



BRIEFING NOTE

Financing Climate Change Adaptation and Resilience

Key Challenges Facing Canada and Potential Solutions

November 2022

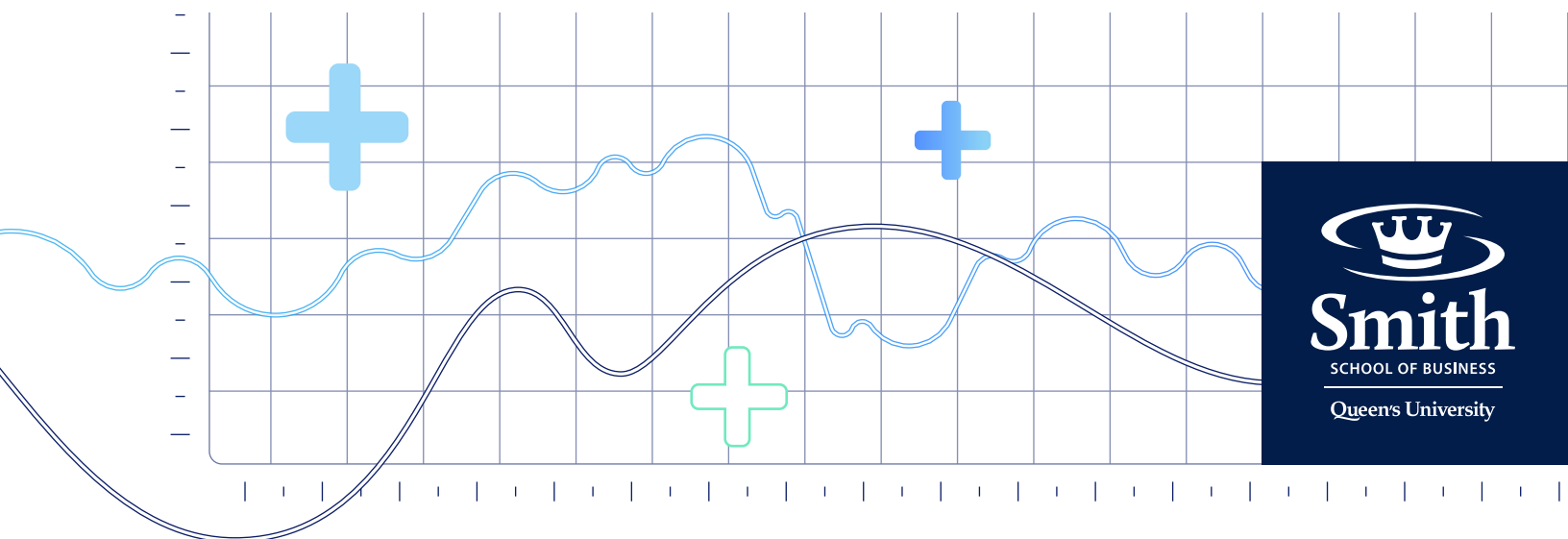
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Additionally, we wish to, in particular, note the contributions to this report's definition of the problem statement, authored by **Chad Park**, with assistance from **Roger Beauchemin**, **Ehren Cory**, and **Craig Stewart**.

INTRODUCTION

OVERVIEW

To enhance Canada's sustainable finance capacity, the Institute for Sustainable Finance (ISF) aspires to act as a collaborative hub, bringing together the cumulative knowledge and expertise within academia, government, and the private sector. Accordingly, ISF seeks to advance solutions that address the main challenges facing Canada in its transition towards a sustainable, resilient economy.

The economic and societal implications of major global events, including the COVID-19 pandemic and the Russian invasion of Ukraine, as well as the need for continued action to address unresolved challenges hindering progress on our climate change imperatives, has been a focus of discussion with ISF's Advisory Board. As a continuation of this dialogue, a sub-group of Advisory Board members was formed to explore the implications that a shifting global economic and policy landscape may have for Canada, as well as the ISF's own strategic approach to sustainable finance.

Several important and cross-cutting considerations have been raised across a range of topics, including the need to articulate the concept of 'transition' in the context of Canada's resource-based economy, addressing the societal implications of a low-carbon transition, as well as recently observed supernormal profits in the oil & gas sector, to name just a few.

Considering these points, and in further conversation with sub-group members, three key focus areas were identified:

1. Financing climate adaptation and resilience;
2. Canada's oil & gas sector transition, and;
3. Alberta, industry, and federal government collaboration.

In cooperation with members of this sub-group and other experts, the ISF aims to articulate the problems within these focus areas, explore the implications for Canada, and provide applicable research recommendations. Further, we aim to emphasize the need for cooperation between government and Canada's intellectual capital to arrive at and ensure the timely implementation of solutions. The ISF is, separately and independently of this work, organizing a series of three educational webinars on Oil & Gas topics. This first briefing focuses solely on financing climate adaptation and resilience.

