

CLIMATE PROSPERITY



A CANADIAN INITIATIVE

NRT



NATIONAL
ROUND TABLE ON
THE ENVIRONMENT
AND THE ECONOMY

// REPORT 05

FACING THE ELEMENTS: BUILDING BUSINESS RESILIENCE IN A CHANGING CLIMATE

// BUSINESS PRIMER



/// ADVISORY
REPORT

// BUSINESS
PRIMER

/ CASE
STUDIES

Canada

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NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY
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Disclaimer: The views expressed in this document do not necessarily represent those of the organizations with which individual Round Table members are associated or otherwise employed. The NRT strives for consensus but does not demand unanimity. The NRT's deliberations included vigorous discussion and debate reflecting diversity of opinion.

**THIS IS NOT
JUST ABOUT
COPING WITH
CLIMATE CHANGE,
BUT PROSPERING
THROUGH IT.**





ABOUT US

Through the development of innovative policy research and considered advice, our mission is to help Canada achieve sustainable development solutions that integrate environmental and economic considerations to ensure the lasting prosperity and well-being of our nation.

Emerging from the famous Brundtland Report, *Our Common Future*, the NRT has become a model for convening diverse and competing interests around one table to create consensus ideas and viable suggestions for sustainable development. The NRT focuses on sustaining Canada's prosperity without borrowing resources from future generations or compromising their ability to live securely.

The NRT is in the unique position of being an independent policy advisory agency that advises the federal government on sustainable development solutions. We raise awareness among Canadians and their governments about the challenges of sustainable development. We advocate for positive change. We strive to promote credible and impartial policy solutions that are in the best interest of all Canadians.

We accomplish that mission by fostering sound, well-researched reports on priority issues and by offering advice to governments on how best to reconcile and integrate the often divergent challenges of economic prosperity and environmental conservation.

The NRT brings together a group of distinguished sustainability leaders active in businesses, universities, environmentalism, labour, public policy, and community life from across Canada. Our members are appointed by the federal government for a mandate of up to three years. They meet in a round table format that offers a safe haven for discussion and encourages the unfettered exchange of ideas leading to consensus.

We also reach out to expert organizations, industries, and individuals to assist us in conducting our work on behalf of Canadians.

The *NRTEE Act* underlines the independent nature of the Round Table and its work. The NRT reports, at this time, to the Government of Canada and Parliament through the Minister of the Environment. The NRT maintains a secretariat, which commissions and analyzes the research required by its members in their work.

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1 INTRODUCTION

Climate change is real and is happening now. Together with natural drivers, global emissions of carbon dioxide and other greenhouse gases (GHGs) are acting like a heat-trapping blanket, and have already caused the Earth to warm by about 0.8°C since 1850.¹ The impacts of this warming are being felt in Canada and around the world, as evidenced by changes to sea levels, extent and thickness of sea ice and glaciers, rain and snowfall patterns, and annual cycles of plants and migrating animals.² Climate scientists have now drawn a statistical link between global GHG emissions and the global rise in the number of hot days and in the frequency and intensity of rainfall events observed in the past decades.³ Since climate governs the weather we can expect in a particular place and time, a *changing* climate is more than a couple of years of unusual weather.

Recent experience with extreme events highlights our economic exposure to changes in weather and climate phenomena. Heavy downpours and other climate-related events are now the leading causes of worldwide natural catastrophes. In Canada, insured losses due to catastrophic events totalled about \$1.3 billion in the first seven months of 2011,^{4,5} with storm-related property damage as a chief source of claims.⁶ In a poll

by Zurich Financial Services Group and the Business Continuity Institute, covering 559 businesses from 14 different industries and 62 countries, one in two businesses blamed weather-related events for supply-chain disruptions in 2011.⁷ In October 2011 alone, flooding in Thailand's manufacturing districts suspended operations and caused output losses to more than 400 Japanese businesses — particularly auto manufacturers and computer hard-disk drive businesses — both operating in Thailand and relying on inputs sourced from Thailand.⁸ The flooding in Thailand contributed to insurance rate hikes of 10 per cent or more during the fourth quarter of 2011 for businesses that experienced major losses and are exposed to catastrophe risks.⁹

Climate change can put businesses' reputations, legal responsibilities, regulatory obligations, financial reporting, operations, and supply chains at stake. Businesses' risk profiles and, in some cases, their strategic positioning can be directly affected by global and local changes in temperature, the frequency and severity of extreme weather conditions, and the availability of water and other natural resources. Businesses must plan now to adapt to the irreversible impacts of climate change.

Opportunities from the impacts of climate change and how people adapt to them are also apparent. Some businesses are exploring and starting to exploit the commercial opportunities of climate change adaptation. Bombardier is assessing opportunities to meet rising demand for firefighting aircraft in a world with more frequent and severe wildfires.¹⁰ SNC-Lavalin foresees a rise in business for sea-water desalination and for water transportation.¹¹ Scotiabank has created an investment product designed to profit from businesses mitigating GHGs and adapting to the physical impacts of climate change over the long term.¹² Hybrid Air Vehicles (a manufacturer of unmanned airships) delivers cargo to remote northern areas, reducing reliance on winter roads and saving money relative to floatplane services.¹³

Yet few Canadian businesses have adopted a structured and explicit approach to incorporating climate change risk and opportunity management into their routine activities.¹⁴ Despite a growing awareness of the business risks and opportunities that a changing climate presents, the business case for taking proactive steps is complicated by uncertainty about both the magnitude and timing of impacts. Further, some changes are incremental and may be long term. And, in grim economic times, short-term financial concerns may tempt businesses to defer initiating adaptation actions — but is this effective risk management? Just as businesses must readily manage financial and regulatory uncertainty, they must also understand the risks and potential opportunities presented by a changing climate and position themselves to respond appropriately.

This report demonstrates tactics and strategies that business executives and managers can use to stay competitive in a changing climate. It illustrates how Canadian firms are exposed to climate change now and in the future and why acting now can make good business sense. It offers practical strategies to help build the resilience of businesses to a chang-

ing climate, and it provides key messages and recommendations. This business-focused report is part of Facing the Elements. In combination with the Advisory Report and Case Studies, this Business Primer sets out what Canadian businesses can and should do to manage the risks and opportunities of a changing climate and how governments can help.

Between January 2011 and January 2012, the National Round Table on the Environment and the Economy (NRT) researched this issue and convened stakeholders

from business, governments, nongovernmental organizations, and academia, both to understand the issues at stake for Canadian businesses as a result of our changing climate and to learn from the experiences of business pacesetters from Canada and abroad. This report builds on the lessons of these pacesetters, which have discovered the business implications of climate change, are assessing and managing risks and opportunities, and are building climate resilience across their enterprises.¹⁵ These businesses demonstrate that adjusting their practices in response to a changing climate is not only feasible but also offers real benefits for preserving and creating value.

MANY BUSINESSES ARE ALREADY CONSIDERING “MITIGATION” BY REDUCING THEIR GREENHOUSE GAS EMISSIONS IN EFFORTS TO LIMIT THE SPEED AND SCALE OF CLIMATE CHANGE. LESS ATTENTION HAS BEEN PAID TO ADAPTATION.

“ADAPTATION” INVOLVES ADJUSTING TO THE CONSEQUENCES OF CLIMATE CHANGE BY MANAGING RISK AND EXPLOITING OPPORTUNITIES. RESILIENCE AND ROBUSTNESS ARE KEY SUCCESS FACTORS IN ADAPTATION. A RESILIENT BUSINESS CAN RESPOND QUICKLY AND RECOVER READILY FROM SURPRISES AND EVENTS BEYOND ITS CONTROL. A BUSINESS THAT RELIES ON ROBUST STRATEGIES CAN REMAIN COMPETITIVE REGARDLESS OF CLIMATE OUTCOMES.

2

BUSINESS RISKS AND OPPORTUNITIES

BUSINESSES ALREADY MANAGE A RANGE OF RISKS AND OPPORTUNITIES, SOME RELATING TO EXTREME AND UNPREDICTABLE WEATHER. SO HOW IS ADAPTING TO THE RISKS AND OPPORTUNITIES OF A CHANGING CLIMATE ANY DIFFERENT?

