CANADIAN INSTITUTE FOR CLIMATE CHOICES

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CUTTING TO THE CHASE ON FOSSIL FUEL SUBSIDIES

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INTRODUCTION

Government budgetary expenditures, lending, and forgone tax and royalty revenue should be supporting a successful economic and societal transformation, not hindering it.

Canada and other G20 countries have committed to phase out "inefficient fossil-fuel subsidies that encourage wasteful consumption" (European Council 2021). This has sparked debates about the definitions of *inefficient* and *subsidy*. On one hand, governments and industry have interpreted this language narrowly to defend measures that support increasing fossil fuel production and consumption. On the other hand, others have taken much broader interpretations that arrive at very high subsidy estimates.[1]

This paper takes a different approach, which we hope will prove useful in guiding Canada's implementation of its pledge to phase out fossil fuel subsidies. We assess whether existing and proposed government measures support or hinder the private investment needed to drive Canada's long-term success through the global low-carbon transition. Success, in this context, means both strong economic growth and a smooth transition for workers and communities.

The basis of this assessment is Climate Choices' recent major report *Sink or Swim: Transforming Canada's economy for a global low-carbon future* (Samson et al. 2021). The report's analysis highlighted the unique challenges facing fossil fuel-producing sectors as global demand for their product declines in the coming decades. The analysis showed that coal mining (both thermal and metallurgical) has a limited future as countries around the world take action to shift away from coal power and reduce coal use in steel making. Oil and gas companies have a chance to succeed if they transform to focus on low-cost, low-emission oil and gas production while ramping up a shift into new business lines such as blue hydrogen, renewables, biofuels, and carbon capture and storage as a service. Government policies and programs should support and encourage this transformation, rather than work against it.

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1 The International Monetary Fund, for example, estimates Canadian fossil fuel subsidies at US$64 billion in 2020.

The *Sink or Swim* report also analyzed the implications of transition for workers and communities. It found that over 800,000 workers and dozens of municipalities and Indigenous communities across Canada are vulnerable to market disruption in the coming transition. Improving the societal outcomes of transition requires existing companies to successfully adapt to new global market realities, requires new companies to capture emerging market opportunities, requires communities to attract new sources of transition-consistent investment, and requires workers and youth to improve their resilience through education and skills training. Government policies that aim to protect communities from global market forces, rather than adapt to them, could in fact worsen their long-term prosperity and well-being.

At the same time, we can't forget the consumption side of the equation. Policies and programs that artificially lower the costs of fossil fuel use, or support the manufacturing of fossil fuel powered vehicles, ships, and airplanes, are also counterproductive.

In the following sections, we assess a selection of federal, provincial, and territorial government measures that are linked to the production or consumption of fossil fuels. We assess these measures against a set of criteria based on the Sink or Swim report, focusing on Canada's long-term transition success. From this analysis, we recommend that federal, provincial, and territorial governments pivot their economic development strategies, clarify commitments and pathways to fossil fuel subsidy reform, and carefully scrutinize support for emission reductions from fossil fuel production. While comprehensive reform is not possible overnight, governments can ensure that new measures are appropriately designed, effectively implement existing programs, and eliminate measures that are most harmful to Canada's transition success, while working towards longer-term adjustment to some of the more politically difficult measures such as fuel tax exemptions for farmers.

1 THE DEFINITION DEBATE

The G20 has committed to rationalize and phase out "inefficient fossil-fuel subsidies that encourage wasteful consumption" (European Council 2021). The Canadian federal government has committed to phase out fossil fuel subsidies by 2023, phase out international public financing (lending, insurance, and other financial products) of unabated fossil fuel energy by the end of 2022, and to phase out public financing of the fossil fuel sector, consistent with the commitment to reach net-zero emissions, by 2050 (Ballingall 2021, Radwanski and Waldie 2021, Export Development Canada 2021).

One of the challenges is that there is no universal definition of fossil fuel subsidy, or inefficient and efficient subsidies (Timperley 2017). In 2009, G20 leaders described "inefficient" fossil fuel subsidies broadly, as those that encourage wasteful consumption, distort markets, impede investment in clean energy sources, and undermine efforts to deal with climate change (G20 Research Group 2011).

Various international organizations offer different interpretations. The Organisation for Economic Co-operation and Development (OECD), for example, defines fossil fuel subsidies as direct budgetary transfers and tax expenditures (forgone tax revenue) that in some way provide a benefit or preference for fossil fuel production or consumption relative to alternatives. The International Monetary Fund (IMF) includes the failure to adequately price externalities associated with fossil fuel use, such as greenhouse gas emissions and air pollution.

