



Managing the business risks and opportunities of a changing climate

A primer for executives on adaptation to climate change

Climate change is a business issue. Firms' reputations, legal responsibilities, regulatory obligations, financial reporting, operations and supply chains can be affected. Global and local changes in temperature, the frequency and severity of extreme weather conditions and the availability of water can have a direct bearing on firms' risk profiles and, in some cases, strategic positioning. Recent experience with extreme weather highlights our economic exposure to these changes: in 2010, 950 natural catastrophes caused global losses totaling US\$130 billion U.S., of which US\$37 billion was insured.¹ As the effects of climate change play out globally, demand for products and services to manage climate risks will also rise.²

Despite these striking prospects and figures, the business case for proactive adaptation is complicated by uncertainty about the magnitude of impacts and the time horizons involved. Further, changes are incremental and may be long-term in nature. This makes it tempting to defer adaptation actions – but is this effective risk management? Just as firms readily manage uncertainty from other sources (e.g. financial markets, regulation), they must understand the opportunities and risks presented by a changing climate and position themselves to respond appropriately.

To explore drivers for corporate climate adaptation and learn from the experiences of leading companies, the National Round Table on the Environment and the Economy (NRT) and the Network for Business Sustainability (NBS) convened approximately 40 business leaders and experts in Toronto on October 27, 2011. The dialogue provided a pragmatic lens on the issue, and the perspectives highlighted will directly inform national policy through the NRT's [Climate Prosperity](#) report on business resilience in a changing climate due for release in spring 2012.

Mitigation and Adaptation

Companies have a role in both climate change mitigation and adaptation.

[Mitigation](#) focuses on limiting the speed and scale of climate change. It has typically received the most attention in policy circles, such as debates over carbon pricing as a mechanism to reduce GHG emissions across the economy.

[Adaptation](#) involves adjusting to actual or expected climate change effects. This includes managing risk and exploiting opportunities.



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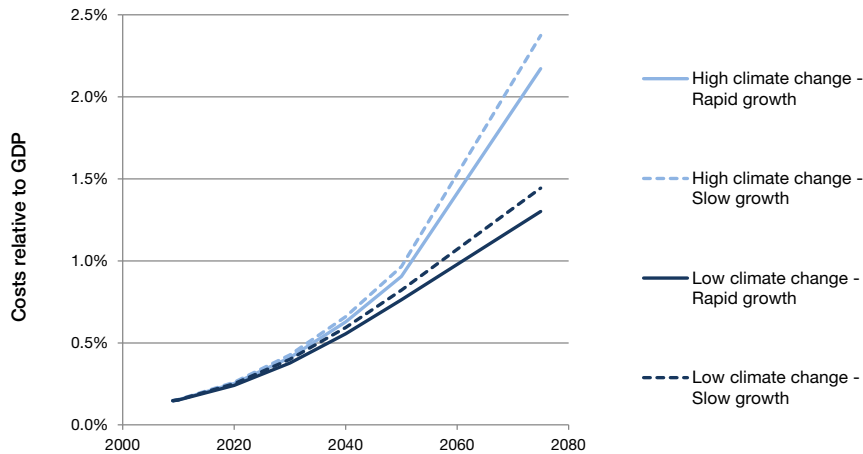
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Climate change 101: What are we adapting to?

The Intergovernmental Panel on Climate Change (IPCC) has concluded that the evidence for a changing climate is unequivocal.³

Figure 1. Average annual costs of climate change for Canada relative to GDP



Source: *Paying the Price*, National Round Table on the Environment and the Economy, 2011

(e.g. cleaner production investments in manufacturing can reduce energy or water use and reduce operational risk if water shortages occur). But, in practice, firms allocate far less attention to adaptation than to mitigation.

What changes must we adapt to? Land and ocean temperatures are rising, extreme events are becoming more common and the hydrological cycle, a determinant of water availability, is changing.