In some ways it isn't. For our resource industries that work on the "frontier," planning for and adjusting to prevailing weather and climate is the normal way of doing business. Eastern offshore oil and gas businesses build platforms that withstand Atlantic hurricanes, and western oil and gas producers successfully operate under a wide range of climate conditions. Agribusinesses cope with floods and droughts, and optimize their production in response to changing weather forecasts. Forestry and tourism businesses are accustomed to dealing with environmental change, including such natural disturbances as wildfires.

Yet coping in the short term by relying on past experience differs from adapting to new climate conditions for the long term (see **Box 1**).

The following examples show how different industry sectors become exposed.¹⁹ Some risks are internal, others arise across supply chains, and still others relate to broader aspects of society, such as markets, stakeholder expectations, and the regulatory environment. In a global economy where lean inventories, long supply chains, and just-in-time delivery approaches prevail, the potential for far-reaching and cascading impacts is not out of the question.

BOX 1 DIFFERENCES BETWEEN MANAGING CLIMATE CHANGE RISK AND ROUTINE BUSINESS RISK MANAGEMENT

Executives and senior managers might ask how managing climate change risk differs from routine business risk management. Integrating forward-looking information about climate change and its business impacts into decisions you've already been making may not sound like a major departure from routine practice.

Notable differences relate to three factors:

TIMEFRAMES¹⁶: Instead of assessing the materiality of risks on a yearly basis, adapting to climate change can mean looking 10 years out or more, depending on planning horizons and renewal or replacement cycles.

SHIFTING RISK LANDSCAPE¹⁷: Solely relying on historic information to guide decisions no longer works since a changing climate translates into changing risk profiles. A combination of current information, trend data, and climate projections is necessary.

THRESHOLDS¹⁸: In a changing climate, adaptive measures that make sense in the short term might not in long term (e.g., investing in coastal defences may be cost-effective only to a given level of sea-level rise, erosion, and flooding risk).

OIL AND GAS // Rising temperatures and shifting water regimes pose operational risks, including a shortened winter drilling season, damage to gas pipelines from soil movements caused by flooding or overflowing rivers, and reduced quantity and quality of inputs (water) critical to exploration, production, and refining. Storms in the North Sea and hurricanes in the Gulf of Mexico already cause downtime in operations and related revenue losses. With sea and storm conditions expected to change as oceans take up heat, financial risks include higher insurance premiums, outage costs, lost revenues, and reconstruction costs.

MINING // Reliance on long-lived and capital-intensive assets in sometimes remote locations, extensive transportation networks, and tight supply chains make mining activities vulnerable to the physical impacts of climate change. Operational risks include a shortened winter road season affecting the ability to move goods to and from remote mines, shifts in seasonal water flows compromising water-intensive mining and milling activities, more frequent and intense extreme weather and other disturbances (e.g., wildfires) leading to disruption of mining operations and supply chains. Safety, legal liability, and reputational issues could arise from environmental releases of tailings stored in degrading permafrost. Opportunities could arise as new transportation routes in a warming Arctic give a competitive edge to Northern mines.

AGRIBUSINESS // Rising temperatures, moisture deficits and excesses, shifts in the prevalence of pests, diseases, and the entrance of competing plants all affect crop yields and quality, presenting both operational and financial risks to growers. In some locations, warmer conditions could enhance crop productivity and create opportunities to cultivate new crops. Unplanned spending to repair damage caused by extreme weather events and other disturbances like wildfires presents another source of financial risk

posed by a changing climate. Volatility in crop yields raises the prospect of increased input costs for food and beverage manufacturers and for certain biomass energy producers.

RETAIL AND DISTRIBUTION // Increasing numbers and intensities of extreme weather events create operational risks like damage to infrastructure assets and inventories. Because retailers rely on stable transport and logistics systems, product distribution is also susceptible to transport disruptions or delays that could increase in a changing climate. Some retailers could face financial risks resulting from a rise in product costs from climate-related shifts in the supply and price of raw materials (e.g., water) and commodities (e.g., cotton, fuel). Weather influences consumer preferences: in a changing climate this will translate into both seasonal opportunities and risks, depending on the product concerned. (For example, U.K. research shows that people switch from beer to cider at 18°C.)²⁰

UTILITIES — HYDROELECTRICITY // A range of operational risks from average changes in temperature and precipitation and increasing climate variability are apparent. Glacier melting and shifts in runoff patterns affect generating capacities, and higher seasonal temperatures can reduce demand for winter heating and increase demand for summer cooling. Challenges to asset and infrastructure design, operation, and maintenance include adjusting hydroelectric generation plans to deal with increased flooding risk and longer summer low-flow periods and protecting transmission and distribution lines exposed to extreme winds, wildfires, storms, icing, and storm-related landslides and rock falls. Legal liability could accrue from third-party damage from infrastructure and asset failure. Strategic risks can result from the need to balance competing demands for water with other sectors.

TECHNOLOGY, MEDIA, AND COMMUNICATIONS // A rise in numbers and intensity of extreme weather events presents operational risks to telecommunications businesses that rely on the performance of expansive physical networks of telecommunications facilities and infrastructure, along with local electric transmission grids. Infrastructure and asset damages resulting in service interruptions and dissatisfied customers pose reputational challenges. Worker safety could also be compromised. Network failures and disruptions present financial risks: a rise in costs related to network maintenance and repair, insurance, and emergency response. Businesses that supply new IT applications that enhance business resilience stand to benefit.

FINANCIAL SERVICES // A changing climate could erode the creditworthiness of climate-vulnerable clients and affect the long-term returns of investment portfolios specialized in one or a few sectors in locations highly exposed to the physical impacts of climate change. Operational risks from disruptions to business continuity are possible due to more frequent

and severe weather events. Canadian asset managers will face financial risk from physical impacts overseas. Opportunities for the financial services sector include project financing for infrastructure upgrades and new builds to withstand impacts. Banks and insurers are uniquely positioned to promote climate change risk management and adaptation across the economy via lending requirements and by aligning insurance premiums to reflect changing climate risk.

Businesses in Canada are becoming aware of the risks and opportunities posed by a changing climate but few are taking action in anticipation of future impacts.²¹ Several factors inhibit getting started, including (1) confusion about the differences between GHG emissions mitigation, adapting to GHG emissions mitigation policy, and adapting to future climate; (2) a poor understanding of the benefits of acting now on risks from future impacts; (3) inattention to longer-term and gradual changes in climate conditions; and (4) the perception that a reactive approach is sufficient.²² Information in this report can help overcome these hurdles.

3

A BUSINESS CASE FOR ACTION

BUSINESS EXECUTIVES AND MANAGERS MAY ASK WHY ADAPTING TO A CHANGING CLIMATE SHOULD BE ON THEIR RADAR. SIX REASONS ARE APPARENT:

THE CLIMATE IS ALREADY CHANGING; SOCIETY MUST ADAPT.

“We live in a region that requires us to be resilient in order to survive. Doing nothing is not an acceptable plan. That’s a plan to put Entergy out of business, a plan for misery and suffering for our customers and a plan that would devastate a region already economically impaired.”

J. Wayne Leonard, Chairman and Chief Executive Officer, Entergy

Due to past greenhouse gas emissions, some degree of climate change is now inevitable, even if drastic cuts in global emissions occurred today. GHG emissions mitigation will limit the speed and scale of future climate change, but governments, communities, businesses, and households must plan to adapt to the impacts of more volatile weather and gradual changes in climate conditions that are already locked-in.²³ The NRT’s 2011 report *Paying the Price: The Economic Impacts of Climate Change for Canada* suggests climate change could cost Canada \$5 billion per year by 2020.²⁴ This amount will rise in the years ahead. Governments, communities, businesses, and households alike are all exposed to the fallout of the cascade of effects that move through the natural and built environment to impact our economic circumstances.

BUSINESSES STAND TO BE DIRECTLY AFFECTED.

“Climate change affects the fundamentals of doing business, both yours and ours.”

Prof. Dr. Peter Hoeppe, Head of Munich Re’s Geo Risks Research/Corporate Climate Centre²⁵

A changing climate will directly affect businesses’ assets and supply chains, the health and safety of their employees, and the communities and environments in which they operate. Chiquita Brand International acknowledged in its 2010 10-K report to the U.S. Securities and Exchange Commission just

how significant weather-related disruptions can be to its business.²⁶ “For example, as a result of flooding which affected some of our owned farms in Costa Rica and Panama in December 2008, we incurred approximately US\$33 million of higher costs, including logistics costs, related to rehabilitating the farms and procuring replacement fruit from other sources.”