Depending on the definition used, estimates of fossil fuel subsidies differ widely:

- The **OECD** estimates, using direct budgetary transfers and tax expenditures (forgone tax revenue), that Canada provided **US$3.4 billion** in subsidies in 2020 (International Institute for Sustainable Development and Organisation for Economic Co-operation and Development 2021). The estimate is heavily weighted toward provincial and territorial measures, with only $14 million in federal tax expenditures included in the database.
- An **International Institute for Sustainable Development** review of federal fossil fuel subsidies includes many of the OECD measures, as well as one-time investments in specific projects, pandemic-related support, and funding for emission reductions from fossil fuel production (Corkal 2021). It estimated the federal government provided **CDN$1.91 billion** in fossil fuel subsidies in 2020.
- A **Parliamentary Budget Office** review of federal energy and agriculture sector tax measures found approximately **CDN$2.4 billion** in 2020 in forgone tax revenue for income tax provisions benefiting corporations engaged in the oil, gas,

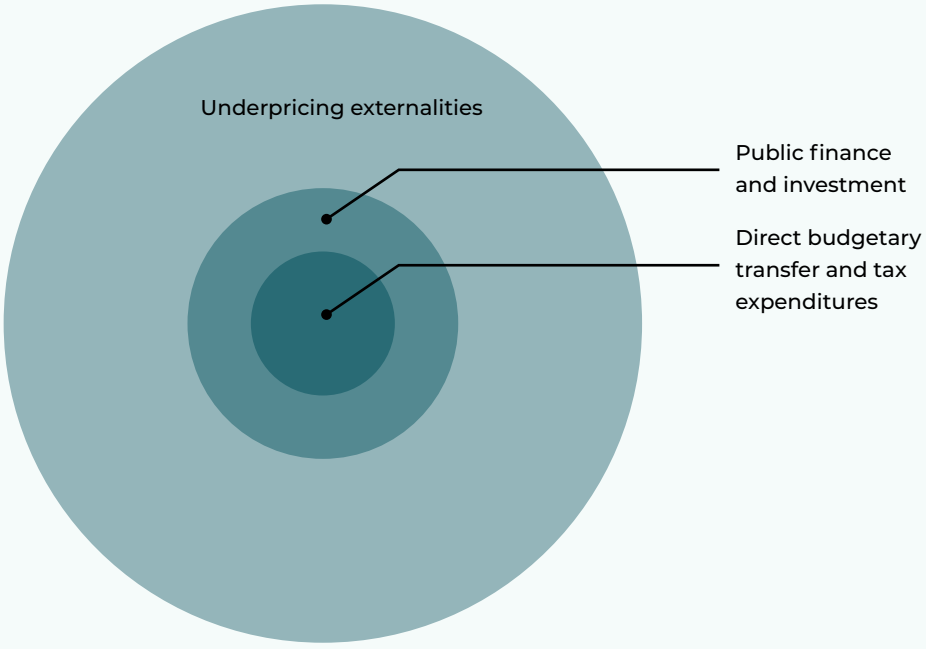
and coal mining sectors, and another **CDN$1.5 billion** in forgone carbon levy revenue due to exemptions for agriculture (Bagnoli and Scholz 2021).

- An **Oil Change International** report released in October 2021 analyzed G20 public finance institutions and found that the Canadian federal government provided an average of **US$11 billion** in fossil fuel finance annually between 2018 and 2020 through Export Development Canada lending and other products (Oil Change International and Friends of the Earth United States 2021).
- The most recent **IMF** study found Canada provided **US$64 billion** in subsidies in 2020, accounting for both explicit subsidies and implicit subsidies associated with underpricing (or taxing) fossil fuels (Parry, Black, and Vernon 2021).

Academic assessments have challenged some of the estimates provided by these organizations. A 2011 paper by Kenneth McKenzie and Jack Mintz argued that traditional estimates of fossil fuel subsidies are inaccurate (McKenzie and Mintz 2011). Many estimates, such as those produced by the OECD and International Institute for Sustainable Development, add forgone revenue from tax deductions or exemptions and royalty reductions in with grants and contributions, without accounting for interactions or establishing an

Figure 1

Different definitions of fossil fuel subsidies lead to varying estimates



Note: The above figure is a stylized representation of three categories of fossil fuel subsidy definitions.

economically meaningful benchmark. They propose to instead use a measure of the marginal effective tax rate that considers the impact of the full mix of tax measures and royalty reductions on resource allocation and economic activity.

In 2019, the Canadian federal government published a discussion document that proposed a definition of non-tax fossil fuel subsidies and criteria for inefficiency (Government of Canada 2019). The document was intended to guide a G20 process where Canada and Argentina undergo peer country reviews of their inefficient fossil fuel subsidies.

The proposed definition of a fossil fuel subsidy covers federal programs that "provide preferential treatment that specifically supports the production or consumption of fossil fuels." Therefore, measures provided to fossil fuel companies *and* non-fossil fuel companies would not count as fossil fuel subsidies.

The federal discussion paper also proposed criteria to assess whether a fossil fuel subsidy is inefficient. It concludes that a policy that is aimed at achieving a social, economic, and environmental objective may not be inefficient if the measure is effective at achieving its objective; is simple; provides distributional benefits across income, gender, age, etc.; or if alternative policies would have fiscal implications, provincial impacts, administrative implications, or compliance and legislative costs.

