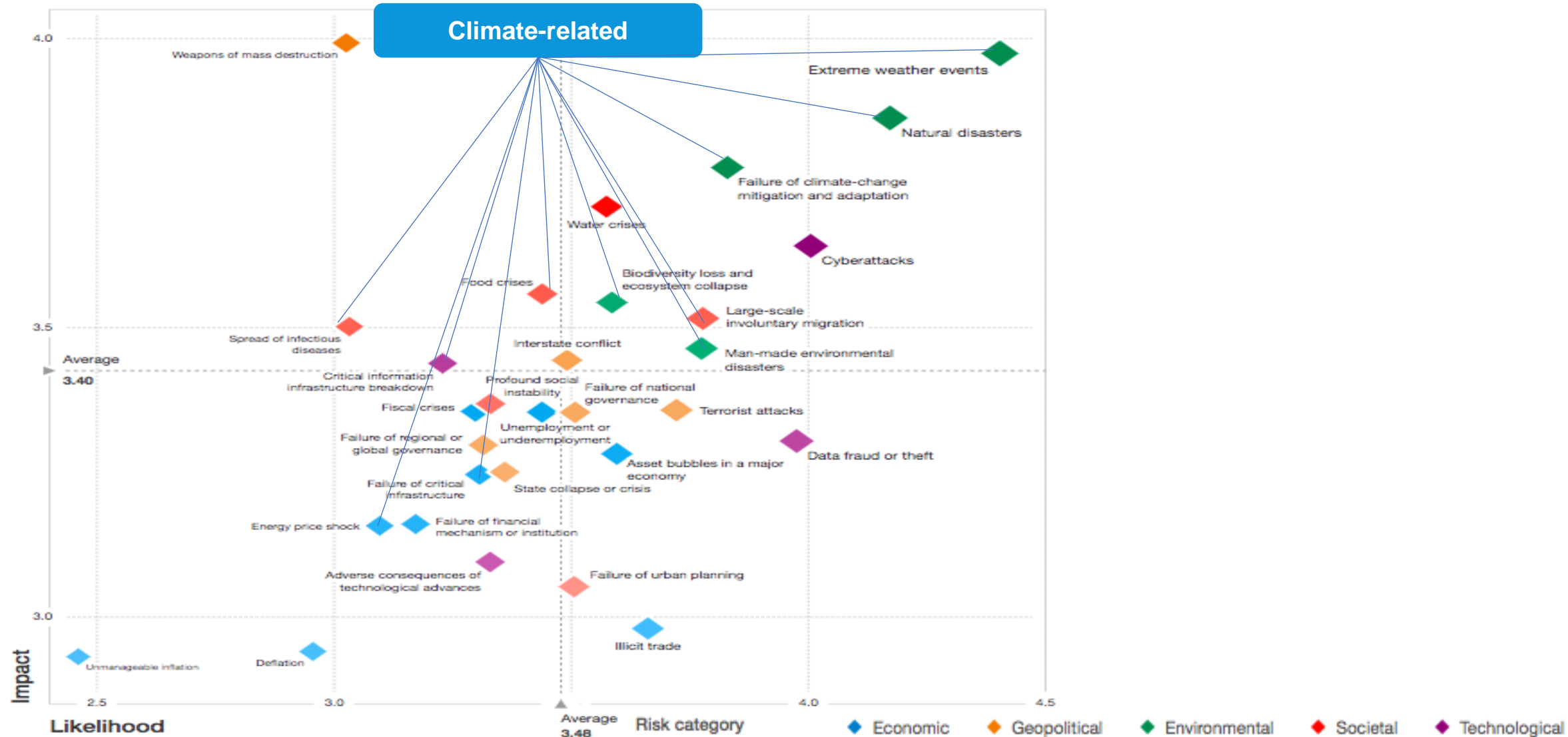


Zizzo Strategy helps organizations stay ahead of the curve and gain competitive advantage in the transition to a low carbon economy.



Risks

World Economic Forum: The Global Risks Report 2018



World Economic Forum: 2018 Global Risk Report

Figure 1. Evolving risk landscape 2008-2018

	2008	2013	2018
Top 5 Global Risks in terms of likelihood	Asset price collapse	Severe income disparity	Extreme weather events
	Middle East instability	Chronic fiscal imbalances	Natural disasters
	Failed and failing states	Rising greenhouse gas emissions	Cyberattacks
	Oil and gas price spike	Water supply crises	Data fraud or theft
	Chronic disease, developed world	Mismanagement of population ageing	Failure of climate-change mitigation and adaptation
Top 5 Global Risks in terms of impact	Asset price collapse	Major systemic financial failure	Weapons of mass destruction
	Retrenchment from globalization (developed)	Water supply crises	Extreme weather events
	Slowing Chinese economy (<6%)	Chronic fiscal imbalances	Natural disasters
	Oil and gas price spike	Diffusion of weapons of mass destruction	Failure of climate-change mitigation and adaptation
	Pandemics	Failure of climate-change mitigation and adaptation	Water crises

● Economic
● Environmental
● Geopolitical
● Societal
● Technological

Climate Change Impacts Business

Significant Economic Impacts of Climate Change Increasingly Recognized

- Bank of Canada warns that estimated **cost of inaction could be \$21-43 billion/year by 2050**
- “Trillions” at stake in move to low-carbon economy
 - **Global low-carbon market of >\$5.8T and projected to grow at 3% per year**
- Investors, stock exchanges, securities regulators, rating agencies pushing for **enhanced climate-related disclosure**
- Financial Stability Board – Task Force on Climate Related Financial Disclosures
 - Mandate to improve and standardize the integration of climate change in financial reporting