BACKGROUND AND RELEVANCE

Article 7 of the Paris Agreement established the Global Goal on Adaptation, detailing the objective of, "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change..."¹ In the years since, global adaptation-related responses continue to lack scale and ambition, leaving a gap between the level of adaptation we've achieved, and the level that is required to reduce climate risks.²

The need for increased ambition for adaptation has been in focus at recent international climate summits. In 2021, the 26th Conference of the Parties (COP26) resulted in the agreement of the Glasgow Climate Pact, which notes concern for the insufficient levels of climate finance for adaptation and called for "multilateral development banks, other financial institutions and the private sector to enhance finance mobilization in order to deliver the scale of resources needed to achieve climate plans, particularly for adaptation, and encourages Parties to continue to explore innovative approaches and instruments for mobilizing finance for adaptation from private sources"³ Similarly, at the upcoming COP27 in Egypt, adaptation continues to be a focus, with a stated objective to enhance the global agenda for adaptation action.⁴

Given the ISF's mission to advance practical, timely solutions for sustainable finance, resolving the challenges that hinder the deployment of sufficient capital towards adaptation and resilience is a highly relevant research focus. The remainder of this briefing sets out a problem definition and identifies three initial research recommendations applicable to the private sector, public sector, and academia.

FINANCING ADAPTATION & RESILIENCE

SUMMARY

On average, Canada's climate has warmed — and will continue to warm — at approximately double the magnitude of global warming.⁵ The near-linear relationship between CO2 emissions and the level of warming that results⁶ underscores the importance of global efforts towards reducing greenhouse gas emissions (GHG) through mitigation activities. However, climatic changes from already observed warming will continue to persist. The resulting physical (acute and chronic) hazards pose increasing economic and societal risks. Certain regions of Canada facing disproportionate risks, particularly northern and coastal communities, are already dealing with significant climate-related impacts. To reduce the severity that these impacts will have on Canada's environment, and the socio-economic well-being of our communities, requires significant investment towards reducing risk and enhancing climate resilience through adaptation.

Despite the urgency to act, adaptation financing accounts for only 7% of global climate finance⁷, and it is unlikely that current investment gaps can be addressed through public funds alone. Fortunately, the private sector has the capital required to reduce the adaptation and resilience investment gap, as well as the expertise to ensure efficient, risk-optimized capital allocation. However, the benefits of resiliency infrastructure are highly diffuse, challenging to quantify, and difficult to monetize as cash flows. Under current financial models, such characteristics are not conducive to private investment. Overcoming the challenges that hinder efforts to mobilize sufficient investment in climate adaptation will require whole-of-society partnerships and innovative thinking to develop new financial models.

Definitions from The Intergovernmental Panel on Climate Change (IPCC)

ADAPTATION

"In human systems, the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate this".⁸

RESILIENCE

"The capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure as well as biodiversity in case of ecosystems while also maintaining the capacity for adaptation, learning and transformation".²

PROBLEM DEFINITIONⁱ

The purpose of this Briefing is to describe the challenges associated with deploying private capital to climate resiliency infrastructure, and to provide key recommendations to help mobilize private sector capital towards adaptation and resilience projects as a complement to public sector funding.

Climate-related Financial Risk is Increasing

As our climate changes, communities are facing increasing risk from acute hazards, such as extreme weather events, and chronic hazards, such as sea level rise and shifting hydrological patterns. Damage and loss from such phenomena have been increasing over time: insured losses from catastrophic events in Canada in 2021 totalled \$2.1 billion¹⁰ – and on average the total economic losses are three times higher than insured losses.¹¹ The cost of rebuilding after the late 2021 floods in British Columbia alone is estimated at \$9 billion.¹²

Significantly More Capital is Needed for Adaptation

As more economies make moves toward Net Zero, society is ramping up investment to reduce greenhouse gases and address the root cause of this risk. However, less attention is given to preparing society for the impacts of climatic changes that are already locked in for the coming decades. So far, only 7% of global climate finance is directed toward adaptation and resiliency.¹³

In addition to investment in climate mitigation, we urgently need significantly more investment focused on reducing predictable risk and building resilience. Without addressing risk, our progress toward our net-zero goals is likely to face avoidable setbacks – **and investment portfolios will face increasing systemic risk with repeated losses and disruptions.**

It has been estimated that adapting to climate change will require investment of CAD\$5.3 billion per year in Canada,¹⁴ and US\$140-300 billion worldwide per year by 2030, increasing to US\$280-500 billion per year by 2050.¹⁵ While these sums may appear large, they are but a fraction of the predicted cost of damage and loss from accelerating climate change.¹⁶

