

Capital Mobilization Plan for a Canadian Low-Carbon Economy

EXECUTIVE SUMMARY

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“... the most important thing [for climate change] is to move capital from where it is today to where it needs to be tomorrow. The [finance] system is very much part of the solution.”

Mark Carney, United Nations Special Envoy on Climate Action

“... with 2030 barely a decade away, we need to consider the plans and investments required to achieve Canada's longer-term climate aspirations and keep pace with international competition. Industries and markets need this horizon and visibility...to make sustainable long-term investment decisions and accurately price risk and opportunity.”

The Final Report of the Expert Panel on Sustainable Finance, 2019

WHY CANADA NEEDS A CAPITAL MOBILIZATION PLAN FOR A LOW-CARBON ECONOMY

The Final Report of Canada's Expert Panel on Sustainable Finance is clear that transitioning to a low-carbon economy is as much an economic as it is an environmental necessity, and that with this transition, ample economic opportunities exist. Sustainable finance will not solve climate change alone, but it can play a major role and the expertise acquired in the process can place Canada as a global leader. In fact, as the report states, we should consider the pursuits for a sustainable climate and a sustainable economy to be one and the same. The imperative to act on climate change in the context of a shifting global economy is critical to the future competitiveness of Canadian industries in international markets, the ability to attract global capital to Canada, as well as attract and retain top talent catering to the new generation's focus on sustainability, and finally our ability to foresee, plan for, and mitigate significant economic and environmental risks.

The Expert Panel on Sustainable Finance was created to investigate ways in which the financial sector can assist in low-carbon Canadian initiatives, the first and foundational pillar of their report is *the need to shift Canada's climate change conversation from burden to opportunity*¹. This means: *establishing a concrete vision and capital plan for Canada's path to a competitive low-emissions, climate-smart economy; offering Canadian businesses, financial firms and individuals the ability to connect with that vision through investment and savings; and ensuring that government and industry join forces to pursue opportunity and manage risk* [1].

This is the starting place for the Institute for Sustainable Finance's Capital Mobilization Plan series. **Its purpose: to provide a detailed and data-driven blueprint for the transition to a low-carbon economy in Canada.** It should be noted that this report is “descriptive” and not “prescriptive”. We aim to remain neutral and non-biased by making objective assumptions.

The idea that “what gets financed, gets built,” is central to understanding the importance of the financial sector in achieving the greenhouse gas emission reduction targets we have committed to globally, seizing the market opportunity of a low-carbon transition in the process.

While Canada's goal of achieving a 30% reduction in greenhouse gas (GHG) emissions within the next decade and net-zero emissions by 2050 is clear, the way to get there is not. The Capital Mobilization Plan series aims to provide the roadmap of Canada's transition path through consecutive studies.

The most salient conclusion from this first report, is that Canada requires a substantial, but far from insurmountable, investment of \$128 billion over the next 10 years to achieve our 2030 emission reduction targets.

A substantial percentage of this investment can be drawn from the private sector.

Indeed, there is significant evidence to suggest that private capital is already flowing, and poised to flow at a more significant pace, in this direction over the next decade—not only despite the unique economic challenges brought on by a global pandemic, but as a result of it.

How we transition from a high GHG emissions Canada to a low GHG emissions Canada, particularly in the context of sweeping economic change, is one of the fundamental questions that will determine our near-term and long-term future and prosperity. Canadian governments and firms are already working together to

¹ The expert panel is made up of Tiff Macklem, Kim Thomassin, Barbara Zvan, and Andy Chisholm

determine our path through the most devastating recession since the Great Depression. The choices we make now will also determine our economy's resilience to climate change, the longer-term crisis of our lifetime, as well as prepare our economy for the global economic transformation in line with a low-carbon transition that is already well in progress. To make wise decisions, we need sound data and sober analysis. That is the primary contribution this work offers to Canada's efforts to shape our way forward.