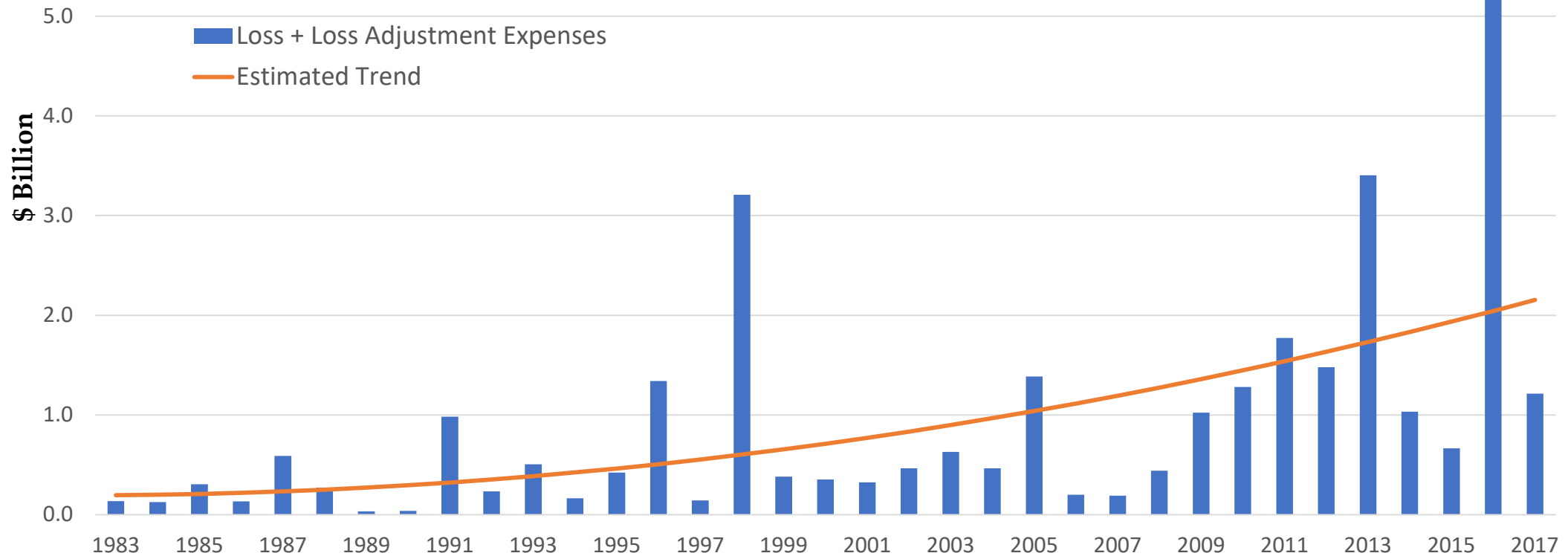


Photo courtesy of Andy Clark, Reuters

Federal and provincial policy developments responding to these trends and showing opportunity for Canadian leadership in the transition to a low-carbon and climate resilient economy

Insured Losses: Risks Related to Climate Impacts

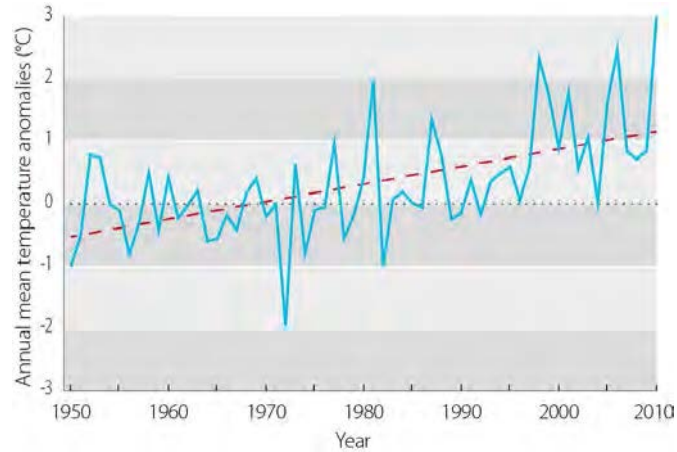
2017 Insured Catastrophic Losses in Canada (Source: IBC)



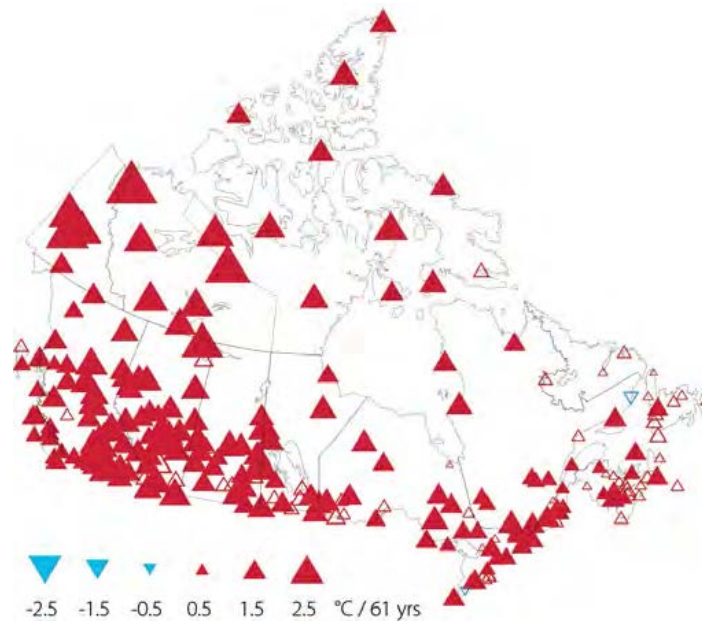
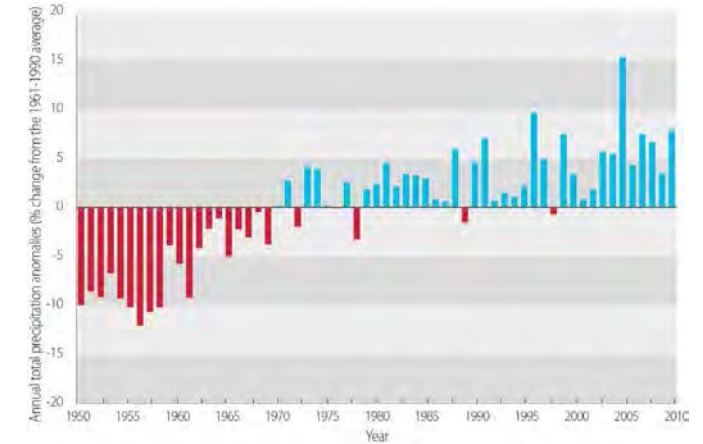
\$2017 - total natural-catastrophe losses normalized by inflation and per-capita wealth accumulation (Source: IBC)

Canada's Changing Climate

1.5 degree warming trend



Increasing precipitation



Warming across Canada

Potential Climate Impacts



- Increasing precipitation & intensity of storms
- More frequent severe freezing/thawing cycles
- More frequent intense summer heat days
- Fluctuations in water availability and quality
- Sea level rise



- Increased costs due to impacts on physical assets & potential legal liability
- Significant need to adapt