Projections suggest:⁵

- Average global warming of 0.2°C is expected for each of the next two decades
- Longer-term warming is expected in the range of 2°C-4.5°C
- Sea level rise of between 18 and 59 cm is expected by the end of the 21st century – a conservative estimate according to recent science⁶

In North America in particular, warming in the western mountains will create more winter flooding and less water availability in the summer, creating greater competition for already limited water resources. The number of heat waves in urban areas is expected to rise, increasing health risks. Coastal communities are at greater risk of flooding due to the combined effect of sea level rise and storms. Crop yields may rise for some grains, but will become more variable by region. Finally, degrading permafrost presents risks to the stability of northern infrastructure.⁷

Business is ultimately responding to a cascade of effects that move through the natural environment to impact the business environment. Climate effects (e.g. changes in the hydrological cycle) and physical effects (e.g. reduced water availability in some regions) trigger business effects (e.g. crops have insufficient water to grow in some regions). The bottom line: some industries will be impacted significantly and permanently – so companies need to carefully assess projections, determine the potential implications for their business and plan accordingly.

Many businesses are already thinking about mitigation — namely, slowing the impacts of a changing climate through reduced greenhouse gas emissions. But because some degree of climate change is inevitable, businesses also need to adapt to those irreversible effects.

A 2011 report by the NRT suggests climate change could cost Canada roughly \$5 billion per year by 2020, rising to between \$21 billion and \$43 billion per year by mid-century (Figure 1) — and adaptation is one key way to drive down the costs.⁴

Adaptation and mitigation are related issues, and strategies for either may have co-benefits

Know Your Positioning

Fifty-six percent of Canadian companies participating in the Carbon Disclosure Project said they were exposed to risk from the physical impacts of climate change in 2010 (up from 17 percent in 2003). In 2010, 38 percent of firms also identified opportunities resulting from climate impacts.

Source: Carbon Disclosure Project 2010



What risks and opportunities does your organization face?

Businesses are already managing a range of business risks and opportunities — and climate change adds a new dimension for executives to consider. Executives can build on existing tools and frameworks to identify the material climate adaptation risks and opportunities for their firms. Major challenges for firms include estimating the costs and benefits associated with risks and opportunities and understanding which of these are priorities for action and which can be re-evaluated over time.

“You cannot manage a risk if you deny it exists, or don’t see it coming.”

Jeffrey Williams,
Director, Climate Consulting,
Entergy Corporation

Because the range of climate and physical effects (and in turn the range of possible business impacts) is broad, organizations should first aim to understand how a changing climate affects them. Consider looking backward to identify the business impacts of past climate-related events — has your company taken a hit due to a storm, drought, unusually hot or cold season or different precipitation levels? Keep in mind that this is a starting point and is not predictive of future impacts. (For instance, by September of 2011, the U.S. had already tied its previous annual record from 2008 for the number of billion dollar weather/climate disasters. Hurricane Irene alone resulted in US\$7 billion in damages.⁸ In some parts of Canada, weather events that used to happen every 20 years are happening every six years, with significant implications for insurance.⁹) Gathering basic information on expected climate change impacts in the countries or regions in which you do business is also a key step (see the Intergovernmental Panel on Climate Change for global information and Lemmen et al. 2008 for Canadian information).

Tools like Enterprise Risk Management (ERM) provide a robust foundation for a systematic analysis of risks and opportunities. ERM suggests companies can be exposed to material risks in several categories (Table 1). In addition to areas of risk, there are also areas of opportunity.