Today, Canadian businesses appear to be increasingly aware of operational and financial risks stemming from severe weather and shifts in water availability,²⁷ in addition to the prospect of permafrost degradation, reduced winter site access, and sea-level rise.²⁸

STAKEHOLDERS WILL EXPECT ACTION.

“Global climate change has widespread implications for the planet and the communities where we operate. Water resources, public health, agriculture and more are at risk. We recognize that climate change has the potential to significantly affect the sustainability of our business and supply chain.”

Nicola Kettlitz, President, Coca-Cola Canada

In the coming years, businesses will be driven to adapt by the changing perceptions and expectations of governments and communities, in addition to key capital market players like investors, lenders, shareholders,

and insurers.²⁹ Assessing the potential impacts of a changing climate on a business includes taking into account the positions adopted by these stakeholder groups — a strategy to get out in front of reputational, regulatory, and financial risk.

As insurers adjust their price structures, businesses will need to adjust their behaviour in response. For example, owners of offshore platforms and associated infrastructure in the Gulf of Mexico have faced increasingly expensive insurance coverage from asset damage caused by windstorms and hurricanes, which were due, in part, to 2008 losses from hurricanes Ike and Gustav. Insurers re-evaluate their pricing structures after every windstorm season, basing prices for the following year on the damages accumulated in the past season. In 2009, many businesses chose to self-insure against the risk of hurricanes.³⁰

EARLY ACTION CAN BRING TANGIBLE BENEFITS.

“Understanding the potential effects of climate change upon our business operations and embedding it into our planning and decision-making is parallel to pursuing efforts now to minimize our direct impacts.”

Brenda Goehring, Corporate Environment & Sustainability Manager, BC Hydro

Businesses can save money by moving quickly to assess and manage the risks and opportunities of changing weather and climate. Upgrading infrastructure or incorporating climate change into capital investments now is often less expensive than doing a retrofit later.³¹ Early adaptation builds skills and technical capacity and positions businesses to better

manage future adaptation. The NRT report *Paying the Price* concludes that small investments in adaptive measures can offset the high costs that unabated climate change can impose on Canada.³²

Investments in managing current business risks from weather, water, and environmental shifts are even more justified in a changing climate. For instance, Suncor Energy’s continued efforts to reduce water withdrawals from the Athabasca River for production³³ not only reduce input costs now also but shelter the business from reduced water availability that could be caused by climate change in the future. Johnson & Johnson’s business continuity plans consider weather risks for all its major global operations. As a result of updating business continuity plans and risk assessments, and implementing adaptive measures, over five years the firm avoided \$2.4 billion in expected losses from hurricane damage at its Puerto Rico facilities.³⁴

ADAPTATION DOESN’T NEED TO BE COMPLEX OR COSTLY.

“Climate change adaptation is already built into what we do on northern projects when it is needed.”

Don Hayley P.Eng FEIC, Director of Arctic Resource Development, EBA Engineering Consultants, a Tetra Tech Company

By integrating climate change alongside other business risks, firms can use existing management systems and procedures like enterprise risk management, business

continuity planning, quality assurance, and environmental management systems to efficiently build on their expertise in these areas. In addition, several low-cost and no-cost measures can save businesses money and improve the performance of infrastructure and assets. To deal with rising flood risks, for example, businesses can relocate critical equipment and other property of high financial value to upper floors or higher elevation. Water-efficiency measures are a low-cost response to seasonal water stress. Natural ventilation and shading offer cheap solutions for businesses in cities exposed to extreme heat, with the added benefit of conserving energy.

For Whistler Blackcomb, a ski resort in British Columbia, adapting to climate change is both an environmental and business necessity. The resort concentrates on inexpensive strategies such as diversifying guest experiences for the off-peak months

of May through November by offering nature walks, hiking trails, mountain biking routes. It wants to avoid over-adapting, given that other climate change risk management measures, such as buying and operating snow-making machines, are costly.

IF YOU DON'T ACT, OTHERS WILL.

“The Northern economies are primarily dependent on their natural resources and public services. Their vast unexploited resources and the new economic opportunities that will be created by a changing climate could make the North one of the fastest growing Canadian economies.”

*T. Vandal, Chief Executive Officer,
Hydro-Québec, 2009*

A changing climate presents commercial opportunities for businesses,³⁵ such as opportunities to access new markets, develop new technologies and prod-

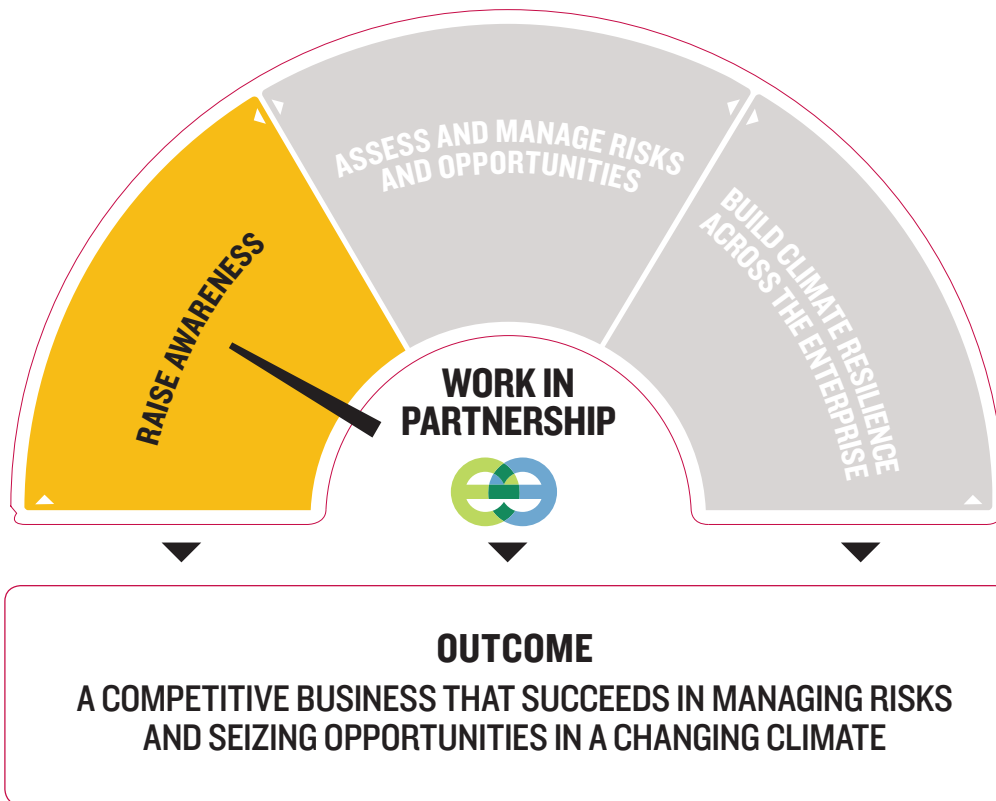
ucts, and stay ahead of regulation. In a survey of global businesses, 86 per cent described responding to climate change risks or investing in adaptation as a business opportunity.³⁶ Such activities can be a source of competitive advantage — or disadvantage, if a competitor gets there first.

Munich Re, in response to the growing demand for risk-transfer solutions to climate change challenges, now offers insurance coverage to solar electric producers. The insurance covers loss of revenue in the event of unusually low sunlight conditions.

The following three sections of this report set out a process to advance adaptation within the business, starting with awareness raising, then assessing and managing risks and opportunities, and ending with building climate resilience across the enterprise.

4

HOW TO DO IT: RAISE AWARENESS



STEP 1

UNDERSTAND HOW A CHANGING CLIMATE CAN AFFECT YOUR BUSINESS.

Businesses demonstrate a clear understanding of the importance of GHG emissions mitigation and are adept at reporting their efforts to achieve emissions reductions and energy efficiencies. Progress on climate change adaptation, however, is less advanced. The first step in adapting to a changing climate is appraising the impacts of climate change on your business objectives.