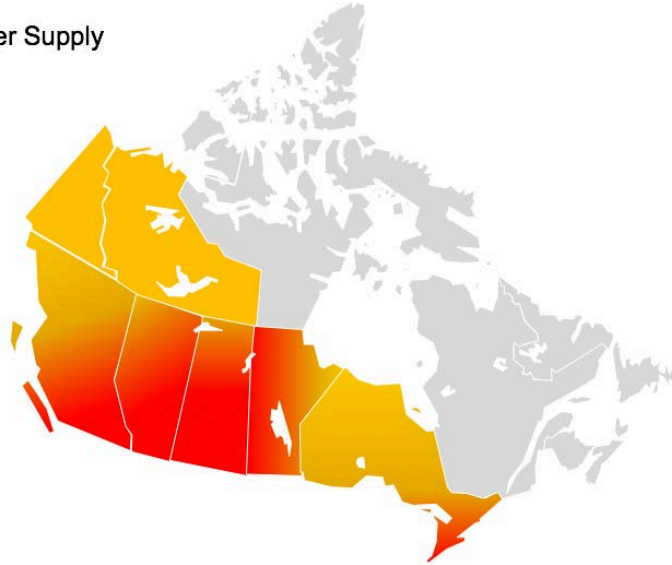
Climate Trends

Red text = increasing

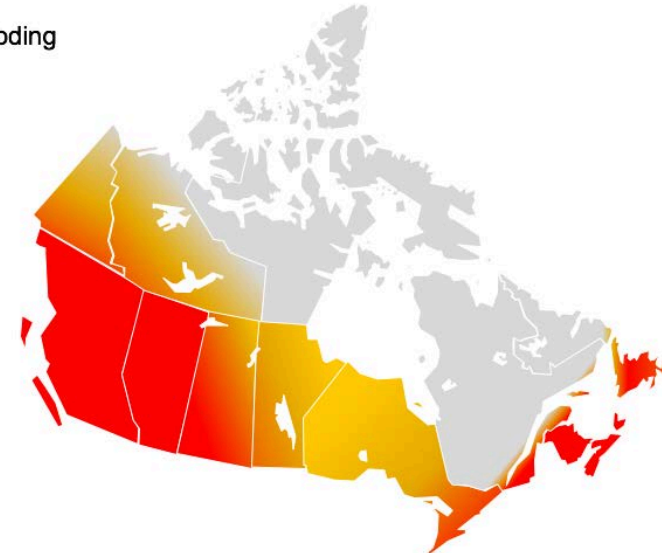
Event Category	Climate Parameter	Trends
Drought Freeze-Thaw	Frequency of Drought	No Trends
	Freeze-Thaw Cycles	Slight increase based on increasing winter precipitation and average temperatures
Humidity	High Humidity Periods	Slight increase based on increasing precipitation from analysis of all models, and increase in temperatures
Rain	Frequency of Rainfall	Trend is unclear due to unknown distribution of rain events in future projections
	Heavy Rain	Slight increase based on higher rainfall volume in the summer season
	Total Rainfall	Increase of ~50mm annually above historic baseline
	Freezing Rain Rain on Snow Events	Slight increase in temperature will create a vertical temperature profile that is conducive to rain on snow or freezing rain events
	Rain and Wind	Generally, winds are decreasing but summertime events have the potential for gustier conditions due to increase in atmospheric energy for thunderstorm events
	Flash Freeze Event	Trend is unclear due to unknown distribution of rain events in future projections
Snow	Snowmelt & Accumulation	Trend is unclear due to unknown distribution of precipitation events in future projections
Sun	Sunny Days	Trend is unclear due to lack of information on future dynamics (cloud cover)
Temperature	Extreme Heat and Cold	Slight increase in extreme heat, slight decrease in extreme cold
	Cooling Degree Days and Heating Degree Days	Slight increase in cooling degree days, slight decrease in heating degree days
	Average Temperature	Analysis of all models indicates an average increase of ~2.5°C above historic baseline for all three sites
Wind	High Winds	Slight decrease in wind speed