DEFINING THE MARKET OPPORTUNITY: REPORT METHODOLOGY

The primary purpose of our Capital Mobilization Plan is to provide a clear-eyed, evidence-based understanding of the required investment associated with reducing GHG emissions to 30% below 2005 levels, which is the Canadian government's 2030 milestone. To further ground this analysis in the reality of the Canadian context, we examine the breakdown of these investments across sectors and jurisdictions. Finally, to lend meaningful perspective, we place these investments in context relative to other major economic indicators and benchmarks such as gross domestic product (GDP), major stimulus spending, and public and private balance sheets.

To conduct this study, we first surveyed the academic and practitioner literature to identify specific costs associated with abating GHG emissions.² Our focus was to pinpoint straightforward estimates of the actual costs associated with carbon abatement projects. We were vigilant in identifying and avoiding suspiciously low estimates arrived at through the omission of implementation barriers (e.g. split incentives, information failures, financing hurdles etc. [2]) and narrow cost definitions, for example those found in the oft-cited 2007 McKinsey cost curve study [3]. These cost estimates form the basis of our calculation of the capital required to reach the 2030 Paris Agreement target of annual emissions 30% below 2005 levels.³

To determine the amount of emissions that require abatement over a 10-year period, to achieve the 2030 target, we use Canada's projected "2019 Reference Case"⁴ to calculate a total of **789 million tonnes**.

Recognizing that abatement costs vary by sector, we group them to calculate average costs per sector. We then weigh these sectoral costs, using the assumption each sector will reduce emissions in the same proportion as they did in 2017.

Let's look at Transportation as an example:

- The average sectoral cost of abatement for Transportation is **\$283/t CO₂eq**⁵ (or \$283 per one tonne of reduced CO₂ or the equivalent of another greenhouse gas)
- The weight assigned to Transportation is **23.5%**, the proportion by which that sector contributed to total emissions in 2017
- When we calculate **23.5%** of the 789 million tonne emission reduction requirement, we see that Transportation's estimated share of reductions is **186 million tonnes** (expressed as Mt. CO₂eq)
- By multiplying the weighted average abatement cost of \$283/tCO₂eq by the total required abatement of 186 million tonnes, we reach a total required investment of \$52.7 billion for this sector

When we apply this approach across all Canadian sectors, and add up each sector's required contribution, we arrive at a total investment estimate of \$128 billion (see Table 2 in the full report found at isfcanda.org/cmp), representing a weighted average abatement cost of \$162.4 per tonne. The "Abatement Required" column is total or cumulative abatement and not annual.

As noted, the underlying assumption in this estimate is that all sectors will continue to reduce emissions in the same proportion as they have in the past. It also assumes that average abatement costs in each sector will stay relatively the same over the next decade. While reasonable, this is far from a guarantee. Variables, from technological breakthroughs to consumer behaviour and policy change, could drive those costs down or up, and sectors may then increase or decrease their emissions reductions accordingly. By examining the abatement costs presented in ranges, we arrive at an overall investment range of **\$90 to \$166 billion to meet the 2030 goal**.⁶

² See for instance: "The cost of reducing greenhouse gas emissions," by Gillingham and Stock in the Journal of Economic Perspectives, 2018, or the 2014 Report from the Inter-governmental Panel on Climate Change

³ Abatement costs are borne by firms when they are required to reduce undesirable negative by-products created during production. Abatement costs can also be calculated for the costs of implementing policy that will reduce CO₂ emissions

⁴ Sourced from Canadian government's "Progress towards Canada's greenhouse gas emissions reduction target"

⁵ We express abatement costs—the cost of lowering one tonne of CO₂ or the equivalent (eq) of another GHG—as (\$/tCO₂eq).

⁶ While this report is specific to Canada, our methodology and the associated abatement costs estimate can be applied globally.

