

WHAT NEEDS TO CHANGE IN A CHANGING CLIMATE: Managing Risk Requires Decisive Policy and Innovative Technology

Innovative policy, new technology, faster adaptation and ways to build public support are all needed to manage climate-change risks, which will be critically important to Canada for decades to come. [By Glen Hodgson](#)



SUMMARY AND RECOMMENDATIONS

Recent Abacus polling suggests a majority of Canadians understand that climate change is real. They recognize that something must be done to adapt to the new climate reality, provided our standard of living and lifestyles are not severely constrained. However, it should also be noted that a full social consensus on climate change adaptation has not been reached, and policy shifts are likely to occur in response to changes in public opinion.

There has been surprisingly little debate about the current and expected economic costs of climate change. Doing little or nothing to curb emissions has an economic cost, as does failing to encourage adaptation. The public policy debate and related decisions need to recognize those costs and take steps to manage and limit them.

Rising costs are now being felt in two key areas: in dealing with the many effects of increasingly severe weather, such as floods and fires; and in dealing with the effects that extreme weather has on public infrastructure. A third key area of focus in the coming years will be the risk of stranded assets, most notably in sectors and regions that have high greenhouse gas (GHG)-emissions intensity.

Climate change is creating a growing array of economic and societal costs and risks, including severe flooding and forest fires, threats to infrastructure, and the risk of stranded assets in oil and gas production and distribution worth many billions of dollars. At the same time, potential opportunities exist in the low-carbon economy as public and private organizations develop innovative, disruptive technologies.

Managing climate change risk will be critically important to Canada and the international community for decades to come, as evidenced by the fact that other jurisdictions are already moving forward with effective regulatory and policy practices. Innovative public policy and technology will be required in Canada to address and manage climate change risks, and to promote faster adaptation without sacrificing robust economic growth.

While we have made a strong start in addressing the consequences of climate change, the Government of Canada needs to focus its policies on completing and implementing key transitions, such as:

- establish carbon pricing and revenue cycling, as well as complementary smart regulations where pricing requires support
- significantly expand public investment in infrastructure to reflect the increased frequency of extreme weather events and their related impacts
- enhance regulatory oversight to avoid stranded assets
- foster the development and commercialization of technologies that reduce greenhouse gas (GHG) emissions
- promote public and private procurement of technologies that reduce GHG emissions without relying on these technologies to meet emissions targets

Severe weather, floods and fires

One clear consequence of climate change is a steady increase in global losses due to extreme weather events and related impacts—most notably an increase in the frequency and severity of overland floods and forest fires. The Organization for Economic Co-operation and Development report *Financial Management of Flood Risk* states that annual losses from overland flooding have grown to over US\$40 billion annually in recent years; more flood events occurred from 2010 to 2013 than in the whole decade of the 1980s.

Not surprisingly, there has been a dramatic rise in government funding, liabilities and insurance claims due to flood damage and remediation. Canadian government spending on floods and recovery has increased dramatically since 2000, from around \$100 million annually to a high of \$2 billion in 2013–2014. The Parliamentary Budget Office has projected that natural disaster recovery costs will remain high for the federal government, at a conservative estimate of \$900 million annually for the next five years. Nearly \$675 million of that cost each year will result from floods alone.

Today, roughly 10 percent of Canadians live in high-risk flood zones. They live in floodplains, urban areas with inadequate storm-water drainage, or in low-lying coastal areas subject to saltwater inundation. However, mapping of flood risk in Canada is inconsistent and mapping information may not be widely available. Many property owners have chosen to live in these areas based on inadequate and incomplete historical information. While mapping is improving with more sophisticated technology, risk mapping and flood-risk information are not managed or distributed under an integrated system.

Extreme instances of wildfires—particularly in British Columbia—have also caught the attention of Canadians. The Province of British Columbia's Wildfire Service estimates that approximately 1.3 million hectares have been affected by wildfires since April 2018—the worst year in the province's history. In 2017, approximately 1.2 million hectares burned, leading to 65,000 displaced people and costing \$568 million for fire suppression.