Example of Physical Risks Across Canada

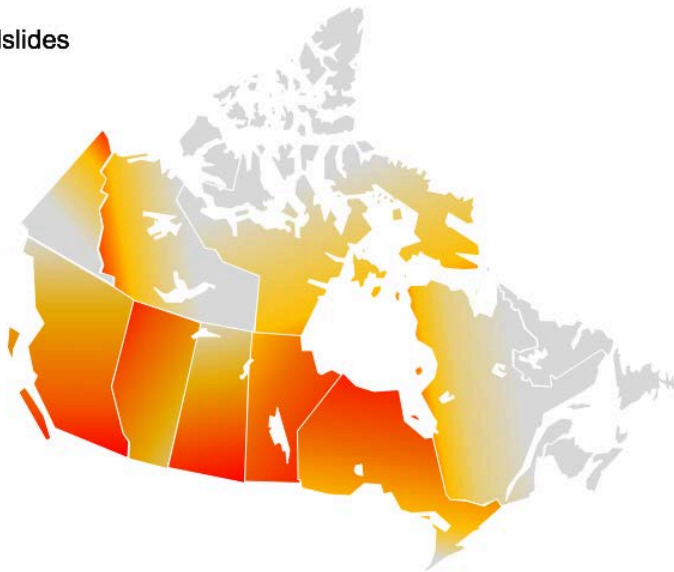
Water Supply



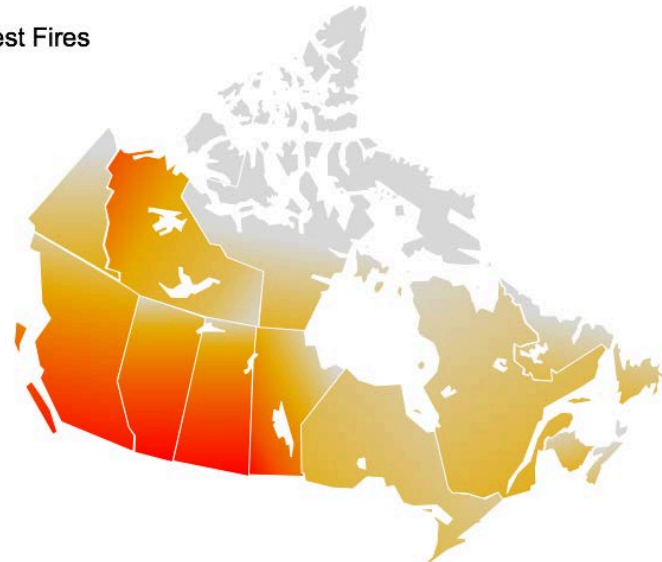
Flooding



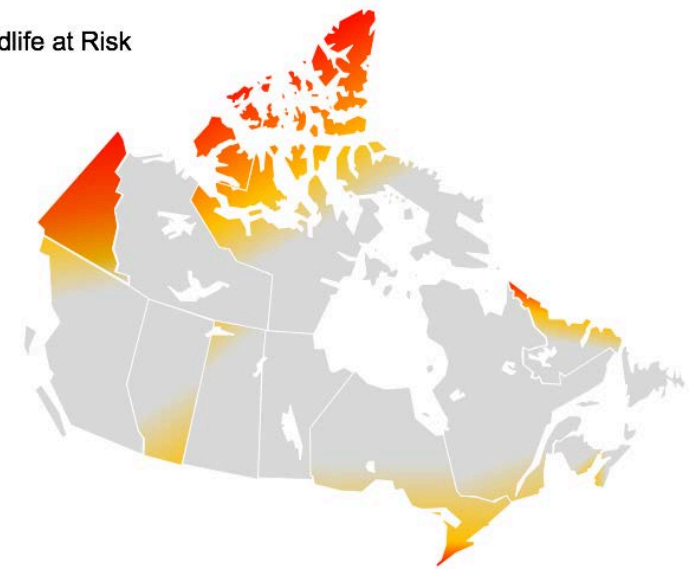
Landslides



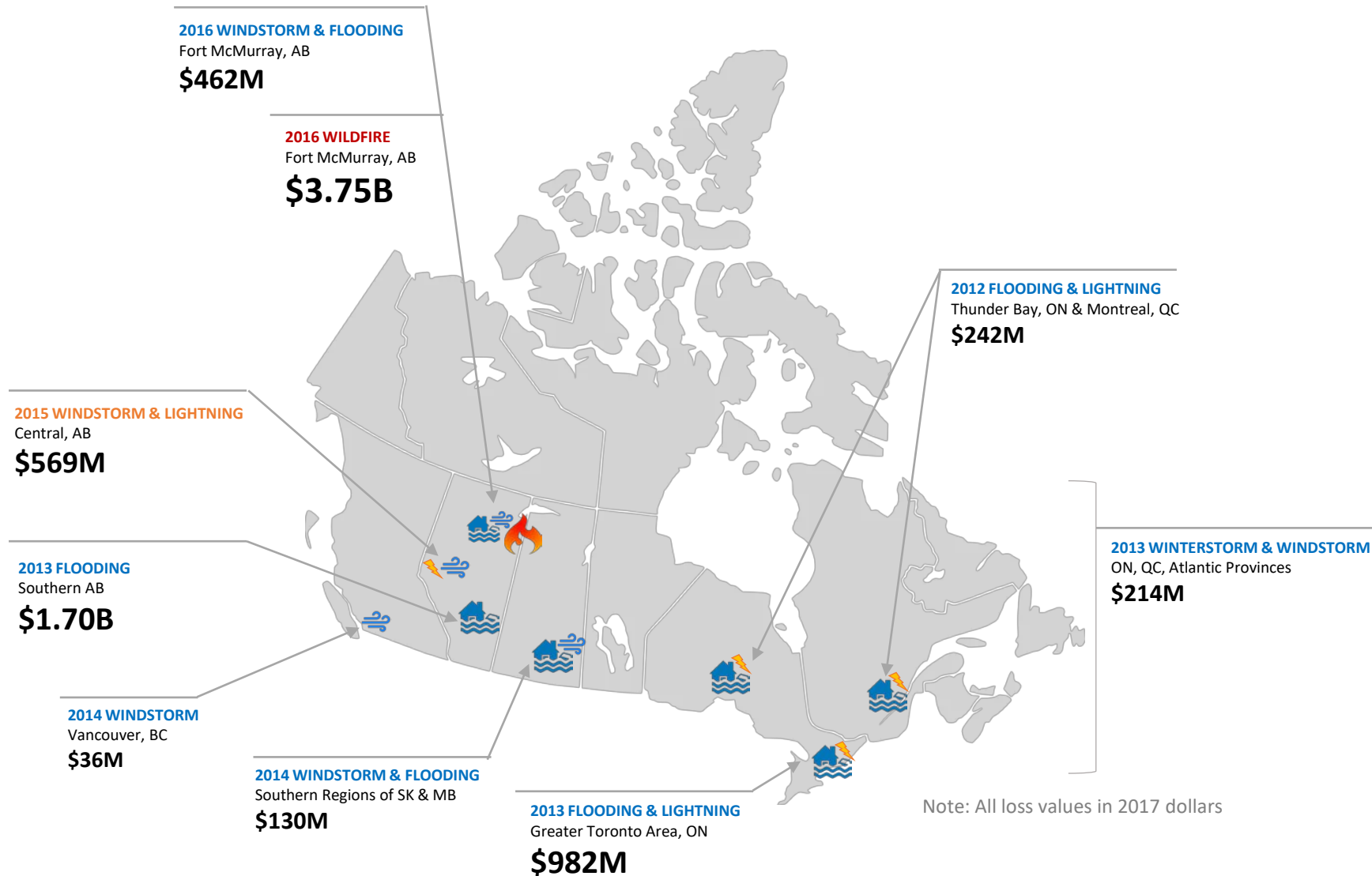
Forest Fires



Wildlife at Risk



Damage Costs from Extreme Weather Events



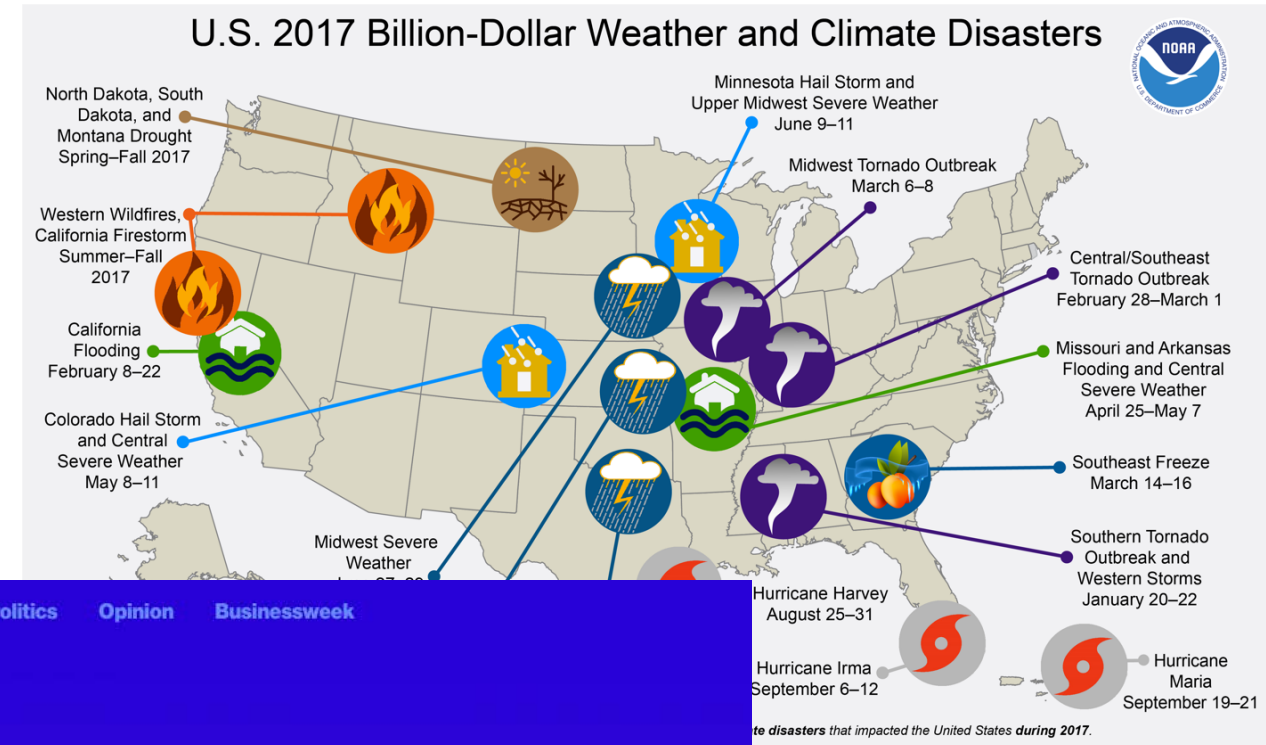
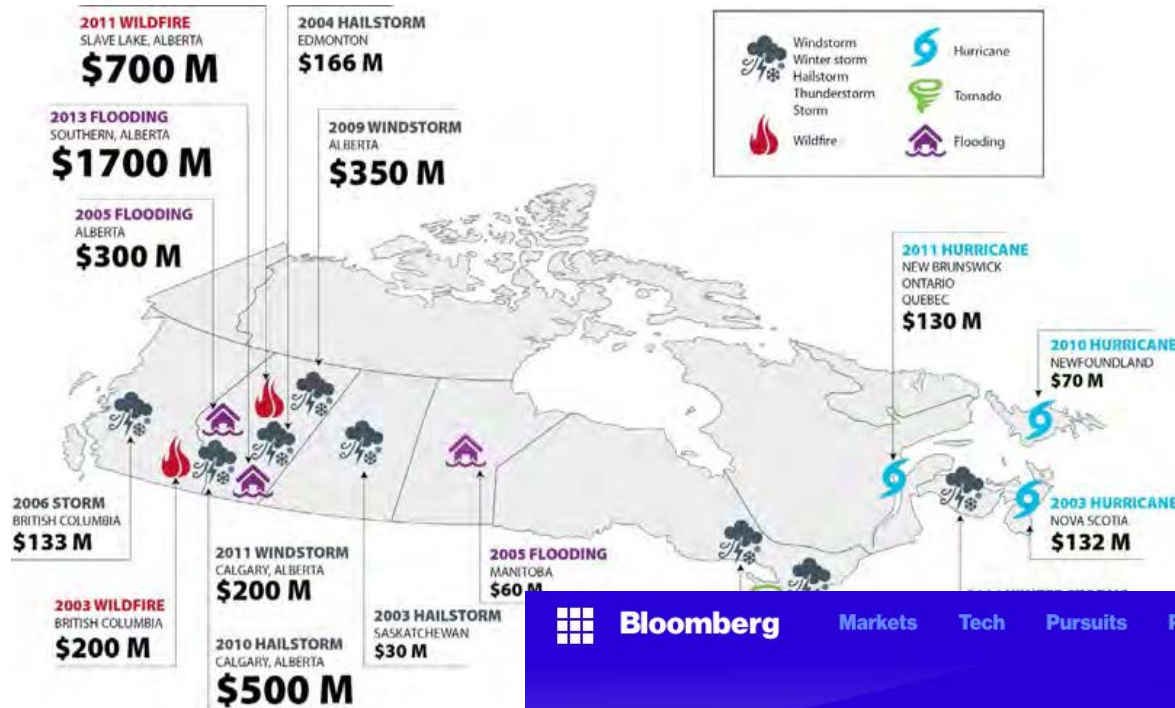
Note: All loss values in 2017 dollars