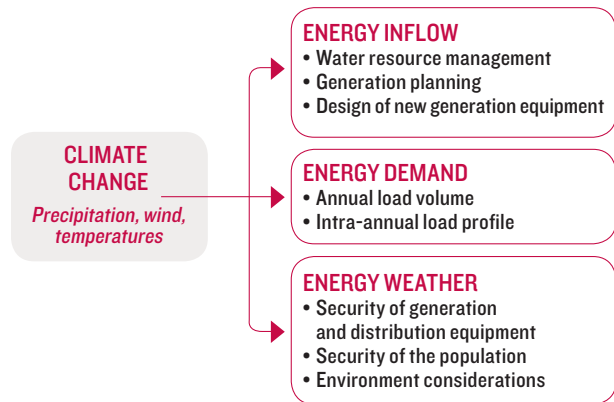
// Inventory the impacts on your business from past climate-related events, such as storms, droughts, and unusually hot or unusually cold seasons. What was your business's response to these events? Are these events likely to increase in frequency and intensity in a changing climate? What operational, financial, strategic, or other kinds of risks could your business face as a result?

// Scan the available research to learn how the climate is expected to change and the possible impacts in the regions where your business operates (see the toolkit at the end of this report for a list of information resources).

// Look beyond the regions where you operate to identify important physical impacts in the regions where your suppliers and customers are located.

IN PRACTICE // HYDRO QUÉBEC

Hydro-Québec has developed a comprehensive program to tackle climate change. The firm started by identifying areas of activity that were sensitive to changing climate conditions, based on consultation with staff from different divisions. The figure below shows some of the areas identified.



Since 2001, Hydro-Québec has made a considerable investment in research on climate change, business impacts, and adaptation, which the company believes has already paid off. Hydro-Québec's accrued knowledge has improved planning, design, and operational decisions of the Equipment and Distribution divisions.³⁷

Leverage resources to understand the risks and opportunities facing your sector by raising these issues with your industry association.

STEP 2 HARNESS INTERNAL KNOWLEDGE AND EXPERTISE.

Formulating a business response to climate change tends to be assigned, at least initially, to environmental sustainability or corporate social responsibility officers. However, climate change impacts can have far-reaching consequences for businesses and require insight and engagement by employees across the enterprise to identify potential impacts of a changing climate within their own corner of the business. A successful response hinges on attracting the right people to the table to harness the business's intellectual capacity and to cultivate awareness and ownership of the adaptation challenge.

// Involve representatives of a cross-section of business units, including the following:

- **Operations:** operational risks can arise from increased scarcity of a resource that is an input to production
- **Legal counsel:** liability risks can arise from damages to local communities as a result of climate-related infrastructure failures
- **Finance:** the physical impacts of climate change can affect a business's long-term financial performance, meriting disclosure to investors

// Establish a common understanding of the issue based on information gathered in **step 1**.

// Work together to assess the links between business objectives, climate change, and its impacts.

// Involve a senior leader who can be an advocate at the executive and board levels.

IN PRACTICE // CAMECO

Cameco, a global uranium producer based in Saskatchewan, created an Environmental Leadership team in 2006. This team's mandate includes scanning and studying environmental challenges that have the potential to become company liabilities, and assessing whether they warrant inclusion in the corporate risk register. Having identified the physical impacts of a changing climate as a potential company risk issue, four working groups comprising staff from different divisions of the company considered a broad range of climate change risks and opportunities, including the potential need for higher amounts of cooling water, increased fire risk, higher road maintenance costs, and possible supply-chain disruptions. This process provided senior management with confidence that no hidden liabilities existed because of climate change and helped the company improve its communication with stakeholders on the business risks and opportunities of a changing climate.

STEP 3

MAKE A BUSINESS CASE FOR GOING FURTHER.

The case for allocating scarce human and financial resources to assess and manage risks and opportunities of climate change can be a tough sell: the perception looms large that upfront costs are high and payback uncertain. How can managers apply intelligence acquired in **steps 1** and **2** to raise awareness of the financial implications of climate change and develop a value proposition to further investigate this issue?

// Identify the costs of recent climate-related damages for your business and your competitors’.

// Tailor the arguments from the business case presented in section 3 of this report to your own circumstances.

// Articulate the direct impacts the business could face due to inevitable climate change that is already underway and future climate change. Consider the potential consequences for business reputation and the licence to operate.

// Emphasize the immediate benefits from implementing adaptive measures (like savings from reduced water use) and the improvements in long-term positioning.

// Identify adaptive measures that cost very little.

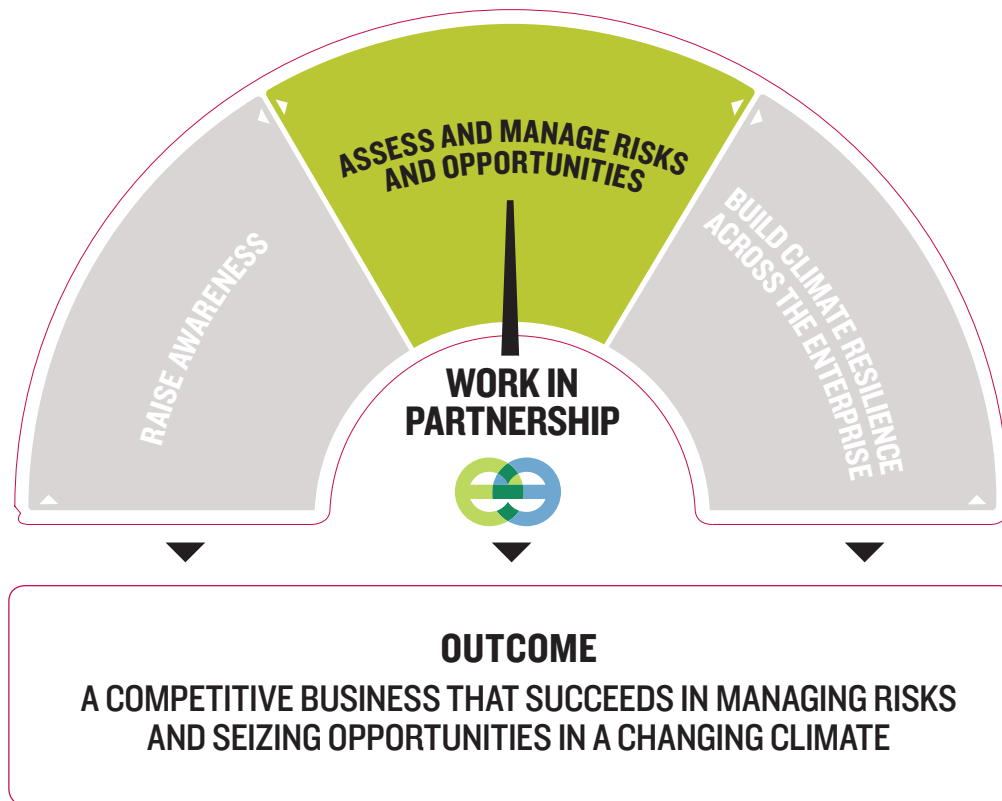
// Highlight possible commercial opportunities.

IN PRACTICE // ENTERGY

Entergy, a Gulf Coast electric utility, witnessed first-hand the costly impact of climate-related events. In 2005, hurricanes Katrina and Rita cost the firm US\$1.7 billion, spelling out a clear business case for action to assess and manage climate risks. 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 region from future climate damage. Entergy is now equipped with a sound financial basis from which to allocate resources and implement priority actions, such as improving standards for offshore platforms and enhancing levees for refineries.³⁸

5

HOW TO DO IT: ASSESS AND MANAGE RISKS AND OPPORTUNITIES



STEP 1 IDENTIFY BUSINESS RISKS AND OPPORTUNITIES.

The initial appraisal conducted in phase 1 will provide the foundation businesses need to drill down into specific risks and opportunities. Risk — either upside or downside — is a function of the probability of an impact occurring and the magnitude of the consequence should it occur. Risk estimation techniques can be simple and qualitative (e.g., comparing the relative probability and magnitude of consequence for several potential impacts) or detailed, requiring quantitative information on climate projections, impacts research, and business consequences (e.g., estimating probabilistic outputs through Monte Carlo simulations).

A key decision is whether to rely on external advisors or build internal corporate capacity.

Are resources tight? Start by assessing a specific component of your operations critical to the bottom line or a specific geographic site. This approach provides the advantage of “learning-by-doing” and allows businesses to commit their resources more gradually.