Major threats to infrastructure

A second key source of rising costs from climate change is public infrastructure spending to ensure that buildings, roads and culverts, bridges, dams, levees, sewers and drainage systems can stand up to more extreme weather. Existing infrastructure will require reinforcement, and new projects will need enhanced design and construction to increase their resilience to extreme weather such as torrential rainfall, heavy snowfall, high winds, drought and wild temperature swings that can precipitate events such as ice storms and wildfires.

Direct government financing from federal, provincial, territorial and local governments is generally the first funding option for infrastructure. Yet Canadian governments have systematically underinvested in public infrastructure for decades. The Canada Infrastructure Report Card for 2016 estimates \$141 billion as the replacement value for existing assets deemed to be in poor or very poor condition. Funding is now being put in place to close this public infrastructure deficit, and to further expand and enhance public infrastructure to ensure it is adequate to withstand the effects of climate change.

Newly built and retrofitted infrastructure can also



Placing undue faith in the capacity of potential new disruptive technologies to redress climate change and mitigate related damage may undermine the political will needed to take near-term action.

help reduce future GHG emissions by using low- or lower-carbon energy sources, and by making design and operational choices that help minimize emissions. Expansion of public transit powered by low-carbon electricity—buses, streetcars, light rail, intercity rail—is an obvious example of enhanced low-carbon infrastructure investment.

Growing risk of stranded assets

A third area of impact in the coming years will be the risk of stranded assets and unproductive investments that could undermine confidence in Canada's financial system and institutions. The ground is shifting on what public and private investors regard as a sustainable investment and, as a result, regulatory and market oversight is being examined in detail.

For example, much recent international discussion has taken place on the increased transparency and disclosure needed to help identify, mitigate and manage firm-level climate change risk, and possible systemic financial risk. The G20's Financial Stability Board created the Task Force on Climate-Related Financial Disclosures in 2015. The task force provided detailed recommendations in December

2016 on four areas for action to improve climate-related reporting for firms across many sectors:

1. **Governance:** Disclose the organization's governance around climate-related risk and opportunities.
2. **Strategy:** Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy and financial planning.
3. **Risk management:** Disclose how the organization identifies, assesses and manages climate-related risks.
4. **Metrics and targets:** Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

Enhanced disclosure of climate-related risks and opportunities would enable investors to make more informed decisions about a firm's potential for long-term business success. The four areas of action would apply most directly to publicly traded firms but could also help inform business decision making in privately held firms.

The Government of Canada created the [Expert Panel on Sustainable Finance](#) to explore the role of the financial sector in supporting the clean growth agenda in Canada; in particular, by identifying opportunities for integrating environmental, social and governance criteria into business and investment decisions. Defining Canadian policy on standards for business transparency is particularly important for financial institutions that provide the capital for energy development. It is also important for firms with significant assets and processes that have high GHG emission intensity, such as those in the energy sector, key energy services like energy transmission, and sectors like petrochemicals and cement.

Other jurisdictions are moving forward

The Bank of England, which regulates the dominant global debt market in the City of London, has been active in advancing the work of the [Financial Stability Board task force](#). The European Union adopted

a package of measures in May 2018, implementing several key actions on sustainable finance. The EU package includes:

- a [regulatory framework](#) to gradually create a unified classification system on what is considered an environmentally sustainable economic activity
- [regulations on disclosure obligations](#) for how institutional investors and asset managers integrate environmental, social and governance factors in their risk and investment decision-making processes
- [amended regulations on low carbon and positive carbon impact benchmarks](#), which provide investors with better information on the carbon footprint of their investment

Regulatory and policy practices in financial market segments also have an impact on the capacity



\$2 BILLION

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of Canadian financial markets to adapt to climate change. For example, investment portfolio regulations, guidelines and practices across the investment industry and within firms could promote or inhibit the diversification of investment assets toward lower-carbon activities.