10 YEAR TREND

YEAR	LOSS
2008	\$0.43B
2009	\$0.93B
2010	\$1.20B
2011	\$1.70B
2012	\$1.42B
2013	\$3.34B
2014	\$1.03B
2015	\$0.65B
2016	\$5.14B
2017	\$1.21B

TOTAL LOSS
1983 to 2017
\$21.16B

Climate Change Impacts Business



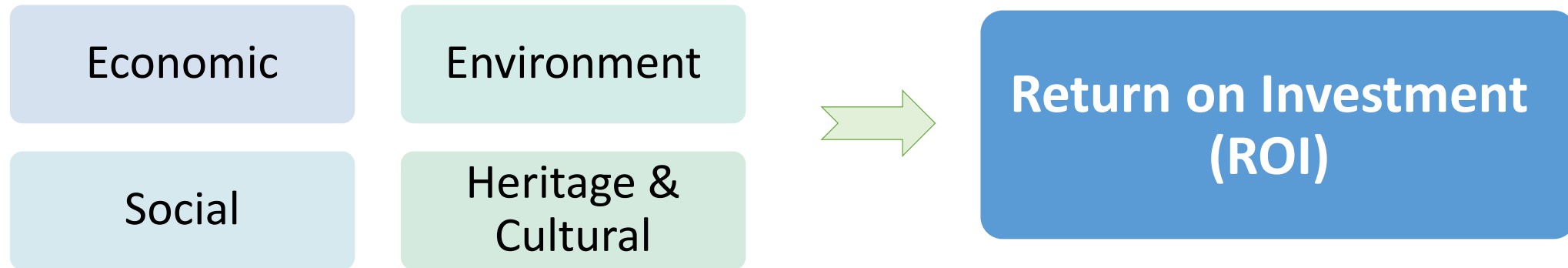
Moody's Warns Cities to Address Climate Risks or Face Downgrades

By **Christopher Flavelle**
November 29, 2017, 4:00 AM EST
From **Climate Changed**

Municipalities Are Trying to Understand Physical Risks

Infrastructure Type	PIEVC Vulnerability Assessment Case Studies
Water Resources	Toronto & Region Conservation Authority Claireville and G. Ross Water Control Dams
Stormwater & Wastewater	Assessment of Town of Welland's Stormwater and Wastewater Collection and Treatment System
Roads & Associated Structures	The City of Greater Sudbury - Ontario; and the City of Edmonton Quesnell Bridge Refurbishment - Alberta
Buildings	Infrastructure Ontario/ Ministry of Infrastructure - Three Public Buildings
	285 Shuter Street Apartment Tower
Electrical Transmission & Distribution	Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment - Distribution Sector
	Assessment of Toronto Hydro Electrical Supply and Delivery Infrastructure

Accounting for Damage Costs in ROI



Climate-related risks affecting companies today...



Regulatory Risk

Broad regulatory changes are affecting costs and demand, and stranding assets.



Performance Risk

Like any other financial risk, climate-related risk can have material impact to company value, and should be part of investment decisions and client dialogue.



Extreme Weather Risk

Affects property values, insurance availability, business continuity, asset security, etc.