Total Weighted Average Abatement Cost Breakdown

Sector	Proportion (%)	Average Cost (\$/t CO ₂ eq)	Abatement Required (Mt. CO ₂ eq)	Required Investment (\$ millions)
Oil & Gas	27	126	209	26,329
Transportation	24	283	186	52,656
Buildings	11	123	88	10,847
Electricity	10	214	76	16,252
Heavy industry	9	126	75	9,391
Agriculture	9	88	74	6,455
Waste & others	5	139	41	5,650
Land use & Forestry (LULUCF)	5	14	39	545
Total			789	128,125

We take a similar approach to determining the amount of required investment for each Canadian jurisdiction. The “weighted average abatement cost” for each province and territory is achieved by adding the proportional costs of each sector that contributes to that jurisdiction’s emissions. For example, Saskatchewan’s top three emissions drivers are Oil & Gas, Agriculture, and Electricity. The province’s weighted abatement cost of \$150/ tCO₂eq factors in the proportional costs of those three main drivers (as well as those of other, smaller, contributing sectors).

We calculate a jurisdiction’s required investment by multiplying its weighted cost by the amount of emissions it is required to reduce. The latter figure is simply a product of that jurisdiction’s “share” of Canada’s 789 million tonne reduction requirement, based on its current contribution to overall emissions. Again, using Saskatchewan as the example:

- Saskatchewan contributes 10.5% to Canada’s overall emissions
- Therefore, its share of required reductions is equal to 82.7 Mt. CO₂ (or 10.5% of 789 Mt. CO₂)
- Given Saskatchewan’s weighted abatement cost is \$150/ tCO₂eq (a product of the proportional costs of its emissions drivers), its total required investment is roughly \$12.4 billion over the next 10 years (\$150 X 82.7 million)

COSTS BY SECTOR AND REGION: OUR FINDINGS

The stark differences in abatement costs across sectors and regions, and the contours of those differences, matter significantly if we want to take a pragmatic approach to financing Canada’s low carbon transition.

In terms of sectors, on the low-cost end of the spectrum, we find Land Use, Land Use Change, and Forestry (LULUCF \$14) and Agriculture (\$88). Transportation (\$283) marks the highest end of the scale, while Oil & Gas falls in the middle (\$126), below the costs of Electricity (\$214) and the average among the eight sectors (\$139).

However average cost is only one part of the overall story when it comes to understanding the opportunities and requirements for low-carbon sectoral investments. Scale matters and so does the cost of capital⁷, which speaks to the ease or difficulty of securing financing for abatement projects (see Table 6 in the full report found at isfcanada.org/cmp).

For example, Transportation, Canada’s second highest GHG emitting sector, not only carries the highest overall cost of abatement, and greatest required capital investment (\$52.6 billion), it also has a relatively high cost of capital at 6%, compared to other sectors and the overall average of 5.6%. The Oil & Gas sector has relatively low abatement costs, but it requires the second highest capital investment (\$26.3 billion) because the scale of carbon emission reductions in that sector is higher than every other sector. Further, the cost of capital in Oil & Gas is among the highest of all sectors at around 7%. Electricity, on the other hand, has the second highest average cost, and third highest required investment (\$16.3 billion), but a much lower cost of capital at about 4.4%.

⁷ The cost of capital describes the risk profile associated with a particular investment. In practical terms, sectors with high costs of capital related to abatement projects have a harder time securing private investment than those with lower costs of capital.

To arrive at a clear picture, we must also take into consideration the trends, technological developments, and economies of scale that are most likely to impact abatement costs over the next decade.

The rollout of biodiesel, electric vehicles (EVs), and EV charging networks are likely to lower the costs of abatement in Transportation. In the Electricity sector, economies of scale related to increased electrification as well as the development and deployment of technologies related to energy storage and district energy solutions are also likely to decrease costs. When it comes to Oil & Gas, we account for the cost-efficient and well-documented reductions that result from methane abatement technologies in that sector's average cost. Carbon capture and storage (CCS) raises this sector's overall average cost, however, when we factor in the potential of a price decline in CCS overtime, we see a potential cost savings in the sector of \$5 billion over 10 years.

These unique sectoral profiles underlie the different investment opportunities and challenges for various provinces and territories. That is because, not only do jurisdictions differ in terms of carbon intensity, they also differ in terms of emissions drivers.