Table 1. ERM risk and opportunity management categories and examples

Category of Risk/ Opportunity	Type	Climate-Related Example
Hazard	<ul style="list-style-type: none"> • Fire and property damage • Storms/other natural perils • Business interruption • Disease and disability • Liability claims 	Poorer air quality leads to higher incidence of disease among employees.
	<ul style="list-style-type: none"> • Credit (e.g. default, downgrade) • Liquidity (e.g. cash flow, call risk, opportunity cost) • Hedging/basis risk 	<p>Creditworthiness is eroded and interest rates rise as lenders consider escalating business risks.</p> <p>A firm that relocated away from a flood zone is rewarded with lower insurance premiums.*</p>
Operational	<ul style="list-style-type: none"> • Business operations (e.g. HR, product development, capacity, efficiency, product/service failure, supply chains) • Information/business reporting (e.g. budgeting/planning, accounting info) 	<p>Supply chain disruptions occur because of droughts or extreme weather impacts in supplier regions.</p> <p>Companies incorporate climate change into capital asset planning, resulting in more efficient investments.*</p>
	<ul style="list-style-type: none"> • Reputational damage (e.g. brand erosion, bad publicity) • Competition • Customer wants* • Technological innovation* • Capital availability • Regulatory/political trends* 	<p>A company’s reputation takes a hit following negative publicity from a climate-related accident.</p> <p>Firms in different parts of the world can now compete for tourist dollars*</p> <p>An agile firm responds more efficiently than competitors when policies are adjusted or new ones created.*</p>

Adapted from: Risk Management Committee. 2003. Overview of Enterprise Risk Management. Casualty Actuarial Society.

*Denotes possible areas of opportunity for business.



Example: A mining company identifies risk around regulation (e.g. by increasing the design standard for storm water management on retention ponds), business operations, physical property damage and changing markets. Similarly, they may discover opportunities to develop new technologies that position their firm advantageously and/or generate new revenues.

A firm's vulnerability to these risks depends on the probability of an effect occurring and the magnitude of the impact if it does happen. Vulnerability can be reduced by managing risk, transferring risk, mitigating risk or avoiding risk. The "right" strategy for an organization will depend on the magnitude of the risk and a host of firm-specific factors (see callout).

"Companies facing similar climate change risks may choose to manage those risks differently based on management's risk tolerances and strategies. This is important information for investors."

Julie Desjardins,
CA and Advisor,
Canadian Institute of Chartered Accountants

To assess and prioritize actions to manage risks and opportunities, businesses need to understand the impact on the bottom line. Numerous financial models exist to help quantify risk (e.g. Extreme Value Theory, Stochastic Differential Equations, System Dynamics Simulation, fuzzy logic) and put a value on averted losses for a range of adaptive actions. Often the most difficult aspect is characterizing both financial and non-financial outcomes in order to decide on the most appropriate course of action.

When financial models fall short of capturing the range of outcomes, there are other ways to prioritize action. You might focus first on strategies that are robust to a range of scenarios (e.g. that benefit the company regardless of climate outcomes), risks/opportunities that implicate your most important stakeholders, "low-hanging fruit" that's low-cost or easy to address, or urgent risks that could result in significant losses in the short-term.

Why it's important to act now

What determines your risk profile?

- Nature of product and service mix
- Business model and firm-specific cost structures
- Industry competitive dynamics – ability/inability to pass costs on to consumers
- Location of head office, production and sales facilities, company-owned properties and physical assets, and related tax and regulatory regimes
- Location and vulnerability of key elements in supply chain, tax and regulatory regimes goods must travel to reach the firm's production or sales locations
- Ability to identify and capture upside and revenue opportunities, including resource efficiencies, new product/service opportunities
- Company-specific risk management capability

Source: Adapted from Kiernan, M. "Climate Change Adaptation: Challenge and Opportunity for Canadian Corporates", and Koval, P. "Legal liability as a driver of and barrier to climate change", both presented at The bottom line on managing climate risks and opportunities: A forum for financial executives, Toronto, October 27, 2011.

Corporate executives may ask why adaptation to a changing climate should be on their radar. Four key reasons are:

1. Climate adaptation can have immediate benefits and help with long-term positioning. Investments in managing current business risks from weather, water, and environmental shifts become even more justified in a changing climate. Suncor Energy's continued efforts to reduce water withdrawals from the Athabasca River for production not only reduce input costs now, but prepare the company from reduced water availability due to climate change in the future. Entergy's business case for adapting to storm scenarios to 2030 accounts for not only the value of infrastructure investments, but also the need to protect their customers, employees, and communities in which they operate.