Market Risk

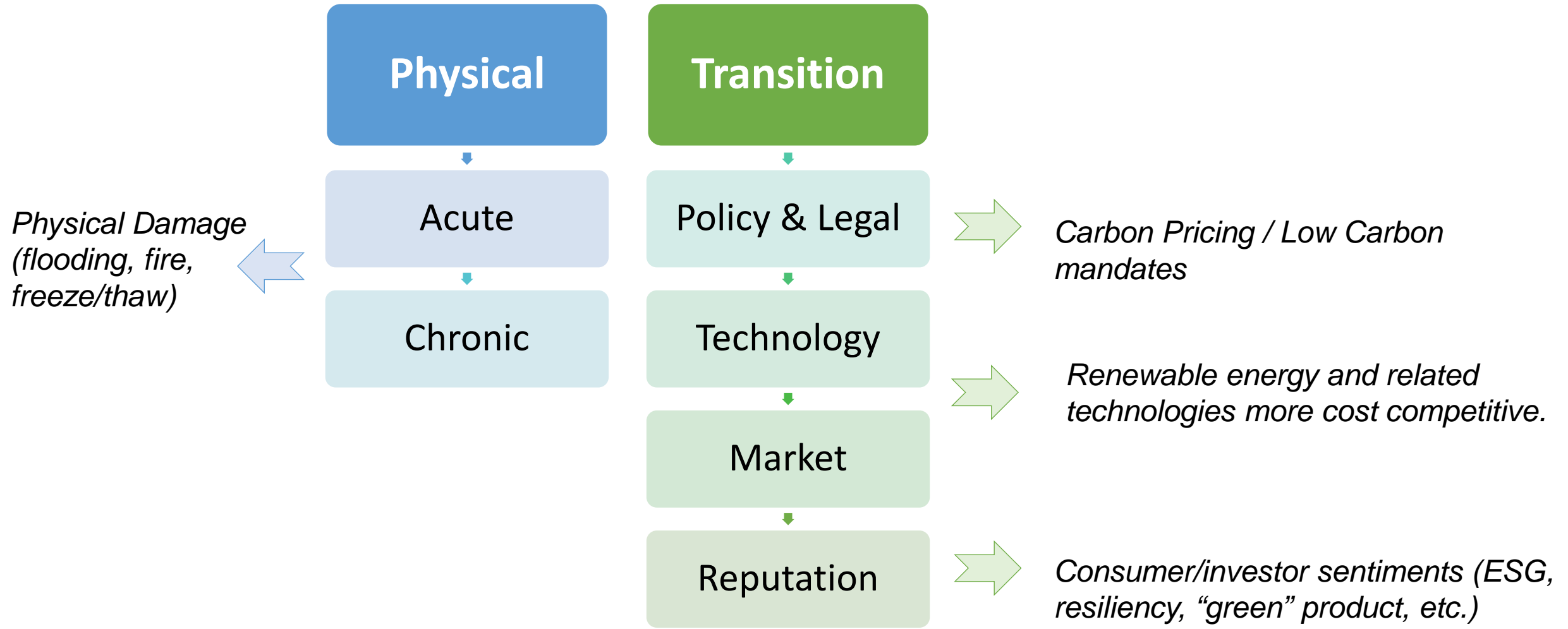
Investors are demanding better transparency of climate risk strategy and exposure.



Litigation and Technology Risk

Rapid innovation and stakeholder awareness mean opportunity for those who can stay ahead of the curve.

How to Think About Climate Risks and Opportunities



Mitigation vs Adaptation



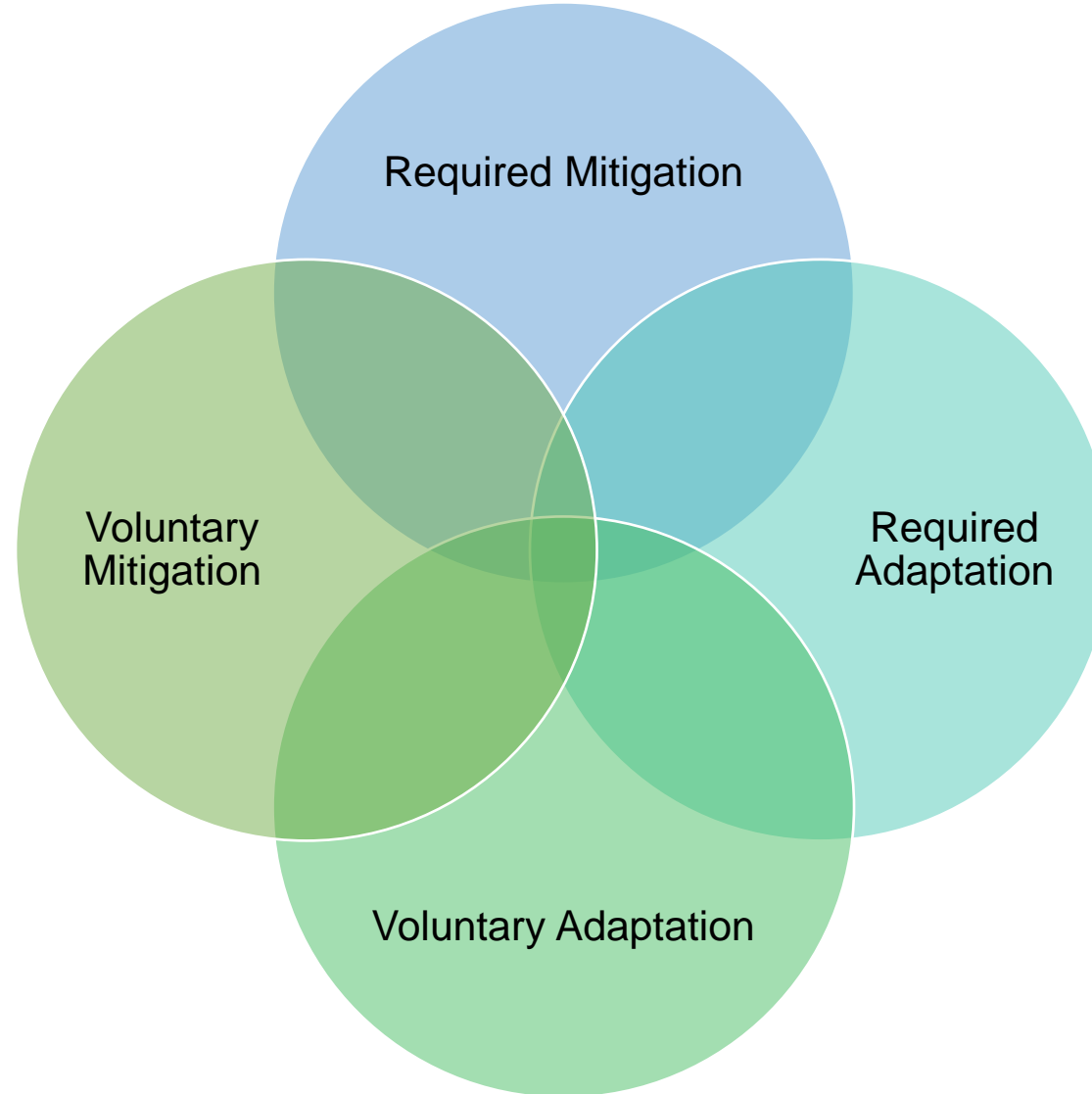
Climate change **mitigation**:
actions taken to reduce the
sources of greenhouse gas
(GHG) emissions or enhance
the sinks



Climate change **adaptation**:
responding to actual or
expected climatic changes or
their effects in a way that
moderates harm or takes
advantage of potential
opportunities