For example, while Nunavut's overall emission reduction requirement is the lowest in the country (0.6 Mt. CO₂), it has the highest weighted average abatement cost (\$257/tCO₂eq). That's because Transportation, with its high abatement cost, makes up 92% of Nunavut's emissions. In other words, even though Nunavut's required contribution to carbon reductions is small, it won't necessarily be easy.

Indeed, the fact that Transportation is the largest contributor of GHG's in 10 out of Canada's 13 jurisdictions, frames the importance of focusing investment solutions in that sector.

On the flip side, while Alberta's weighted average cost of abatement is the lowest in the country (\$146/tCO₂eq)—a direct result of Oil & Gas being its primary emissions driver—the province's overall required investment to reduce emissions (\$43 billion) is the highest.

Again, this comes back to scale. Alberta's required emission reductions are the most significant in Canada (294 Mt. CO₂eq), much higher than its nearest contender, Ontario (179 Mt. CO₂eq). The high financing cost of Oil & Gas abatement projects is another important factor, which shapes Alberta's low-carbon investment reality.

Finally, if we look at each region's required investment to achieve Canada's overall 2030 goal relative to its GDP, we can further understand what it will take to make progress across the country. As a proportion of GDP, the greatest investment will be required in Saskatchewan, Alberta, and Nova Scotia, while Ontario, Quebec, and British Columbia require the lowest investments relative to their GDPs. Financing Canada's transition will require a sober understanding of these differences, the barriers they present, and the mechanisms by which those barriers can be redefined as investment opportunities.

Key Insights

While a number of insights emerge from our sectoral and jurisdictional analysis, here are the three most salient:

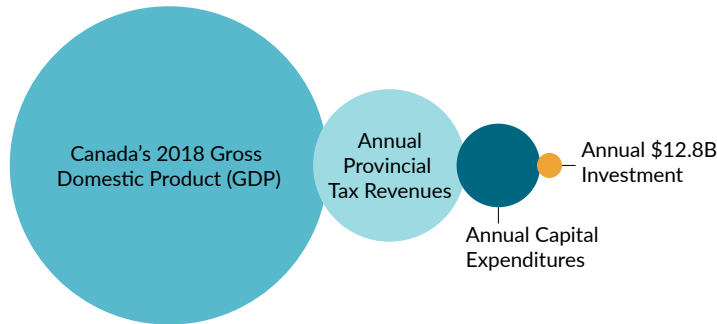
- 1. The Building sector is Canada's lowest-hanging fruit.** When it comes to low-cost GHG reductions, the Building sector—Canada's third-highest source of emissions—offers the most substantial opportunity. In fact, it is the only sector where, in certain scenarios, reducing carbon emissions is less expensive than maintaining them. A small financial and/or behavioural nudge in this sector has the potential to unlock large environmental and economic benefits.
- 2. Transportation is Canada's highest-stakes play.** Reducing emissions in this sector will require a significant investment and the need to address vast amounts of "locked-in capital," capital that is tied up in existing carbon-intensive infrastructure that is costly to abandon. At the same time, unlocking emissions reductions in this sector will have the most substantial impact on provincial and jurisdictional targets, and Canada's overall emissions profile. Public-private partnerships can be an effective way to mobilize capital in this sector. Financing and technology opportunities specific to GHG abatement strategies will be examined in greater detail in reports to come.

3. Electricity and Oil & Gas are the big bets we need to get right. These two sectors are both characterized by relatively high emission abatement requirements and relatively high levels of investment needed to achieve those reductions. What is also true about both sectors is they are poised for meaningful low-carbon technological disruption over the next decade. Saskatchewan, Alberta, and Nova Scotia—the provinces with the highest investment to GDP ratios—will be those best served by effective abatement investments in these sectors. Nova Scotia is the only province in the country where Electricity is the primary source of emissions. Oil & Gas is the primary driver of emissions in both Alberta and Saskatchewan (with Electricity being the second and third-highest driver, respectively). Collaborative efforts between these two sectors would be highly beneficial. Electricity will likely displace some Oil & Gas services in the future, so the Electricity sector should make use of some of the expertise and capital that is found in the Oil & Gas sector.