Based on the definition used, the federal discussion paper concludes that none of the federal programs identified are inefficient fossil fuel subsidies, largely because they are also provided to other sectors or are aimed at a desirable social, economic, or environmental objective. For example, Business Development Canada (BDC) financing for oil and gas companies is not deemed to be a subsidy because BDC also provides financing to non-oil and gas companies (Business Development Canada 2022). The Petroleum Technology Research Centre is deemed to be a subsidy, but not an inefficient subsidy because it does research on enhanced oil recovery and carbon capture and storage (Petroleum Technology Research Centre 2022).

The various definitions and estimates of inefficient fossil fuel subsidies have thus far served to complicate, rather than clarify, decision-making. Debates focus narrowly on definitions, wording, and dollar estimates instead of critically evaluating the policies themselves. For example, is the appropriate question on BDC financing whether or not it is technically a subsidy, or whether BDC should align with, or exceed, commitments from private financial institutions to reduce financed emissions (emissions associated with the projects and companies they lend to)? (Glasgow Financial Alliance for Net Zero 2021) What will be the economic and societal outcomes for Canada if BDC maintains the status quo versus reforming its approach?

In the next section, we propose a new set of assessment criteria for evaluating policies and programs that support fossil fuel production or consumption.

2 PROPOSED CRITERIA TO ASSESS POLICIES THAT AFFECT FOSSIL FUEL PRODUCTION OR USE

Drawing on our report *Sink or Swim: Transforming Canada's economy for a global low-carbon future*, we propose four assessment criteria to determine if a given policy supports or hinders Canada's transition success: transition consistency, value for money, employment outcomes, and policy fit (Samson et al. 2021). Each of these is described in more detail below.

2.1 TRANSITION CONSISTENCY

Government policies should be stress-tested under scenarios where global action is consistent with stated goals, such as country net zero commitments. For the purposes of assessing fossil fuel subsidies, it is important to determine whether the associated economic activities are transition-consistent (i.e., competitive in a world where market change is consistent with global climate commitments).

Our *Sink or Swim* report provides a framework for assessing the transition consistency of economic activity, which makes it a useful guide (Samson et al. 2021). It analyzed the impacts of global low-carbon transition on the profitability of Canadian companies, identified transition-vulnerable and transition-opportunity sectors, and proposed metrics to assess company transition consistency.

Low-carbon transition scenarios are not predictions of the future, but they do provide a useful way to assess risk. While the long-term decline of global demand for coal, oil, and natural gas is inevitable, the exact timing and trajectory of demand decline in this decade and the next is less clear (Principles for Responsible Investment 2021, International Institute for Applied Systems Analysis 2021, International Energy Agency 2021, BP p.l.c. 2021). The scenarios we used in our *Sink or Swim* report draw from those developed by the international Network of Central Banks and Governors for Greening the Financial System (NGFS) (Network of Central Banks and Supervisors for Greening the Financial System 2020). From a range of NGFS scenarios, we selected a 1.5-degree scenario, which included immediate action and full access to carbon dioxide removal options (such as planting trees), and a two-degree scenario with delayed action and limited access to carbon dioxide removal options. These two scenarios illustrate key uncertainties in terms of the timing of action, and the availability of carbon dioxide removal options to offset emissions from fossil fuel production and use.

Which global scenarios should governments use for planning purposes? Should they assume trajectories based on the current mix of policies in place, or those consistent with countries' net zero commitments (Mountford, et al. 2021)? It is important to at least assess policies against transition scenarios, even if they do not fully guide planning. The Bank of Canada and the Office of the Superintendent of Financial Institutions used scenario analysis to assess Canada's climate transition risk and have suggested that financial institutions use scenario analysis to assess their own credit and equity risks (Bank of Canada 2022).

The Minister of Natural Resources has directed the Canada Energy Regulator to include a domestic Canadian net zero scenario in its annual energy outlook, but it is not yet clear if it will also be required to consider global low-carbon scenarios (Singh 2021). The Canada Energy Regulator's 2021 outlook assumed oil prices (Brent Crude) of around US$70/barrel out to 2050 (with a sensitivity at US$40), and gas prices (Henry Hub) of around US$4.5 per MMBtu out to 2050 (with a sensitivity at US$3.5) (Canada Energy Regulator 2021). While the lower sensitivity prices may be consistent with some global low-carbon scenarios, both would be unlikely to hold at the same time. For example, our 1.5-degree NGFS scenario has oil prices at US$43 in 2050, but natural gas prices are much lower at US$1.5 per MMBtu in 2050. Other low-carbon scenarios have lower oil prices, but higher natural gas prices (Hittle, et al. 2021).

There is a self-fulfilling-prophesy aspect to the scenarios governments choose to use for decision making. If all governments assume that other governments will live up to their emission reduction commitments, they will take actions that make it more likely the world will reach its emission reduction goals. Markets will also take on their own momentum at a certain point, as investors seek to live up to commitments to reduce "financed emissions," technology costs decline, and consumer adoption accelerates (United Nations 2021, Loveday 2021, Rabb 2021).