Response to Climate Change

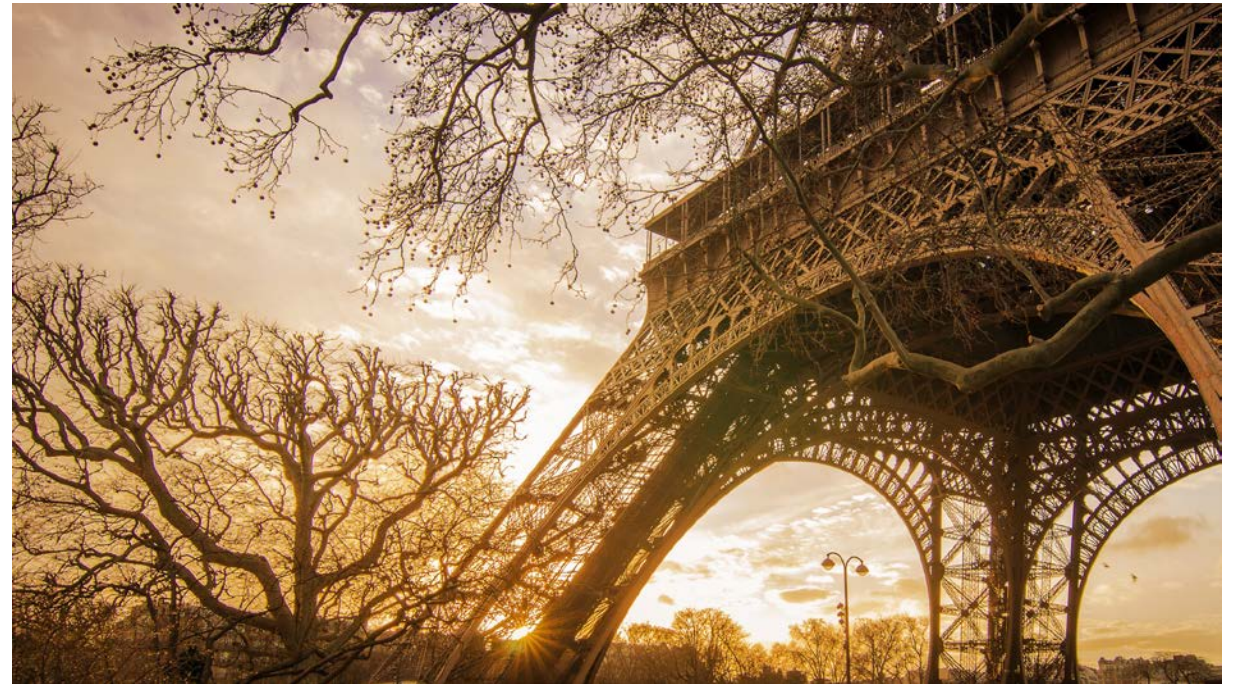






Paris Agreement: Universal Agreement & Market Signal

- *Universal* Agreement to address climate change
 - Goals:
 - Limit warming to well below 2°C above pre-industrial levels and pursue efforts to limit increase to 1.5°C
 - Decarbonization of economy in second half of century
 - Nationally determined contributions
 - 5-year global stocktakes, transparency through UNFCCC secretariat
 - Global direction + collective movement



Climate Change and Cities

70% of all cities are already experiencing climate change impacts.

For many reasons, cities have emerged as leaders on climate action:

- Cities are **in touch with local needs and capacities**, making them well-positioned to direct investments and see what is working on the ground.
- They **sit at a nexus of key players in the climate action arena**—from federal and provincial governments to private sector insurers and lenders, to community organizations and residents.
- Finally, cities are **hubs of innovation, creativity and technology**. They are where solutions are most likely to be dreamed up and tested out.
- Initiatives Emerging e.g.



Source: <http://427mt.com/2015/01/20/city-adaptation-spotlight-nd-gain-adds-index/>

Legal and policy drivers to reduce GHGs

Command and control

Market approaches

Litigation

Regulatory tools

Performance standards

Litigation Related to GHG Reduction



Lawsuits forcing government action

- Urgenda lawsuit against Netherlands re GHG emission reduction targets

Lawsuits against large emitters

- San Francisco and Oakland sue major oil companies around sea level rise
- New York City sues five largest publicly-traded oil companies

Litigation Related to Failure to Adapt to Climate Change



Flood-related class action lawsuits

- City of Muskoka (2016, \$900M)
- City of Thunder Bay (2012, \$300M)
- City of Stratford (2010, settled for \$7.7M)

Defendants include:

- Owner or occupier (including government)
- Government entities
- Engineers, architects and other design professionals
- Contractors

Standard of Care Under Constant Evolution

Reasonable

Foreseeable

Information
Accountability

Competent

Current

Potential for liability

- Negligence: Injury to person(s) or property because another failed to take reasonable care
 - Duty
 - Standard of Care
 - Causation, Foreseeability, Damages

Duties and Responsibilities Are Evolving in Various Sectors

- Delivery of safe electricity
- Owner of land / infrastructure
- Keeping roads safe and fit for use
- Clean drinking water
- Adequate inspection
- Proper emergency response systems in place





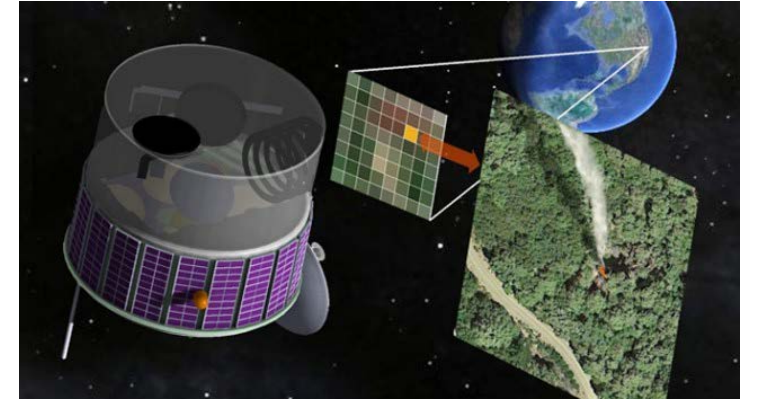
Opportunities

Climate-Resilient Economic Sectors

Tourism



Agriculture



Information & Communication Technology

Smart Investment and Operational Efficiency

- Renewal=opportunity for a smart investment
- Avoiding response and recovery spending and being better prepared for emergencies
- Evolved understanding of operation and maintenance