// Assess the risks and opportunities from a changing climate as they relate to the following five areas:³⁹

- Site conditions, physical assets, and infrastructure
- Processes and workforce
- Raw materials, supply chains, and logistics
- Products, services, and markets
- Regulatory risks, changing standards, and business reputation

// Work in partnership (see **Box 2**).

// Think beyond the factory gates to identify and manage risks and opportunities with your suppliers and customers.⁴⁰

IN PRACTICE // COCA-COLA

Water is the main ingredient in **Coca-Cola** drinks. The impacts of climate change on water availability, therefore, represent a key business risk for the company globally. Coca-Cola is taking steps to ensure a reliable supply of this valued input. All Coca-Cola manufacturing plants, including Canadian facilities, must complete a Source Water Vulnerability Assessment and then prepare and implement a Source Water Protection Plan. These assessments include assumptions about the impacts of future climate change alongside assumptions about infrastructure pressure, pricing, drought, competing use, increasing demand, regulatory limits, and social acceptance. Coca-Cola’s efforts to protect the supply of water and demonstrate good corporate citizenship have the benefit of safeguarding competitiveness.

BOX 2 FOUR REASONS TO CONSIDER PARTNERING THROUGHOUT THE ADAPTATION PROCESS

GAIN VALUABLE KNOWLEDGE AND INFORMATION AT LOW COST	Ouranos is a research consortium developed by Hydro-Québec and the Québec government to study the regional climate, climate change impacts, and adaptation solutions. Through collaboration with Ouranos, Hydro-Québec has contributed to the development of future climate change scenarios and has used these scenarios to model impacts on various elements of the business.
SHARE BEST PRACTICES TO HELP ACCELERATE ACTION AND REDUCE TRANSACTION COSTS	The Canadian Electricity Association (CEA) held a joint workshop between its Generation Council and Sustainable Electricity Steering Committee to explore climate change impacts and adaptation issues for the sector and to share best practices, challenges, and lessons learned. ⁴¹
BUILD ADAPTATION SUCCESS	Summerhill Pyramid Winery, an organic vineyard in British Columbia's Okanagan Valley, collaborates with the Okanagan Basin Water Board, which supports adaptation by improving water efficiency and developing policies for resource-sharing during times of water shortages.
INFLUENCE GOVERNMENT ACTION	Intact Financial Corporation, a major insurer operating in Canada, teamed up with the University of Waterloo to support research and policy action on six adaptation challenges for Canada: agriculture, biodiversity, city infrastructure, First Nations, freshwater resources, and insurance. The project includes an outreach and advocacy plan and, through it, a commitment to engage policymakers, among others. ⁴²

STEP 2

PRIORITIZE RISKS AND OPPORTUNITIES TO MANAGE.

Businesses need to be strategic when choosing which climate change risks and opportunities get their limited attention and dollars.

// Establish a set of evaluation criteria to determine which risks and opportunities demand immediate action, which should simply be monitored, and which can be put aside. Criteria should include the following:⁴³

- **Financial risk:** To what extent can this risk or opportunity threaten or enhance overall business value?
- **Timing:** When are climate change impacts expected to materialize? What lead time will the response require?
- **Alignment with business values:** What risks is the business willing to absorb? At what point do the risks become unacceptable?
- **Proportionality:** What is the magnitude of this risk relative to other risks actively managed by the business?

- **Knowledge:** Do you have enough information to act? The precise magnitude, timing, and location of climate change impacts will never be certain, but that uncertainty is not a valid reason to ignore climate change risk and defer action. Use the best available information and risk tools to treat uncertainty about climate change and its impacts as seriously as you treat other sources of business uncertainty.

// Apply evaluation criteria to prioritize the risks and opportunities to manage.

// Characterize both financial and non-financial consequences of those risks and opportunities.

Your business risk profile is a function of your product and service mix, cost structures, industry competitive dynamics, location of operations and assets, vulnerability of supply chain, ability to identify and capture opportunities, and business-specific risk management capability⁴⁴

IN PRACTICE // RIO TINTO ALCAN

Rio Tinto Alcan — a Montréal-based global producer of bauxite, alumina, and aluminum — is developing a climate change sensitivity framework to assess the exposure of operations and associated infrastructure to climate change risks. An output of the framework is a matrix that highlights priority risks. Instead of using a top-down approach that attempts to foresee the future, Rio Tinto Alcan's approach is bottom-up. It relies on the expert input of Rio Tinto staff, emphasizes learning from past events, and increases the company's capacity to deal with the unexpected. The value of developing and applying this framework includes spotting opportunities in new geographies, identifying new risk dimensions, and enhancing competitiveness.

STEP 3 APPRAISE ADAPTATION OPTIONS.

Prioritizing the risks and opportunities to be managed will lead to strategies for dealing with them. Vulnerability can be reduced by transferring or spreading risk, reducing risk exposure, and avoiding risk. Other options are accepting the loss and exploiting new opportunities.⁴⁵ In some cases it makes sense to postpone action to study the issue and narrow the uncertainties, all the while monitoring for shifts in risk profiles.⁴⁶ The following process can be used to identify the most promising management options.⁴⁷

// Identify a long list of risk management options.

- Consider options to manage specific climate-related risks and to build system resilience.
- Think beyond business boundaries, collaborating with infrastructure providers, suppliers, and others in the value chain.

// Conduct a qualitative assessment of each option.

- Favour “low-hanging fruit” that’s low cost or easy

to address. Prefer those options with proven effectiveness to address the risk or opportunity, options that are flexible to course adjustments, options that benefit the business regardless of climate outcomes, options that yield co-benefits, and options that follow the precautionary principle. Avoid options that conflict with other business objectives.

- Consider whether the business has sufficient information, capacity, and lead time to implement the option.

// Identify a short list of preferred adaptation options.

// Conduct an assessment of each remaining option, using quantitative methods where possible.

- Depending on the information available, employ decision-support approaches like cost-benefit analysis, cost-effectiveness analysis, multi-criteria analysis, and scenario methods.

// Choose the adaptation option(s) to implement.

IN PRACTICE // ENERGY

In 2010, **Entergy** studied and quantified climate change risks in the U.S. Gulf Coast to identify cost-effective adaptive strategies. Completed in collaboration with Swiss Re and others, the study identified the following adaptive strategies, for which the benefits exceeded the costs with cost-benefit ratios of 0.7: updates to building codes, beach nourishment, and improved standards for offshore platforms.⁴⁸ The results helped inform Entergy’s adaptation strategies and provided a foundation for community engagement, enabling Entergy to encourage community adaptation and to better respond to its customers’ needs.

STEP 4 IMPLEMENT AND MONITOR RESPONSE(S).

Prepare your business to adapt and thrive in a changing climate: the risk screening, risk assessment, and options appraisal in previous steps help deliver the actions that will position your business appropriately. The following steps will help to achieve results and learn from experience:

// Prepare an implementation plan that includes roles and responsibilities, resource requirements, possible implementation challenges and corresponding ways to address them, links to other business activities, tasks and timelines, and a stakeholder engagement and communication strategy.⁴⁹

// Establish a monitoring and evaluation framework that includes key performance indicators and success criteria.