To analyze transition consistency, our *Sink or Swim* report divided sectors into three categories based on the primary driver behind the estimated profit change:

- **Demand-creation sectors**, where growing global demand for their product is the greatest driver behind increased profitability through transition (e.g., EV batteries, hydrogen fuel cells, solar and wind equipment);
- **Carbon-cost sectors**, where the costs associated with government policies such as carbon pricing, regulations, and border measures are the greatest driver behind decreased profitability through transition (e.g., iron and steel, chemicals, aluminum);
- **Demand-decline sectors**, where shrinking global demand for their product is the greatest driver behind decreased profitability through transition (e.g., coal mining, oil and gas production, traditional auto manufacturing).

For demand-creation and carbon-cost companies, transition consistency can be assessed using greenhouse gas emission intensity trends at the company and product level

(scope 1 operational emissions and scope 2 emissions from purchased electricity or steam), combined with forward-looking emission and investment targets and other decision-useful information on company performance.

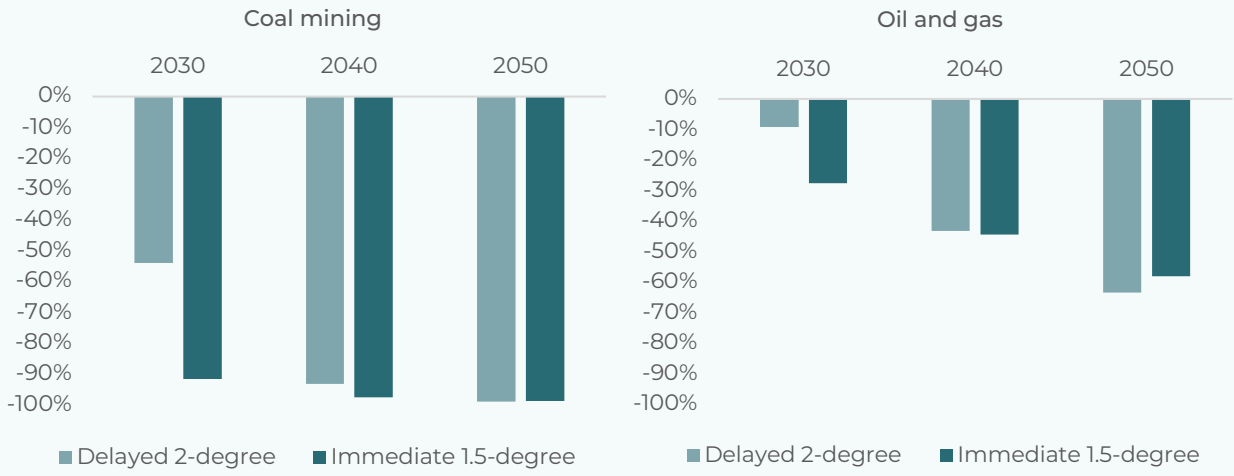
Demand decline companies—such as coal, oil, and gas producers and traditional auto manufacturers—require additional measures since operational emissions would not reflect the risk of declining global demand for their product. Additional metrics of transition-consistency could include supply chain emission estimates (scope 3), capital investment in transition-consistent business lines (such as hydrogen or electric vehicles), and measures of competitiveness in markets with lower demand (such as breakeven production costs).

Figure 2 below shows more detailed results of the *Sink or Swim* analysis for coal mining and oil and gas companies. Under both scenarios, coal mining is not profitable by 2040. Even the top 10 per cent best-performing coal mining companies in the world would see an 87 per cent decline in profitability relative to the baseline scenario in 2040 under the two-degree scenario.

For oil and gas, the picture is more varied. Delaying action to 2030—which is less likely given recent acceleration in 2030 commitments and policies—would result in reduced profit

Figure 2

Profit change for fossil fuel companies under global low-carbon transition



Note: The figures above show the weighted average difference in profitability across all equities in the sector (publicly traded companies in the global market) between the baseline scenario with no new climate policy and the two transition scenarios (Delayed 2-degree and Immediate 1.5-degree). See the Sink or Swim report for additional information on the analytical approach and results.

Source: Canadian Institute for Climate Choices (Samson et al. 2021), based on modelling and analysis commissioned from Planetrics.

impacts in the near term (Mountford, et al. 2021). However, the delay would lead to even greater impacts in 2050 in a scenario where action is consistent with a global two-degree goal given the need for more emission reductions over a shorter time period.

There is also greater variation across companies in the oil and gas sector than in coal. Under both scenarios, the bottom 10 per cent of global oil and gas companies are bankrupt by 2040 while the top 10 per cent of companies see between 10 and 50 per cent lower profitability. The weighted average of Canadian publicly traded oil and gas company performance is around 80 per cent lower profitability in 2050, with the best performing Canadian exporters showing 55-60 per cent lower profitability than the baseline scenario.

Based on the results of our analysis, any government support for coal mining would be transition inconsistent by 2040 and is very likely inconsistent by 2030 given global commitments to phase out coal power and growing efforts to shift away from metallurgical coal use in iron and steel production (Bone 2021).

For oil and gas, there may be more nuance needed and a greater consideration of timing. Some of the lowest-cost, lowest-emission projects could remain competitive for some time. However, measures that dilute or work against market and policy signals that are driving sector transformation (such as the cost of capital or carbon prices) could leave companies less prepared to weather future market changes.