The Economic Case for Resilience is Compelling

Governments at all levels in Canada are increasing their commitments to climate adaptation. That's because they know resilience investments come with a handsome payback: Public Safety Canada estimates a 3-5x payback,¹⁷ the Federation of Canadian Municipalities calculates the payback at 6x,¹⁸ while the Global Commission on Adaptation estimates a range of 2-10x payback, depending on the intervention.¹⁹ The Government of Manitoba quantified the benefit:cost ratio of the Red River Floodway **from the mitigated 1997 flood alone at 40:1.**²⁰

Government Funding May Not Suffice

Despite this strong economic case, public funds are constrained. Against all the other pressures facing Canadians we cannot realistically ask taxpayers to carry the full financial burden of building a resilient Canada at the scale and with the urgency required, especially when there are a variety of benefits and cost avoidances that can be modelled, quantified, and harnessed or set off to make more projects financially viable.

Private Capital & Expertise Could Help Scale Solutions Faster

Private investors, professional engineering and solutions designers, and innovative bundling and project delivery mechanisms will all surely be needed to achieve the scale and speed of construction required. Fortunately, there is no shortage of climate-concerned capital – now trillions of dollars globally – available to be deployed, with a growing appetite to generate societal benefits alongside financial returns.²¹

i Authored by **Chad Park**, with assistance from **Roger Beauchemin**, **Ehren Cory**, and **Craig Stewart**.

Beyond offering capital itself, the private sector also possesses sophisticated risk modelling and risk transfer products (e.g., parametric and catastrophe insurance), which can help right-size infrastructure investments ensuring the most efficient, risk-optimized allocation of capital.

.... But Innovation and Whole-of-Society Partnerships will be Required

The challenge is that the benefits resulting from resiliency infrastructure possess characteristics not entirely conducive to private investment given current financial models:

- **Concentration:** The benefits of resiliency infrastructure accrue to many entities' balance sheets, income statements, and wellbeing. In other words, they are highly diffuse, making quantification and harvesting potentially complex and costly.
- **Quality:** Some benefits are easily quantified (e.g., changes in insurance premiums, property values and corresponding taxes, generation of carbon credits). Some are contingent, like avoided losses. Others require sophisticated methodologies to quantify or may elude quantification altogether (e.g., peace of mind, liveability, mental health from green space).
- **Confidence:** The benefits of any additional revenues are clear to see and have confidence in, and so too are many co-benefits arising from resiliency infrastructure. It may be much more difficult to gain broad agreement and confidence in the quantification of the benefits of avoided costs (from avoided disasters). Quantifying the absence of a phenomenon may require modeling hypothetical futures (sometimes distant) on which there may not be a high degree of understanding or agreement among decision-makers.
- **Cash-ability:** Even if quantifiable, some benefits can be difficult to monetize as cashflows — much less to aggregate and harvest to repay investors.

New financial models (and likely whole-of-society partnerships) are needed to overcome these challenges and unlock the private investment required to protect Canadians, our economy and our environment from the growing systemic risks we face.

Greatest Opportunity for Impact is in Municipalities

While this challenge applies at all orders of government, it is particularly poignant among municipalities, which control approximately 60% of the country's infrastructure but collect just 8% of its tax dollars.²² The size and sophistication of municipalities varies widely, and all municipalities are limited in how they can raise funding — significantly hampering their ability to protect Canadians from the physical climate risks they face on the 'front lines'.

While it is tempting to draw a straight line between a resiliency infrastructure intervention — whether gray, green or hybrid — and a source of cashflow to repay investors, we needn't constrain our thinking to such financial models. Indeed, cash flows may arise:

- **Directly from resiliency infrastructure:** These cash flows may flow either directly to investors (e.g., earmarked user fees, generation of carbon credits), or flow through beneficiaries (e.g., tax increases, insurance premium reductions).
- **Indirectly from the infrastructure but dependent on it:** The existence of the infrastructure may enable a municipality to enact a mechanism that gives rise to cash flows (e.g., tax-increment financing, local improvement charges, development cost charges).
- **Independent of the infrastructure:** A municipality may repay investors through sources of cash flow that are completely independent of the resiliency infrastructure (e.g., taxation, general operating revenues). Doing so likely requires an enabling political environment (e.g., high climate risk awareness and sense of urgency to act among citizenry).

While new revenue tools may be helpful, these examples illustrate that municipalities are not without any existing means to pay for resiliency infrastructure. In fact, an academic study in 2015 identified 18 tools available to municipalities and rated each on the basis of a set of criteria including their effectiveness, ease of implementation, public acceptance, equity, and flexibility.²³

RECOMMENDATIONS

The three inter-related recommendations presented here, which apply broadly to the public/private sectors and academia, evolved from consideration of the above problem definition and through further dialogue with members of the Advisory Board sub-group. They represent an initial step in the ISF's efforts to drive progress in arriving at solutions to overcome challenges in financing adaptation and resilience projects in Canada. With these recommendations in mind, the ISF, moving forward, will continue to seek further guidance from its Research Advisory Council, and to leverage the capacity and expertise of ISF's established research networks by disseminating this information to the members of the Canadian Sustainable Finance Network (CSFN). The CSFN, an independent research and educational network with broad representation from academia, industry, and government, was established by the ISF for precisely the purpose of advancing research topics in sustainable finance and to provide a hub to share learnings and foster opportunities for collaboration across Canada and internationally.