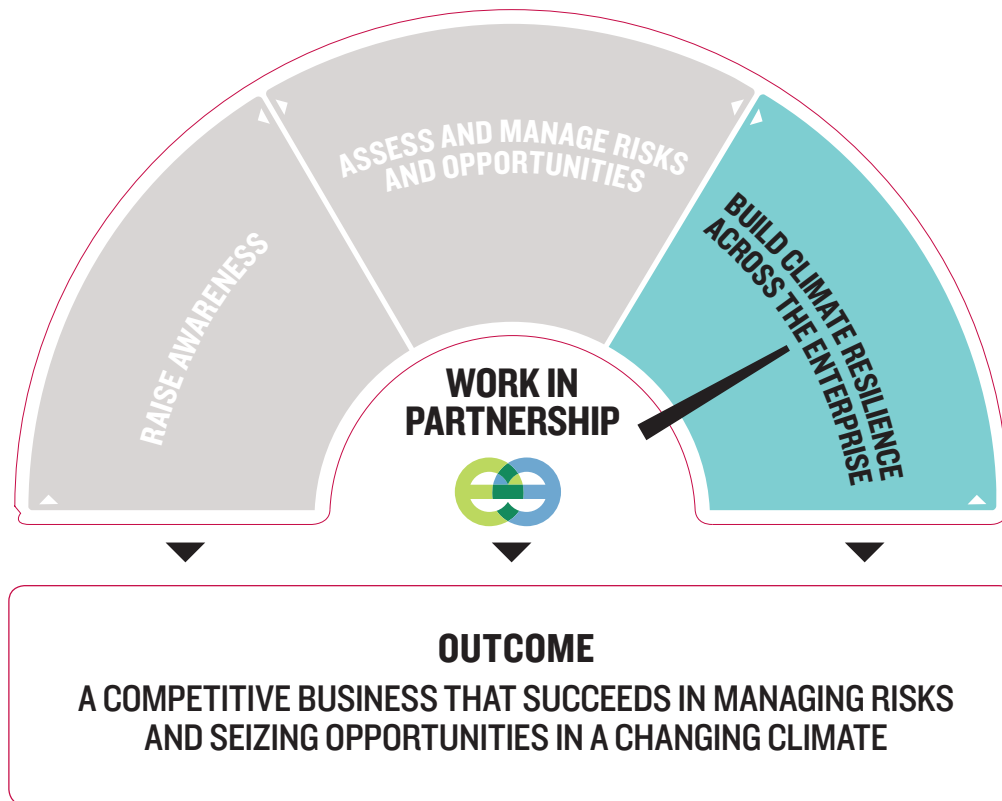
// Use the results of the monitoring strategy to flag needed course corrections, inform future planning decisions, and assess the adequacy of climate change risk governance.

IN PRACTICE // TOLKO

Tolko — a wood products manufacturer based in British Columbia — has adjusted its practices to strengthen the ecological resilience of the timber stands it manages. Tolko's actions include increasing the diversity of the timber stand, considering local bioclimatic conditions when selecting tree species to plant, and avoiding soils that are considered to be vulnerable to climatic stresses. The company has also increased the proportion of Douglas firs planted in certain forest areas to increase resilience and improve carbon sequestration, despite the higher cost of planting this species. These measures will increase the capacity of a timber stand to cope with different possible climate futures, in line with the ecological concept of resilience.

6

HOW TO DO IT: BUILD CLIMATE RESILIENCE ACROSS THE ENTERPRISE



STEP 1 ASSIGN SENIOR-LEVEL RESPONSIBILITY.

Make accountabilities clear and articulate a vision: otherwise, cross-cutting issues such as climate change will be both everyone's problem and no one's problem.

// Assign lead responsibility for building climate resilience to a senior individual to signal the priority of adaptation and make it part of senior-level discussions.

// Include adaptation in existing business climate change strategies.

IN PRACTICE // MUNICH RE

At **Munich Re**, responsibility for climate risk management sits within the Board. In 2007, Munich Re adopted a corporate climate change strategy founded on three pillars: investing in risk assessment, including research on climate change impacts and climate risk management measures; seizing opportunities by offering new insurance products; and considering climate change risks as part of investment decision making. Munich Re now has confidence in its understanding of the business risks of a changing climate and has also identified business opportunities.

STEP 2 AMEND ENTERPRISE AND PROJECT-LEVEL PROCESSES.

Adapting to climate change is most successful when it becomes just another part of doing business. Integrating adaptation into the way businesses already work can minimize resource commitments and keep adaptation on the business radar.

// Integrate climate change risks in existing management systems.

// Adjust enterprise-wide processes and guidelines so that adaptation thinking will factor into key decision

points, including siting decisions, long-term planning, and capital asset plans.⁵⁰

- Check whether contracting and procurement processes are sufficiently flexible to accommodate disruptions in the availability of raw materials in a changing climate.
- Consider the stages at which infrastructure development projects may require additional and explicit consideration of future climate conditions.

// Strengthen approaches to managing supply-chain risks (see **Box 3**).

Businesses already work with a range of standard management systems including ISO 31000 Risk Management, ISO 14000 – Environmental Management, and ISO 9000 – Quality Management. Each of these can accommodate climate change risk management and adaptation.

"We feel it is important to manage risk at the appropriate level. For example, site specific issues such as water availability at an existing reservoir are managed differently than socio-economic considerations associated with a new hydropower project."
Sonia Lacombe, Director – Climate Change,
Rio Tinto Alcan

IN PRACTICE // RBC

RBC has implemented thorough risk management and investment due diligence processes. For example, as part of its credit risk analyses, RBC assesses industry-, company-, and transaction-level risks and ensures that staff is trained to address these risks. In some cases, RBC has added new risk dimensions to its credit-review process in response to the increasing body of knowledge on climate change and its impacts. RBC's analysis has identified the following sectors as those most impacted by climate change: tourism and recreation, agriculture and fisheries, forestry, insurance, and hydropower.⁵¹ The benefits of these actions register as improved risk management and due diligence, key to the performance and reputation of businesses in the financial services sector.

BOX 3 STEPS FOR MANAGING RISKS AND OPPORTUNITIES ACROSS THE SUPPLY CHAIN⁵²

1

Map your supply chain. Identify the products and services that contribute most to the bottom line, and then focus efforts accordingly.

2

Prioritize risk management investments by assessing current and future exposure to climate-related events and clarifying your risk tolerance.

3

Engage suppliers in the process to understand their risk management programs, how they prioritize customers during a disruption, and their plans for managing risks associated with extreme weather events and gradual climate changes. Establish a common communications framework, including risk management definitions, provisions for data collection, and agreed-upon communications channels when responding to a disruption.

4

Develop specific strategies to manage risks related to short- and long-term changes in climate.

- Stress-test business continuity plans in light of increased climate volatility.
- Implement an enterprise-wide plan to be activated each time a supply-chain disruption occurs. The plan should include provisions for communication with both upstream and downstream suppliers and clients.
- Consider investment in risk-transfer mechanisms, such as insurance, to cover profit loss or increased costs stemming from supply-chain interruptions.
- Start real-time monitoring to track supply-chain disruptions.
- Update strategies for supply-chain resilience in response to new climate change events or threats.

STEP 3

DISCLOSE RISKS TO INVESTORS AND STAKEHOLDERS.

While voluntary disclosure of climate change risks continues to grow through such initiatives as the Carbon Disclosure Project (CDP), publicly traded companies must provide this information, if material, in continuous disclosure documents.⁵³

// Consult the following sources to identify potential material climate-related disclosures for inclusion in annual securities filings:⁵⁴

- CDP survey responses from your own business and your peers
- Industry research papers on physical impacts relevant to your sector
- Enterprise risk management reports

// Follow Canadian Securities Administrators guidance on disclosure of environmental risks and other sources (e.g., sector-specific guidance published by Ceres).⁵⁵

IN PRACTICE // GREATER TORONTO AIRPORTS AUTHORITY (GTAA)

In its 2010 securities filings, the **Greater Toronto Airports Authority (GTAA)** noted that climate change may lead to more severe weather, creating flooding risk for airports. In response to this risk, GTAA is spending roughly \$100,000 to identify improvements and adjustments in operational practices to prevent storm flooding.⁵⁶

Good climate change risk governance:

- promotes risk awareness across the enterprise,
- strengthens coherence among firms' sustainability and financial units,
- drives the assessment of financial implications of climate change, and
- emphasizes longer-term shareholder value.⁵⁷

STEP 4

MONITOR ENTERPRISE PROGRESS AND NEW DEVELOPMENTS.

Adapting to changing climate conditions is a moving target: it's not about adapting from one climate to another, but rather about a continual process of adjustment to continuously changing conditions. To optimize adaptive strategies, pay attention to lessons generated internally and by others.

// Step back from the micro-assessment of each individual adaptive strategy to take an enterprise-wide view of progress in adapting to the risks and opportunities of a changing climate.

// Participate in networks that keep you attuned to advancements in climate science and adaptation research.

// Scan for new risks and opportunities on the horizon and factor new information into risk assessments.