2. Stakeholders expect more. Lenders, investors, insurers, and regulators are increasingly interested in climate change, expecting more information and action from firms. A record

109 shareholder resolutions were filed with 81 companies in the U.S. and Canada on climate change and other sustainability issues during the 2011 proxy season.¹⁰ Also, climate change risks are increasingly being considered material, implying that corporations are required to disclose them in their MD&A and other types of financial reports.¹¹



3. **Soft costs do not equal small costs.** It's difficult to manage what you can't measure. But as BP and others have shown, the value of business reputation is huge. A tarnished reputation due to perceived lagging or negligence on an issue can drive down share price and raise the cost of debt. Companies demonstrating leadership may benefit from enhanced reputation. For instance, Travelers, an insurance firm, prides itself on providing industry leadership on climate issues to educate customers, employees and society.¹²
4. **If you don't act, others will.** There are competitive opportunities associated with a changing climate – opportunities to access new markets, develop new technologies and products, and stay ahead of regulation. These can be a source of competitive advantage – or disadvantage, if a competitor gets there first. For example, knowing water resources and innovations in water management will be crucial in the coming years, the UK's Anglian Water has already invested £95 million to protect its assets and improve resilience.¹³

It Pays to be Informed

All companies with physical operations face some degree of risk from a changing climate. Entergy, a Gulf coast energy provider, paid US \$1.5 billion to put its system back together after damage inflicted by Hurricanes Katrina and Rita. Since that time, Entergy has worked with Swiss Re to assess the corporation's asset exposure to wind-related damage, sea-level rise and increased storminess by 2030 under three climate scenarios. They have also assessed the cost-effectiveness of actions to protect the corporation and the region from future climate damage. Entergy is now equipped to allocate resources and implement priority actions, such as improving standards for offshore platforms and enhancing levees for refineries, on a sound financial basis.

In contrast, RBC expects the financial implications of climate change impacts on its operations to be relatively small. The bank has identified business interruptions from storm damage in coastal regions, changes in heating and cooling costs, higher insurance costs for some properties, and supply chain disruptions as risks to manage. As a next step, RBC plans to assess the vulnerability of coastal operations to changing storm patterns.

Sources: Adapted from Williams, J. "The future of the Gulf Coast – Adapting to environmental vulnerability", and Odendahl, S. "Understanding the risks and opportunities of a changing climate", both presented at The bottom line on managing climate risks and opportunities: A forum for financial executives, Toronto, October 27, 2011.

What are current drivers of and barriers to action?

During the October 27 forum, participants heard about a range of external corporate adaptation drivers (Figure 2). These pressures create risks for companies that fail to adapt, but pace-setting companies can turn these risks into opportunities as they demonstrate leadership.

Figure 2. External drivers for business to adapt to a changing climate



Insurance: For the Insurance Bureau of Canada, the evidence is clear: climate change is happening and is affecting their property and casualty insurance offerings. The incidence of natural disasters is increasing, with rising numbers of storms, floods, and other climate-related events driving this trend. Combined with aging infrastructure, climate trends have clear business implications: global insured losses have increased roughly five-fold since 1980.¹⁴ Canada has seen a significant rise in catastrophic insurance losses over the past six years. To the extent that insurance companies can design products to match evolving risk profiles, changes in coverage and pricing can act as incentives for firms to manage climate risks. However, this is difficult

in practice. Commercial flood insurance is one example illustrating the effect of risk-based premiums: premium adjustments have driven warehouse operators to relocate assets away from flood plains.¹⁵



Legal:¹⁶ The likely impacts of climate change and related impacts on physical infrastructure are now “reasonably foreseeable”; firms that own, develop, design, build or operate infrastructure and fail to make investments to take these impacts into account could face litigation risk. Legal liability stems from three sources: statutes that encourage or mandate climate change adaptation, common law (i.e. negligence and nuisance), and fiduciary and other duties of directors and officers. For example, if a dam is not designed for more intense rainstorms in a changing climate and it overflows and causes injury to a third party, the firm responsible for the dam could be charged with negligence and potentially nuisance charges. A firm’s exposure to legal liability could also result in difficulties obtaining financing and insurance, not to mention reputation and competitiveness risks