KEY QUESTIONS FOR ASSESSING **TRANSITION-CONSISTENCY**:

- **Does the measure support transition-consistent economic activity that will remain competitive across multiple global low-carbon transition scenarios (i.e., low-cost, low-carbon oil and gas production or oil and gas company transformation into new business lines)?**
- **Does the measure enhance or dilute market and policy signals driving transformation?**

2.2 VALUE FOR MONEY

Raising revenues to support government policies and programs comes with a cost—known as the ***marginal cost of public funds*** (Dahlby and Ferede 2011). For example, an increase in corporate income taxes will raise additional revenue but will also reduce private sector activity that forms the tax base. Therefore, a $1 increase in taxes does not necessarily mean a $1 increase in government revenue. The amount of revenue raised will depend on a variety of factors, including pre-existing tax rates and the type of tax used. The OECD, for example, has touted the growth enhancing benefits of shifting taxation away from personal and corporate income towards consumption taxes such as

the GST (Johansson, et al. 2008). Sales taxes have a lower marginal cost of public funds than corporate or personal income taxes. There are also administrative costs associated with government measures, both within government and in the companies that take advantage of them.

> Activities consistent with global low-carbon transition are more likely to generate long-term economic benefits, given that they are more resilient to global market change.

The benefit of any government measure, whether it is a budgetary expenditure or forgone tax or royalty revenues, should be weighed against the costs associated with raising the revenue and administering the program. For example, exempting certain products from sales taxes (which have the lowest marginal cost of public funds) or reducing sales taxes means that revenues need to be raised in some other way. If they are raised through corporate or personal income taxes that come with a higher marginal cost of public funds, then the benefit of the measure (e.g., economic activity generated through the sales tax reduction) would need to be significantly greater than the dollar amount of forgone revenue.

The benefits of the measure should also be carefully assessed. If the aim of the measure is to increase economic activity, it should consider the potential range of economic activity generated over the full lifetime of the measure. For example, a measure that benefits one company or generates one year of construction jobs will not be as valuable as one that leads to sustained investment in new sources of economic activity for decades. Shared infrastructure—such as rail transportation, electricity transmission, or carbon capture and storage pipelines—can be particularly beneficial if it overcomes a barrier to new private-sector investment.

Our *Sink or Swim* report identified several areas where companies are underinvesting in transformation due to real and perceived risks relating to market and policy uncertainty, unproven technologies, and high up-front capital costs with long payout periods. Government measures that address these barriers could help unlock private investment.

There is also an opportunity cost associated with each government measure. If funding is allocated to one activity, it means there will be less available for other activities. Similarly, forgoing tax revenue in one area will mean a reduced ability to spend in other areas. In this sense, it is important for governments to carefully select activities that will offer the greatest short- and long-term economic, societal, and environmental benefit. Activities consistent with global low-carbon transition are more likely to generate long-term economic benefits, given that they are more resilient to global market change. Those that support Indigenous equity participation in projects, or reduce air pollution as well as greenhouse gas emissions, could have greater long-term societal benefits.

Stranded assets are another important consideration. For example, if a government chooses to allocate dollars to reducing emissions intensity in a coal mine and the coal

mine then faces bankruptcy due to reduced global demand, there will be limited economic or societal benefit to the expenditure. The risk of stranded assets should be factored into decisions on which economic activities receive support.

KEY QUESTIONS TO ASSESS **VALUE FOR MONEY**:

- **Do the economic benefits of the measure exceed the costs associated raising revenue (or forgoing revenue)?**
- **Does the measure help to mobilize multiple sources of private investment, generating increasing economic activity over time?**
- **Does the measure avoid supporting activities and assets that are at risk of becoming stranded from market disruption?**

2.3 EMPLOYMENT OUTCOMES

An institute report that preceded *Sink of Swim*, *11 Ways to Measure Clean Growth,* identified several social indicators that governments should consider as Canada transitions to a low-carbon economy and works to improve resilience to the impacts of a changing climate (Arnold et al. 2020). Employment is one that is critical to the standard of living of Canadians, and therefore to well-being. While governments should not design policies that lead to worse labour productivity, they can implement measures that increase the likelihood of attracting investment to regions or communities that have high unemployment or are at risk of employment loss through transition.

> The low-carbon transition is not a temporary shock. It is a permanent structural change.

In *Sink or Swim*, we identified several vulnerabilities to employment through global low-carbon transition. Over 800,000 people in Canada work in sectors vulnerable to market disruption. More than 50 communities with populations over 10,000 people depend on transition-vulnerable sectors as a major source of employment. Governments have a role to play in reducing the vulnerability of the workforce through education and skills training, and in helping to smooth the transition for vulnerable communities.

Governments should carefully assess the impact of measures on workers and communities in both the short and long term. Short-term support for companies may help them weather a temporary economic shock, such as the pandemic-related decline in oil demand or the 2009 financial crisis. However, the low-carbon transition is not a temporary shock. It is a permanent structural change. Rather than eventually returning to a previous state, market

disruption will increase over time. While our *Sink or Swim* analysis only considered impacts out to 2050, keeping the global average temperature increase well below 2 degrees will require action indefinitely.