IN PRACTICE // ANGLIAN WATER

Anglian Water, a large private water utility in the U.K., views climate change as among its greatest business risks due to the expected reduction in summer rainfall and the already dry nature of the region. Several adaptive measures are already in place, including developing alternative supplies and launching a campaign to reduce water use among its customers. The company relies on asset performance indicators to monitor its climate change resilience. Anglian Water believes that a flexible approach to adaptation is critical. It plans to use an ongoing review process to identify new risks and the firm's corresponding adaptive responses.⁵⁸

As the impacts of climate change intensify, policy and regulatory reform is sure to follow. Firms may find it advantageous to work collaboratively to engage with governments on the issue. In some cases, new policies may be necessary to mandate the assessment of climate change risk. Specific management actions among the private sector may also be needed. Key for firms is being at the table as new policies are created and existing policies are adjusted.

7

KEY MESSAGES AND RECOMMENDATIONS

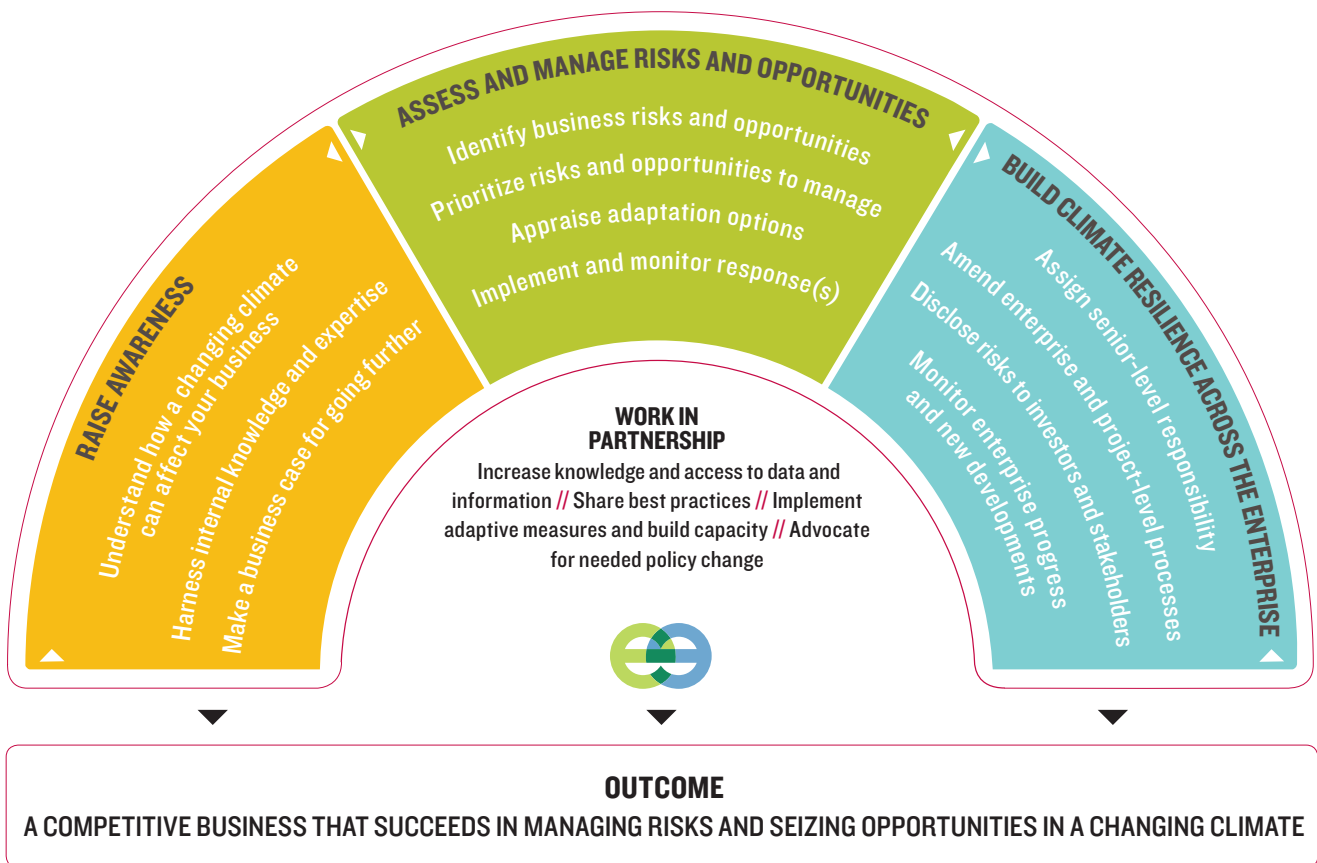
A changing climate presents operational, strategic, and financial risks and opportunities for Canadian businesses. These range from increased insurance costs because of growing flood risks to reputational losses from customer delays resulting from extreme weather events, and from limits to business expansion opportunities due to limited water availability to new market opportunities for providers of adaptation solutions.

Pacesetter businesses demonstrate that firms *can* adjust the way they do business to better manage

climate change risks and opportunities. These adjustments can preserve and create value. However, many businesses have yet to follow their lead.

Climate change is here to stay. Businesses of all sizes, sectors, and in all regions will continue to be affected. Proactive planning for climate change can limit downside risks and take advantage of commercial opportunities. Businesses that follow the process set out in this report will be well positioned to adapt and prosper in a changing climate (**Figure 1**).

FIGURE I NRT DASHBOARD FOR BUSINESS SUCCESS IN A CHANGING CLIMATE



THE NRT RECOMMENDS THAT BUSINESSES PRIORITIZE THE FOLLOWING STRATEGIES TO MOVE FORWARD WITH ADAPTATION, PARTICULARLY WHEN RESOURCES ARE LIMITED:

DON'T LET PERFECTION BE THE ENEMY OF THE GOOD

Where resources are constrained and preclude a comprehensive assessment of climate change risks and opportunities, choose smaller steps. For example, select one or two obvious areas of risk or opportunity and start by prioritizing adaptation responses that are inexpensive and will bring benefits to the business regardless of future climate change.

SPOT OPPORTUNITIES

Stay alert to opportunities to reduce costs of potential climate change impacts through adaptation, to expand existing business lines, and to create new ones by providing adaptation solutions to customers. For some industry sectors, an opportunities framing goes a long way to inspire action that advances adaptation within the business.

KNOW YOUR EXPOSURE AND RESPONSES

Decision makers, from operational managers to directors, should be able to answer the following questions: What risks and opportunities does a changing climate create for your business? What actions are currently in place to manage these risk and opportunities? What further actions are you planning for the future?

INVOLVE SUPPLIERS AND CUSTOMERS

Engage suppliers and customers across the supply chain in adaptation discussions. Draw on these upstream and downstream perspectives to clarify risk tolerances across the board, better assess your own vulnerability, and encourage action among the actors on which your business depends.

WORK WITH OTHERS

Share expertise and limit resource demands by collaborating with experts and other businesses in your sector or region. Use your common interests to identify risks and opportunities and assess potential adaptive responses.

BROADEN YOUR LENS BEYOND MANAGING TODAY'S WEATHER RISKS

Businesses should be prepared for today's severe weather but also consider the impacts on business from future climate change, including gradual shifts in baseline climate, the changing frequency and intensity of extreme weather events, and cascading societal and economic risks.

8 TOOLKIT

OVER THE COURSE OF THE NRT PROJECT ON BUSINESS RESILIENCE AND ADAPTATION TO CLIMATE CHANGE, STAKEHOLDERS MENTIONED THE FOLLOWING INFORMATION SOURCES, TOOLS TO AID DECISION MAKING, AND OTHER RESOURCES THAT ARE USEFUL FOR BUSINESSES.