Disclosure:¹⁷ Capital providers, securities regulators and NGOs are increasingly putting pressure on public companies to disclose climate change risks in their financial reporting. The Carbon Disclosure Project, representing hundreds of investor institutions, has been a key driver of voluntary reporting for large firms in Europe and North America. 2010 was a notable year for mandatory reporting, with both the U.S. Securities and Exchange Commission and the Canadian Securities Administrators issuing guidance to improve the quality and completeness of climate change and environmental reporting of material risks (i.e. those that the “reasonable investor” would consider in evaluating the company’s position). But immediate access to information and the rise of social media are changing the profile of a “reasonable investor”. Firms are increasingly susceptible to stakeholder perceptions, elevating the importance of both voluntary and mandatory disclosure. So, firms should have robust controls and procedures in place to identify and manage material risks. Directors are responsible for risk oversight. Those seeking additional guidance on material climate-change related disclosures can consult publications by the Canadian Institute of Chartered Accountants.¹⁸ Finally, requirements by security regulators concerning forward-looking information apply to both voluntary and mandatory disclosure, so consistency is important.

Infrastructure owners should ask themselves two questions when gauging legal liability:

1. Could the physical impacts of climate change affect the infrastructure asset during its lifecycle?
2. If the asset could be affected, does the technology exist to design the new asset or repair or otherwise improve the asset to withstand the impacts of climate change?

Experts can help you answer these questions with confidence. But a next step is deciding what to do about it. In such cases, you should weigh the additional cost of building, refurbishing, and maintaining infrastructure to withstand the impacts of climate change against the potential future costs of repair, refurbishment, rebuild, and potential legal liability arising from a decision to not take climate change effects into account. Taking proactive **adaptation measures can help you avoid the latter costs.**

Source: Adapted from Koval, P. “Legal liability as a driver of and barrier to climate change”, The bottom line on managing climate risks and opportunities: A forum for financial executives, Toronto, October 27, 2011.

“Canadian and international companies need to tell investors their “climate story”. Increasingly, investors are using companies’ climate risk management capabilities as a proxy for their overall management quality. But companies need to frame those stories in ways which are meaningful to investors: how do the steps the company is taking contribute directly to risk reduction, competitive advantage, profitability, and reputational capital?”

Matthew Kiernan,
CEO,
Infection Point Capital Management

Investors and lenders:¹⁹ Some global institutional investors are beginning to use climate change management and disclosure as a proxy for good management. Investors tend to see a firm’s ability to manage risk as the most important indicator of vulnerability to climate change. Short time horizons for investor decisions have limited investor pressures relating to climate change and put a premium on adaptation measures with short payback periods. Firms need to be able to demonstrate the outcomes of climate adaptation strategies in metrics and indicators that are familiar to financial analysts. Lending institutions are also beginning to consider the credit risk that climate change impacts could create — for instance, RBC has begun identifying industry sectors and regions likely to be most affected by climate change and incorporating climate change-related risks into the bank’s lending policies.



Discussions at the October 27 forum revealed several factors perceived as hindering corporate action (Figure 3). Firms can overcome a number of barriers internally.

1. **Language and terminology.** Increase the salience of climate adaptation by instead referring to specific risks such as “preparing for severe weather risks” or “water availability risks”.
2. **Lack of understanding of the costs of inaction.** Assemble information on the costs of not adapting to inevitable climate change impacts emphasizes the risks of business-as-usual and benefits of adaptation.
3. **Organizational culture.** Leaders of corporations may want to invest in moving the firm’s culture toward one that embraces innovation, preparedness, and flexibility in the face of uncertainty and change.

Figure 3. Barriers inhibiting business adaptation to climate change



Other barriers require action by external parties.

1. **Negative framing.** Industry associations, government agencies and NGOs will have more success in promoting climate adaptation to business audiences with a positive framing rather than a “doom and gloom” framing. Highlighting cost reductions anticipated from the adaptation initiative, or advantages gained relative to the competition, can both create a positive framing.
2. **Unclear performance indicators.** Firms unclear on best practices and how to measure, communicate, and benchmark performance against peers may adopt a “wait-and-see” approach.
3. **Signals from governments and stakeholders.** Firms respond to the signals they get from governments and key capital market players. If these stakeholders prioritize and buy into the importance of investing now to avoid potential losses later, so will firms.