Governments will not be able to stem the tide of change by protecting companies from the inevitable global market transition. Around 80 per cent of Canada's oil and 55 per cent of Canada's natural gas is exported, and global demand for those products will decline over the coming decades. In fact, delaying company transformation could make companies—and the workers and communities that depend on them—more vulnerable to abrupt market disruption in the future.

Oil and gas companies are also expected to provide less employment over time, with or without a global low-carbon transition. Automation alone is expected to eliminate 30 per cent of jobs in the sector by 2040 (Mortlock 2020). Increased competitive pressure from a shrinking global market will exacerbate this trend, as companies seek to cut costs.

Uncertainty relating to the timing of market disruption, combined with recognition that employment conditions are changing, are reasons to move more quickly on transformation and economic diversification, not to seek to delay it further. The Bank of Canada/Office of the Superintendent of Financial Institutions study concluded that delaying climate policy action increases overall economic impacts and risks to financial stability (Bank of Canada 2022). If global demand declines more quickly than anticipated (for instance, if transportation electrification hits a tipping point or Asia transitions to renewable electricity instead of natural gas power), or if financial markets see a sudden repricing of assets, there could be an earlier and more volatile economic impact. Companies that fail to take action in the near term could also miss out on growth markets as early movers gain an advantage.

This puts government measures to support jobs in context. Measures aimed at delaying and slowing transformation, and protecting the status quo of fossil fuel production, may support employment in the short run but make workers and communities worse off in the long run.

On the other hand, measures that help attract new sources of transition-consistent investment to vulnerable communities or help improve educational or skills outcomes can help to smooth the transition and lay the groundwork for stronger long-term employment.

KEY QUESTION TO ASSESS **EMPLOYMENT OUTCOMES**:

- **Does the measure decrease worker or community vulnerability to transition-related market disruption?**
- **Does the measure help to smooth the transition by improving the transition readiness of companies or by attracting new investment to vulnerable communities?**

2.4 POLICY FIT

Government measures identified as fossil fuel subsidies cover a wide range of policy tools and were developed with a range of policy objectives in mind. Policy tools can include grants, contributions, rebates, equity stakes, public research, loans, insurance, tax credits, tax deductions, tax reductions, tax exemptions, royalty reductions, royalty exemptions, and more. Policy objectives include economic development, financial relief for households, regional employment, reduced greenhouse gas emissions, and other environmental outcomes.

In assessing policy fit, it is important to analyze which policy tool is best suited to achieve the desired policy objective. There may be an alternative that is more effective, lower cost, results in less market distortion, or better supports other policy objectives.

For example, governments have introduced carbon pricing and regulations that provide incentives or requirements for companies to invest in improving their transition readiness. The first choice should be to use these pricing and regulatory tools to achieve emission reduction and low-carbon investment goals. If there are gaps or insufficient incentives, those policies can be adjusted.

However, the stringency of carbon pricing and regulation usually strikes a delicate balance between near-term competitiveness and affordability concerns, on the one hand, and longer-term climate and economic objectives on the other. There may also be a lack of market confidence in the durability of the policies across governments. Canada's carbon price may not, therefore, provide sufficient near-term incentive for companies and investors to allocate capital to large-scale emission reduction and transformative projects that are critical to Canada's future competitiveness, particularly if there is combined policy, technology, and market risk.

Complementary government policies are therefore sometimes needed to help overcome barriers to private investment. These complementary policies should be viewed as temporary measures and re-evaluated as policy and market conditions change. A 2017 report by Canada's Ecofiscal Commission identified three rationales for the implementation of policies in addition to carbon pricing (Ragan, et al. 2017):

- **Gap filling:** addressing emissions currently not covered by carbon pricing or regulations.
- **Signal boosting:** enhancing policy and market signals to accelerate transformation.
- **Benefit expanding:** some low-carbon projects result in benefits beyond greenhouse gas emission reductions (for instance, air pollution or Indigenous employment) that could justify additional intervention.

For policies aimed at economic development, rural employment, or support for low-income households, there should be a similar evaluation of the policy tool choice and

design to ensure they reflect the latest market and policy conditions and are not distorting market decisions in ways that harm long-term economic and societal outcomes.

While oil and gas production may have once been the most promising source of economic development in certain regions, that may no longer be the case. Shifting to economic development policy tools focused on transition-consistent economic activities could open up a wider range of possibilities.

There may also be policy tools that more directly address barriers to private investment in rural and remote communities. These could include infrastructure investments or skills training for the local workforce.

For low-income households vulnerable to high energy costs, technological change—and the cost reductions that come with it—may offer greater scope to shift away from fossil fuel energy sources over time. For example, Indigenous communities are increasingly reducing reliance on diesel and moving toward renewable energy (Turner 2021). There is also greater adoption of heat pumps for residential heating (Canada Energy Regulator 2021).

QUESTION TO ASSESS **POLICY FIT**:

- **Is there an alternative policy tool or design that would achieve the same policy objective in ways that align more closely with the other three criteria?**

3 HOW DO CURRENT POLICIES AND PROGRAMS STACK UP?

In the sections below we assess six categories of government measures that have been described as fossil fuel subsidies in at least one report against our four criteria. The six categories include: producer support, consumer support, public financing, project-specific and one-time funding, funding for emission reductions, and underpricing and undertaxing fossil fuels.