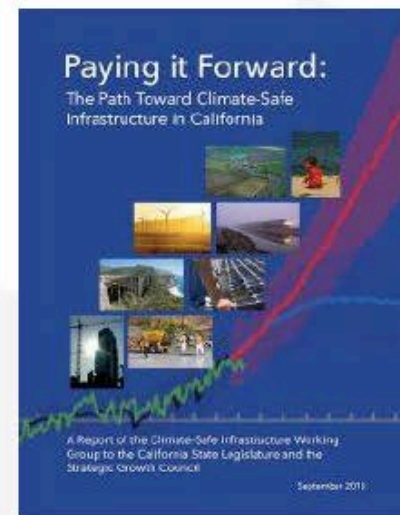
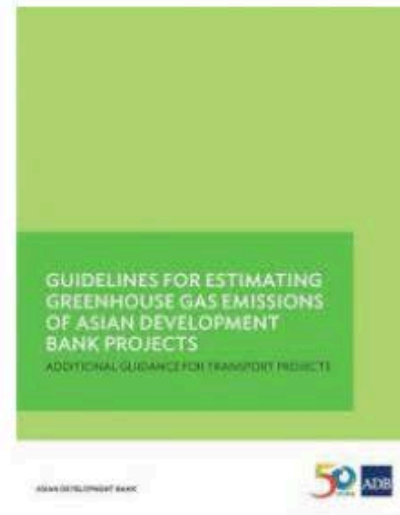
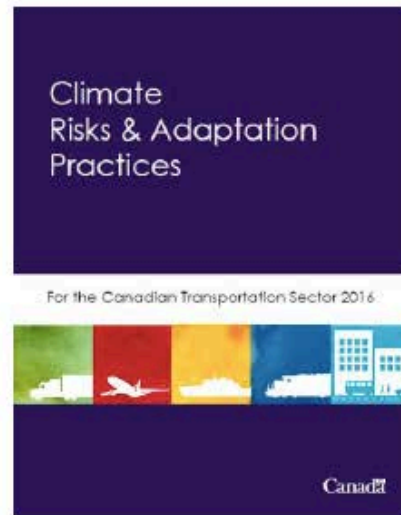
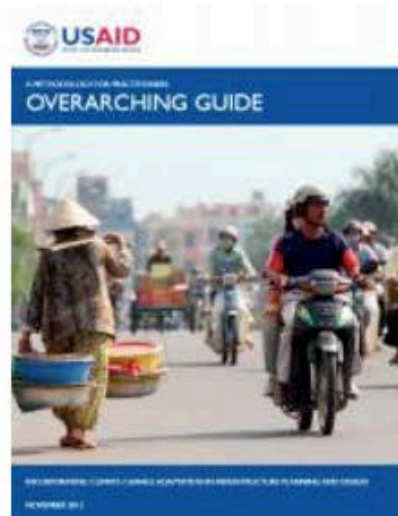
Source: <http://427mt.com/2015/01/20/city-adaptation-spotlight-nd-gain-adds-index/>

Increasing Access to Capital

- Improved credit rating and interest rates
- Attracting business, investment and talent
- Green bonds and public-private partnership (PPP)



International & National Momentum



Infrastructure Canada Funding Streams

INVESTING IN CANADA \$180 + BILLION INFRASTRUCTURE PLAN OVER 12 YEARS



Investments to support Canada's long-term infrastructure plan will flow through:

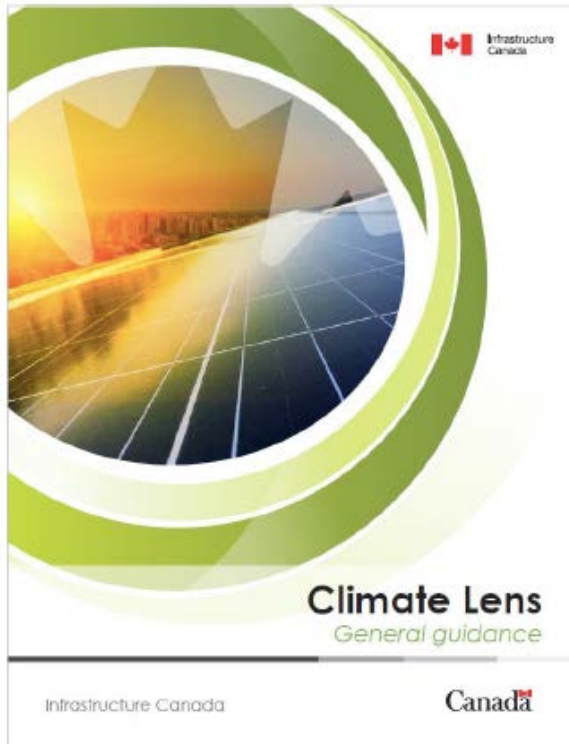
Bilateral agreements with provinces and territories

A series of national programs

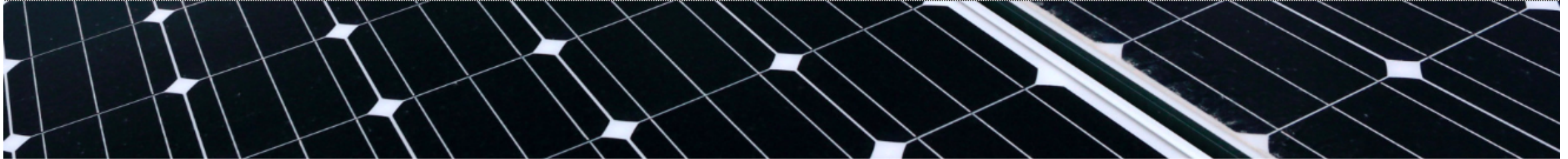
Canada Infrastructure Bank

Innovative Challenges

Climate Lens Guidance



Programs and Streams	GHG Mitigation Assessment	Climate Change Resilience Assessment
Investing in Canada Infrastructure Program (Integrated Bilateral Agreements)		
Green Infrastructure – Climate Change Mitigation sub-stream	All projects <u>(eligibility requirement)</u>	If total eligible project costs are \$10M or greater
Green Infrastructure – Adaptation, Resilience and Disaster Mitigation sub-stream	If total eligible project costs are \$10M or greater	All projects <u>(eligibility requirement)</u>
Other streams and Sub-streams (Environmental Quality, Public Transit, Culture and Recreation, Rural and Northern Communities)	If total eligible project costs are \$10M or greater	If total eligible project costs are \$10M or greater
National Programs		
Disaster Mitigation and Adaptation Fund	All projects	All projects
Smart Cities Challenge (Winner)	If total eligible project costs are \$10M or greater and project is a mitigation project	If total eligible project costs are \$10M or greater and project is a climate change resilience project



Photographer: Yuzuru Yoshi

Markets

Canada Pension Sells \$1.2 Billion Green Bond in Global First

By Maciej Onoszko

June 13, 2018, 10:25 AM EDT *Updated on June 13, 2018, 1:25 PM EDT*

- ▶ CPPIB priced C\$1.5 billion of inaugural green bonds due 2028
- ▶ This is the largest Canadian green bond offered in single sale

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Utilities



The New York Times



Power Companies' Mistakes Can Cost Billions. Who Should Pay?

Utilities say they must be shielded from liability or the electric grid will suffer. Critics say that puts the burden on ratepayers, not investors.



Benefits of identifying and managing climate impacts



With the Paris Agreement,
\$20+ trillion in opportunities



- + Better informed investment decisions
- + Readiness for regulatory and economic change
- + Internal capacity to respond to climate change
- + Robust and sustainable enterprise risk management
- + New investment opportunities and revenue streams
- + Optimized operational costs
- + Asset and supply chain security
- + Ability to communicate climate resilience to stakeholders

Key Takeaways

- Climate change presents risks, but also opportunities
- Leverage strengths of partners for transformational change
- With proper foresight, cities can thrive



Thank You!

Let's work together to help avoid the
unmanageable and manage the inevitable

.

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