Uncertainty around timing and magnitude of impacts and seemingly more pressing short-term business concerns stand out as two key stumbling blocks to corporate climate adaptation. However, deferring adaptation, waiting for more and better information, and relying on just-in-time solutions isn’t feasible or efficient because:

- It’s often cheaper to upgrade infrastructure or incorporate climate change into capital investments upfront than to retrofit later.
- Building internal capacity to deal with climate change takes time. Developing the human resources, governance and skills to effectively manage new challenges cannot be done overnight.
- Reacting with one-off adaptation actions to weather or climate events leaves companies exposed to long-term shifts.
- Technology needs to be built over time; the “solutions” to all of our adaptation problems aren’t readily available on the market.



In practice: What Canadian companies are thinking and doing

Businesses in Canada and around the world are taking action on climate adaptation. The following examples illustrate firms' strategies at different points of their responses to climate change.²⁰

- **Get the language right.** *RBC* asks borrowers about business continuity planning, management of weather risks, and water availability rather than about “climate adaptation”. This helps focus attention on tangible and familiar risks.
- **Spot opportunities.** *Bombardier* is assessing their potential to meet increasing global demands for fire-fighting aircraft that could be expected in a world with more frequent and severe wildfires. *SNC-Lavalin* foresees a rise in business for sea water desalination, along with transportation of potable or irrigation water.
- **Know your own risks.** *BMO* notes that prolonged heat waves and airborne pollution like smog could pose health risks to individuals, and potentially lead to greater workforce absenteeism.
- **Work in partnership.** *Catalyst* has worked with climate change experts and government officials at the Pacific Institute of Climate Solutions to help develop robust climate solutions that involve forests and forests products.
- **Assign responsibility.** *Barrick Gold* has employed in-house climatologists to advise their operations and inform strategic planning priorities. *PotashCorp* assigns climate issues to its Safety, Health and Environment Committee, whose chair interacts with senior management and the Board of Directors through a Climate Change Sub-Committee and Enterprise Risk Management Committee.
- **Plan for the long-term.** *TransAlta Corporation* is focused on the long-term effects of climate change on water supply used for process cooling. The *CPP Investment Board* adopted a Policy on Responsible Investing in 2005, in which environmental, social, and governance factors are viewed in a positive light because of their link to long-term performance.

Key takeaways:

1. Firms face a range of cross-enterprise risks and opportunities. A changing climate exacerbates these risks and has the potential to create new ones.
2. Pressures to disclose and manage risks in a changing climate are increasing as definitions of the “reasonable investor” and “reasonably foreseeable” impacts change. Expectations of firms evolve as climate information and advice becomes more accessible.
3. Many barriers inhibit corporate action, including language, framing, poor understanding of the costs of inaction, and short termism by government and investors. Firms can avoid getting mired in a “climate” conversation by building climate adaptation into existing risk management processes and making it a business conversation.
4. Firms in Canada and around the world are starting to act. Understanding risk exposure, taking a long-term view of issues (20 year plus), and scanning for opportunities are all important strategies.



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- 15 Gregor Robinson, personal communication
- 16 Pat Koval presentation, October 27, 2011 and personal communication
- 17 Julie Desjardins presentation, October 27, 2011 and personal communication
- 18 Canadian Institute of Chartered Accountants
- 19 Matthew Kiernan and Sandra Odendahl presentations, October 27, 2011
- 20 Wellstead 2011

Forum speakers and participants

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Patricia Koval, Partner, Torys LLP
Julie Desjardins, Advisor, Canadian Institute of Chartered Accountants
Matthew Kiernan, CEO, Inflection Point Capital Management

Corporate leaders panel:

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Sandra Odendahl, Director, Corporate Environmental Affairs, Royal Bank of Canada
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