INFORMATION ON CLIMATE CHANGE, IMPACTS, AND ADAPTATION

Canadian Climate Change Scenarios Network:

www.cccsn.ca

Climate trend analyses for 18 Canadian regions to 2050: www.iclr.org/images/Bruce_climate_change_info_march_2011.pdf

Intergovernmental Panel on Climate Change:

www.ipcc.ch/index.htm

National Round Table on the Environment and the Economy: www.nrtee-trnee.ca

Natural Resources Canada Impacts and Adaptation website: www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/54

Regional climate services: www.ouranos.ca; www.pacificclimate.org; www.parc.ca

The Nature Conservancy Climate Wizard:

www.climatewizard.org

World Bank Climate Change Knowledge Portal: sdwebx.worldbank.org/climateportal/index.cfm

GUIDANCE, TOOLS, AND STANDARDS

Australian Government Climate Change Impacts & Risk Management: A Guide for Business and Government: www.climatechange.gov.au/community/~media/publications/local-govt/risk-management.ashx

British Standards Institution: Climate Change Adaptation. Adapting to climate risks using ISO 9001,

ISO 14001, BS 25999 and BS 31100: shop.bsigroup.com/en/ProductDetail/?pid=00000000030213386

Canadian Securities Administrators Environmental Reporting Guidance: www.osc.gov.on.ca/documents/en/Securities-Category5/csa_20101027_51-333_environmental-reporting.pdf

PIEVC Engineering Protocol for Climate Change Infrastructure Vulnerability Assessment: www.nrcan.gc.ca/earth-sciences/projdb/pdf/211_e.pdf

Shaping climate-resilient development: a framework for decision-making: mckinseyonsociety.com/downloads/reports/Economic-Development/ECA%20%20Shaping%20Climate%20Resilient%20Development%20%20Report%20Only.pdf

Standard CAN/CSA-ISO 14001-04 (R2009) - Environmental Management Systems - Requirements With Guidance for Use: shop.csa.ca/en/canada/environmental-management-systems/canca-iso-14001-04-r2009/invt/27002912004

Standard CAN/CSA-ISO 31000-10 - Risk management - Principles and guidelines: shop.csa.ca/en/canada/risk-management/canca-iso-31000-10/invt/27030372010

Standard CAN/CSA-ISO 9000-05 (R2010) - Quality Management Systems - Fundamentals and Vocabulary: shop.csa.ca/en/canada/quality-assurance-and-quality-management/canca-iso-9000-05-r2010/invt/27012042005

UKCIP Climate adaptation: Risk, uncertainty and decision-making: www.ukcip.org.uk/wordpress/wp-content/PDFs/Risk.pdf

United Kingdom Climate Impacts Programme (UKCIP) Business Areas Climate Assessment Tool (BACLIAT): www.ukcip.org.uk/bacliat

INSTITUTIONAL NETWORKS

Canadian Centre for Emergency Preparedness (CCEP): www.ccep.ca

Carbon Disclosure Project: www.cdproject.net/en-US/Pages/HomePage.aspx

United Nations Framework Convention on Climate Change Adaptation Private Sector Initiative: unfccc.int/adaptation/nairobi_work_programme/private_sector_initiative/items/4623.php

FINANCIAL INCENTIVES

Canada Revenue Agency Scientific Research and Experimental Development (SR&ED) tax incentive program: www.cra-arc.gc.ca/txcrdt/sred-rsde/menu-eng.html

Sustainable Development Technology Canada SD Tech Fund: www.sdte.ca/index.php?page=sdtech-funding-niche&hl=en_CA

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- 1 Solomon 2007
- 2 Intergovernmental Panel on Climate Change 2007; Lemmen et al. 2008a; National Round Table on the Environment and the Economy 2010
- 3 Intergovernmental Panel on Climate Change 2011
- 4 Unless otherwise noted, all monetary figures are in 2010CAD.
- 5 Robinson October 27, 2011
- 6 Power 2012
- 7 CSCMP's Supply Chain Quarterly 2011
- 8 Watkins and Ito 2011
- 9 Johnson 2012
- 10 Carbon Disclosure Project 2009
- 11 SNC-Lavalin ND
- 12 State Street Global Advisors 2008
- 13 Wallace January 24, 2012
- 14 Deloitte 2011
- 15 Our research included commissioning Acclimatise to prepare case studies outlining specific steps and strategies thirteen businesses have already taken to adapt to a changing climate. These businesses are: Cameco, Royal Bank of Canada, Hydro-Québec, Tolko, EBA Engineering, JD Irving, Summerhill Pyramid Winery, Rio Tinto Alcan, Coca-Cola, Whistler-Blackcomb, Entergy, Munich Re, and BC Hydro.
- 16 British Standards Institution 2011
- 17 British Standards Institution 2011
- 18 Smith et al 2011
- 19 The examples cited are primarily derived from Canadian responses to the Carbon Disclosure Project (Carbon Disclosure Project 2010) and from NRT's Facing the Elements: Building Business Resilience in a Changing Climate-Case Studies research.
- 20 British Standards Institution 2011
- 21 Deloitte 2011; Wellstead 2011
- 22 See chapters 2 and 4 of NRT's Facing the Elements: Building Business Resilience in a Changing Climate-Advisory Report for a complete discussion on barriers to business adaptation in Canada.
- 23 Intergovernmental Panel on Climate Change 2007
- 24 National Round Table on the Environment and the Economy 2011
- 25 Munich Re 2009
- 26 Chiquita Brands International Inc 2010
- 27 Ceres and Climate Change Lawyers Network 2012
- 28 Wellstead 2011
- 29 Investor Group on Climate Change 2012
- 30 Stenek, Amado, and Connell 2010
- 31 Fankhauser 2009
- 32 National Round Table on the Environment and the Economy 2011
- 33 Wellstead 2011
- 34 Johnson & Johnson
- 35 UK Trade & Investment 2011
- 36 United Nations Global Compact et al. 2011
- 37 Unless otherwise indicated, the In Practice examples are taken from NRT's Facing the Elements: Building Business Resilience in a Changing Climate-Case Studies research.
- 38 Williams October 27, 2011
- 39 The categories we present more or less align with the themes covered in the UK Climate Impacts Programme's risk assessments (UK Climate Impacts Programme 2010). It also makes sense to use categories embedded in firms' existing management systems.
- 40 NRT's Facing the Elements: Building Business Resilience in a Changing Climate-Advisory Report includes advice on questions that small and mid-sized businesses should consider to assess their risks and opportunities.
- 41 Canadian Electricity Association January 6, 2012.
- 42 Intact and University of Waterloo ND
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- 46 UK Climate Impacts Programme 2010
- 47 Brown et al. 2011; UK Climate Impacts Programme 2010
- 48 Williams October 27, 2011
- 49 UK Climate Impacts Programme 2010
- 50 UK Climate Impacts Programme 2010
- 51 Marsh 2011
- 52 Odendahl October 27, 2011
- 53 Canadian Securities Administrators 2010
- 54 Canadian Institute of Chartered Accountants 2008
- 55 Canadian Securities Administrators 2010; Ceres 2011
- 56 Greater Toronto Airports Authority 2011
- 57 Based on Cogan 2006
- 58 Anglian Water 2011

FOR THEIR COLLABORATION ON THE CASE STUDIES REPORT, THE NRT THANKS



CLIMATE PROSPERITY

THE TIMELINE

2010

2012



REPORT 01 //
**MEASURING UP:
 BENCHMARKING CANADA'S
 COMPETITIVENESS IN A
 LOW-CARBON WORLD**

This report will assess Canada's capacity to be competitive in a new global low-carbon economy, by comparing us to other G8 nations in areas such as emissions and energy, skills, investment, innovation and governance.



REPORT 02 //
**DEGREES OF CHANGE:
 CLIMATE WARMING AND
 THE STAKES FOR CANADA**

This report will communicate the risks and benefits that a warming climate poses to Canada over the next one-hundred years in areas such as ecosystems, water resources, health, infrastructure and natural resource sectors and how adaptation can help.



REPORT 03 //
**PARALLEL PATHS:
 CANADA-U.S. CLIMATE
 POLICY CHOICES**

This report will examine Canadian climate policy choices based on potential U.S. courses of action and what this means for achieving Canadian environmental goals at the least economic cost.



REPORT 04 //
**PAYING THE PRICE:
 THE ECONOMIC IMPACTS
 OF CLIMATE CHANGE
 FOR CANADA**

This report will provide, for the first time, national economic costings of the impact of climate change on Canada, together with a detailed look at three key sectors.



REPORT 05 //
**FACING THE ELEMENTS:
 BUILDING BUSINESS
 RESILIENCE IN A
 CHANGING CLIMATE**

**/ CASE STUDIES
 // BUSINESS PRIMER
 /// ADVISORY REPORT**
 These three reports set out what Canadian businesses can and should do to prepare and take action to manage the risks and opportunities of a changing climate, and how governments can help.



REPORT 06 //
**POLICY PATHWAY
 REPORT FOR GLOBAL
 LOW-CARBON
 TRANSITION**

Building on previous reports in the series, this advisory report will provide policy pathways and actions necessary for Canada to thrive in a global low-carbon economy in areas such as energy, innovation, skills, investment and governance.



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