In each section, we include a table that assesses the measures against the four criteria by shading cells with different colours. The colours are defined as follows:

LIGHT TEAL	The measure **meets the criteria**.
LIGHT ORANGE	The measure **could meet the criteria** if implemented carefully, or if a change is made.
ORANGE	The measure meets the criteria in the short term (one to five years) but **does not meet the criteria in the medium to long term** (more than five years).
DARK RED	The measure **does not meet the criteria**.
LIGHT GREY	There is **insufficient information** to determine if the measure meets the criteria.

3.1 PRODUCER SUPPORT

Producer subsidies include any public spending, tax measures, or royalty provisions that reduce the costs that fossil fuel producers face. According to the OECD fossil fuel subsidy database, governments across Canada provide around $1.4 billion in financial support for oil and gas exploration, drilling, research, and infrastructure (Organisation for Economic Co-operation and Development 2021). Many of these estimates include forgone tax or royalty revenues. As noted above, the dollar amounts should be interpreted with caution as the appropriate benchmark for estimating the "cost" of these measures continues to be debated. For our purposes, exact dollar amount estimates are not needed to assess the measure against the four criteria.

The federal government has phased out many of its producer subsidies. The OECD database for 2020 only includes an estimated $14 million in flow-through share tax deductions for oil and gas and coal extraction and mining. However, a 2021 study by the Parliamentary Budget Officer estimated that, in 2019, there was $2.4 billion in forgone federal

tax revenues associated with tax provisions that benefit corporations engaged in the oil, gas, and coal mining sectors (Bagnoli and Scholz 2021). The Parliamentary Budget Officer included the in-year revenue impact of tax deductions for resource-related expenses and the accelerated capital cost allowances for liquified natural gas equipment. They did not consider interactions with other tax measures, royalties, or accounting treatments.

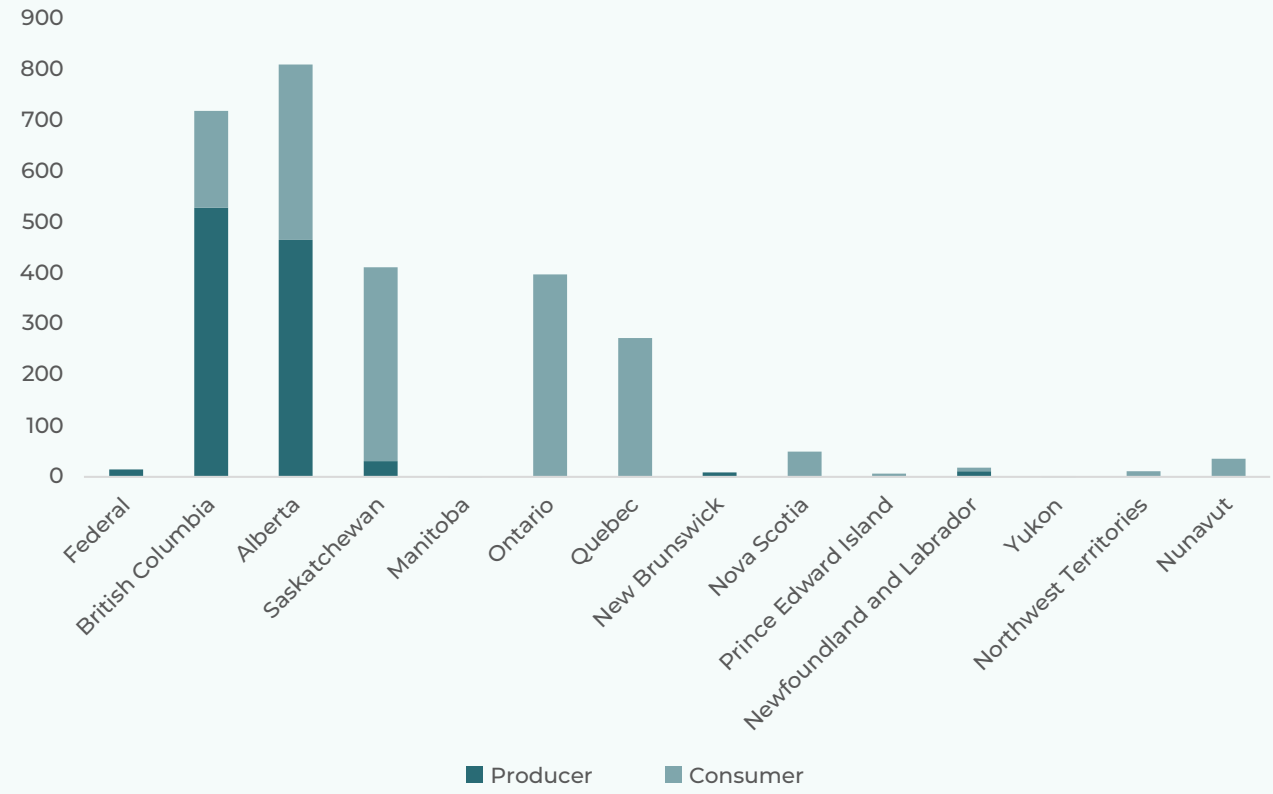
Significant producer subsidies are also provided by provincial and territorial governments (Figure 3). Based on OECD data, British Columbia and Alberta are the largest provincial providers of producer support.