DOLLARS AND SENSE: PUTTING THE INVESTMENT OPPORTUNITY IN CONTEXT

Mobilizing the \$90 to \$166 billion required to achieve Canada’s 2030 targets is not a small endeavour. However, when we put this investment in context, it is revealed as imminently reasonable and achievable.

Our estimated investment target of \$12.8 billion annually represents just 0.62% of Canada’s 2018 GDP, 2.7% of annual provincial tax revenues, and less than 10% of annual capital expenditures of firms listed on the TSX (see Table 8 in the full report found at isfcanada.org/cmp).



*Scaled for visualization

Three additional considerations matter, if we want to put this investment in real world context.

1. Private capital can achieve at least 50% of the required investment. Financing mechanisms, such as green and transition bonds and green investment trusts, can draw significant private capital to develop and scale up the technologies and innovations needed to reduce emissions in Canadian sectors. Blended finance in the form of public-private partnerships will help form the basis of new innovative partnerships and financing vehicles that harness the best of public and private financing worlds. The Canada Infrastructure Bank (CIB) is one effective way to encourage and stimulate these public-private partnerships as its mandate includes using federal support to attract private sector investment into green infrastructure projects.

If large publicly traded Canadian firms devoted 5% of their annual capital expenditure to GHG abatement projects over the next decade, that would cover half of the investment required to achieve Canada’s 2030 emissions target.

This is not a pie-in-the-sky aspiration, but rather one grounded firmly in existing trends. For example, green bond issuance in the second quarter of 2020 totalled US\$49.5 billion—the third highest quarterly total on record [4]. Last year, Canada broke the seal on sustainability-linked loans, which directly support private investment in abatement technologies and innovation [5].

2. The costs of not investing are exceedingly high. In its foremost study on the economic costs associated with inaction on climate change, the Economist Intelligence Unit (EIU) found that a five-degree warming scenario (a reasonable outcome of business-as-usual global carbon emissions)⁸ would result, from a public-sector perspective, in present value losses worth US\$18.4 trillion. At a six-degree warming scenario this number jumps to US\$43 trillion—30% of the entire stock of the world’s manageable assets [7].

Discerning Canada’s share of this loss is complicated, but if we approach it purely as a percentage of GDP, it could cost Canadians, on the high end, roughly double to not invest in lowering emissions in keeping with global targets. Economic losses will come in the form of direct and indirect impacts. Sectors like agriculture, forestry, tourism, and real estate are most at risk from floods, droughts, and other forms of climate change-induced extreme weather. A more substantial portion of losses will come in the form of weak growth and lower returns.

⁸ Recent reports from the U.N. World Meteorological Organization (WMO) state “On the current path of carbon dioxide emissions, we are heading towards a temperature increase of three to five degrees Celsius by the end of century” [6].

Even if the rest of the world acts to reduce emissions effectively, avoiding massive global losses, lack of a Canadian response to climate change still exposes our economy to major risks, namely the inability to attract global investment to key Canadian sectors and a significant competitive disadvantage for Canadian industries and business competing in a low-carbon global marketplace. In other words, the Canadian economy cannot free ride on the carbon-emission actions of other nations; climate-proofing our economy starts at home.

3. Canada has a historic opportunity to align its goals for growth with its low-carbon transition.

Right now, as we face the most severe economic recession since the Great Depression, Canada is poised to make generation-defining decisions about how to invest in our economy's future. Spurred by the imperative for economic recovery in the short-term, and economic growth over the long-term, Canadian governments, financial institutions, and the private sector can work together to define tangible "clean growth" opportunities that will set us on the right path for 2030. With financing costs at a historic low, there is a unique opportunity to channel cheap capital into GHG abatement projects, which will pay economic and environmental dividends.

The economic opportunities of a low-carbon transition have been well-documented. The New Climate Economy report found that "...bold action could yield a direct [global] economic gain of US\$26 trillion," by 2030 [8]. This is the moment to chart how Canada will secure its share of that wealth, and the broader national prosperity that will come from achieving a healthy and sustainable climate.