RECOMMENDATION 1: CASE STUDY



Private



Public



Academia

A case study examination of recent, significant hazard-related events in Canada would be a useful exercise for capturing the complexity of the impact of and response to these events, and to illustrate the benefits of investing in prevention measures. A case study could, for instance, examine the series of floods impacting British Columbia in November 2021 with an associated estimated cost of \$9 billion.²⁴

A case study would summarize the event, and provide focused analysis of the impact (e.g., economic and insured losses). It would further identify and map the response and recovery-related financial flows and the involved stakeholders, who paid and how much. Importantly, case studies would aim to explore possible prevention measures and their estimated costs, presenting a quantitative cost/benefit analysis demonstrating the value of investing in adaptive measures to reduce predictable risk and build resilience and provide ideas for the structuring of financial products.

Case Criteria

- Recent and significant hazard-related event
- Large impact, with costs covered by multiple stakeholders
- Public & private infrastructure
- Prevention measures available

Event

- Map stakeholders
- Quantify losses
- Insured vs. uninsured losses
- Map/track financial flows
- Cost to municipality, federal government, private sector (e.g., insurance), others.

Analysis

- Explore possible prevention measures
- Quantitative cost/benefit analysis to implement prevention measures
- Cost allocation to the different parties
- Savings allocated to the different parties

RECOMMENDATION 2: MUNICIPALITIES AND INNOVATIVE FINANCIAL STRUCTURES



Private



Public



Academia

While recognizing that adaptation financing challenges are not exclusive to the municipal level, there is significant opportunity to be realized through research that advances innovative solutions to support the efforts of municipalities to build resilience and protect Canadians.

Canada's **municipalities** control 60% of the country's infrastructure; however, the ability of local governments to build resilience and protect Canadian communities against increasing climate-related hazards is significantly constrained by their limited financial capacity. They also face additional financial burdens from costs incurred from extreme weather events.

Estimates of required annual investments in municipal infrastructure and adaptation measures at the community-level are significant. While additional public funding is needed, it is unlikely to close the investment gap. Research in this area could focus on **innovative financial structures**, as well as the effectiveness of existing approaches, in order to catalyze greater private investment towards adaptation and resilience projects at the municipal level.

RECOMMENDATION 3: CREATING A PAYMENT STREAM



Private



Public



Academia

The need for adaptation and resilience project financing far exceeds available public funds, while the private sector has significant amounts of funds ready for investment. Such private sector investments have specific purposes, be that to support pensions, life & health insurance coverage or individual savings. Accordingly, it is important for these investors to have clear visibility of a revenue line or sources of funds from which returns can be expected and risks adequately assessed, mitigated and/or managed, such that the risk/return profile of those investments can be properly considered in building investment portfolios.

In order for private capital to consider adaptation and resilience project finance investment opportunities, it is important for the market to understand the impact of negative externalities resulting from climate events and, importantly, to also understand who covers the costs or benefits from the implementation of prevention measures, such as flood and fire mitigation strategies. It is only then that financial market players will be able to understand the flow of funds and risks involved, which will allow investors to build adequate risk-allocation matrices, and be able to create financial products that could address this significant financing gap for Canada's much needed adaptation and resilience projects.

Having said this, we believe the case study analyses stipulated in Recommendation #1 will provide a solid base for this discussion and will help inform decisions by the financial sector in the creation of financial products such as first-loss position coverage, guarantees or partial guarantees, aggregation platforms, decoupling strategies, etc. The Canada Infrastructure Bank (CIB) could play a significant role in this space given its mandate to help catalyze private sector investments into priority infrastructure projects in Canada and will accordingly benefit from the findings resulting from Recommendation #1 in creating these products. Other financial players and policy makers will also benefit from the results from Recommendation #1 as they assess the adaptation problem from their own perspectives and can make better informed decisions and work on potential solutions faster. The ISF will strategically position this paper accordingly for maximum impact across Canada.

ENDNOTES

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- 3 UNFCCC: [Glasgow Climate Pact, 2021 \(p. 3\)](#).
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- 17 Public Safety Canada: [Canada's National Disaster Mitigation Strategy](#)
- 18 Federation of Canadian Municipalities: [Climate and sustainability](#)
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- 24 IPCC. (2021). [Summary for Policymakers](#). In V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, & B. Zhou (Eds.), *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.