Canada must leverage conventional and disruptive technologies

What specific role could be played by the development and procurement of conventional and disruptive technologies in managing climate change risk? Recent research by the Canadian Academy of Engineering, presented in the [Trottier Energy Futures Project](#), indicates that the wide deployment of existing and known emerging technologies could allow Canada to achieve its commitments under the Paris Agreement. This deployment will require massive private investment over the coming decades—[estimated by the Conference Board of Canada at \\$2 trillion or more](#). Profound changes will be required to how we produce and consume energy, guided by policies that encourage individuals, businesses and governments to actually purchase and use these technologies.

The following are some examples of disruptive technologies that could help manage climate change risk and accelerate low-carbon transition:

- Enhanced remote mapping information technology would improve management of extreme weather risk and aid community development planning. It could also promote better access to private insurance coverage for extreme weather events, notably floods.
- Disruptive information technology and the use of artificial intelligence could enhance financial sector risk analysis and management, reducing the risk of stranded assets.

- Advances in decarbonization technology could reduce carbon from conventional energy production, from energy consumption and even from the atmosphere.
- Technology is being explored to convert stored carbon into economically useful products.
- Electric and automated vehicles could help reduce transportation emissions, although widespread viability is still a work in progress.

While disruptive technologies may indeed play an important role in addressing climate change, they are not a panacea. There may be limits to their use. For example, it will be challenging to use disruptive technology to achieve significant GHG emission reductions in freight transport, [according to recent Conference Board of Canada research](#).

Disruptive technology can also be a double-edged sword. It often creates economic and social losers as well as winners; for example, consider the impact of ride-hailing mobile applications like Uber and Lyft. The net impact of technological disruption on society is not always obviously positive. Regulatory frameworks will need to evolve quickly if the greatest benefits are to be captured from disruptive technology and adjustment costs minimized.

In addition, placing undue faith in the capacity of potential new disruptive technologies to redress climate change and mitigate related damage may undermine the political will needed to take near-term action based on current knowledge.

Canadian policy has made a strong start

A combination of creative public policy and technological innovation will be needed to address the consequences of climate change and promote the

transition toward a lower carbon economy. Transition policies that have begun include the following:

- **Pricing carbon and recycling revenue.** [The Ecofiscal Commission](#) (of which the author is a member) has suggested pricing carbon initially at a modest level, such as \$20 a tonne, and increasing the price steadily over time. There is no consensus among economists on the optimal or desired price for carbon; in our view, a target price of \$75 to \$100 a tonne would provide a clear signal to consumers and businesses to modify their behaviour, reduce carbon emissions and avoid paying the carbon price. There are many options for recycling revenue from carbon pricing, but returning the revenue to taxpayers as a dividend may help build wider public support.
- **Using complementary smart regulations in areas where prices alone will not produce significant change.** For example, GHG emissions from methane, or from the agricultural sector, may be technically and practically difficult to price. Well-designed regulations may be more effective in achieving reductions in these areas.
- **Encouraging public investment in more robust infrastructure,** as discussed earlier.
- **Enhancing financial regulatory oversight to avoid stranded assets.**
- **Fostering the development of technologies that reduce GHG emissions and help manage**

climate risk.

- **Developing policies to promote public and private procurement in these technologies, and their sale internationally.**

A good start has been made in implementing many of these structural policies, but there is much more to do. As noted earlier, [a significant minority of Canadians remain unconvinced of the reality and negative impacts of climate change](#). As the policy framework advances, finding ways to build public support will be as important as the measures themselves.

NEXT STEPS

Public policy today aimed at addressing the consequences of climate change and promoting the transition toward a lower carbon economy should focus on completing and implementing the transition policies outlined above and acting based on current knowledge and technologies.

While disruptive technologies can make an important contribution to the transition, relying excessively on “discovery” may deflect from taking necessary near-term actions that can reduce adjustment costs and generate foreseeable payoffs. Ongoing and enhanced investment in promising areas of disruptive technologies should be pursued, but only as a complement to the framework of other efforts.

Glen Hodgson is an economist and author who brings deep pools of knowledge of economic policy and growth related to recent work on energy and climate policy. He has accumulated 35 years of experience in global and Canadian macro-economics, international trade and finance, fiscal and tax policy, and other “big picture” topics.