Alberta's support primarily comes in the form of royalty reductions to encourage enhanced oil recovery (EOR) and production from low productivity and reactivated wells. Whether this provision is justifiable is debatable: it could be considered transition-consistent to maximize the value of the publicly owned resource and environmentally beneficial to favour

Figure 3

Canadian producer and consumer fossil fuel subsidies in the OECD database, 2020

(Millions of dollars)



Source: OECD (2020) Fossil Fuel Database. Note: The OECD database only includes budgetary and tax/royalty support estimates where data is available. There are many additional measures that are not reflected in the estimates. The numbers in the chart above are for estimates provided for 2020. Estimates of forgone tax and royalty revenues assume economic activity would continue at the same level without the deductions in place.

extraction from existing wells over the drilling of new wells. The justification for enhanced oil recovery could increase if it uses industrial carbon dioxide and is combined with long-term storage. Extending the life of existing wells may be economically beneficial to some communities but could also mean less work in drilling new wells.

British Columbia's producer support measures, on the other hand, are primarily aimed at encouraging new oil, gas, and coal production. For example, the OECD estimates that the BC deep well royalty credit resulted in $421 million in forgone revenue in 2020. The industry disputes this estimate since many of the wells would not have been drilled without the incentive (Resource Works 2020). The OECD estimates another $70 million in forgone tax revenue related to a road and pipeline infrastructure credit for oil and gas development. Over $17 million in forgone revenue is also estimated for a tax credit that encourages new coal mining exploration.

Many of British Columbia's financial incentives, tax credits, and royalty credits work against domestic and global policy signals aimed at slowing fossil fuel production and demand. A 2021 evaluation of B.C.'s royalty system, commissioned by the government of British Columbia, recommended a complete overhaul to reduce complexity and address design flaws (Olewiler and Winter 2021). The B.C. government could re-evaluate the full suite of spending, tax, and royalty provisions alongside its royalty review, ensuring that they reflect the latest market conditions and align with the government's climate, economic and social policy objectives (Government of British Columbia 2021).

Table 1

Evaluating producer support

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
Alberta royalty reductions for enhanced oil recovery	Only if EOR uses industrial CO_2 and is combined with long-term storage.	Only if EOR royalty reductions increase incentives for private investment in CCUS infrastructure, which in turn attracts transition-consistent economic activity.	EOR could extend production time and jobs but also lead to less work in drilling new wells.	Royalty reductions are one of the best ways to provide incentives for EOR, though they could be combined with requirements or other incentives for long-term CO_2 storage.
British Columbia tax credits and funding to encourage new oil, gas, and coal development.	Incentives for high-cost wells and coal mining work against policy and market signals.	The economic value derived from budgetary and tax expenditures is likely to dwindle over time due to competitive pressures and should be evaluated within the context of negative cumulative environmental effects	Fossil fuel development could provide near-term jobs and income in rural and remote areas, but also prolong dependency on work that is not sustained in the long-term.	If the policy goal is increased economic development in rural and remote areas, financial incentives should be available in targeted regions for all project types, including clean energy.

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

RECOMMENDATIONS FOR **PRODUCER SUPPORT**:

- **British Columbia should reevaluate financial incentives and tax and royalty provisions aimed at encouraging new oil, gas, and coal development in the province in light of anticipated changes in global market conditions and government climate, economic, and societal policy objectives.**
- **Alberta should adjust enhanced oil recovery royalty deductions to encourage the use of industrial (or anthropogenic) and long-term carbon dioxide storage.**

3.2 CONSUMER SUPPORT

Consumer support includes any public spending or tax measure that artificially reduces what consumers pay for fossil fuel products (i.e., beyond what would be justified by changes in production or distribution costs). The OECD database identifies an estimated $1.5 billion in consumer support subsidies that mainly fall into two categories: residential energy use rebates and support for farmers and other businesses.

Residential energy rebates are usually introduced to address concerns relating to the burden of high energy costs. Low-income households are vulnerable to high energy costs, particularly in the territories and Atlantic Canada. Measures targeted at low-income households that do not have viable energy alternatives may be justifiable in the near term (e.g., Northwest Territories home heating subsidies for low-income seniors in certain residential zones). However, not all energy rebates are tied to income (e.g., Nova Scotia's sales tax rebate on heating bills).

British Columbia and Saskatchewan exempt residential electricity and natural gas use from provincial sales taxes. These measures resulted in an estimated $177 million of forgone revenue in B.C., and $36 million in Saskatchewan, in 2020. While B.C.'s electricity is low emission, electricity only accounts for around 12 per cent of forgone revenue. Saskatchewan also provided a temporary rebate for SaskPower consumers in 2020, estimated at $218 million.

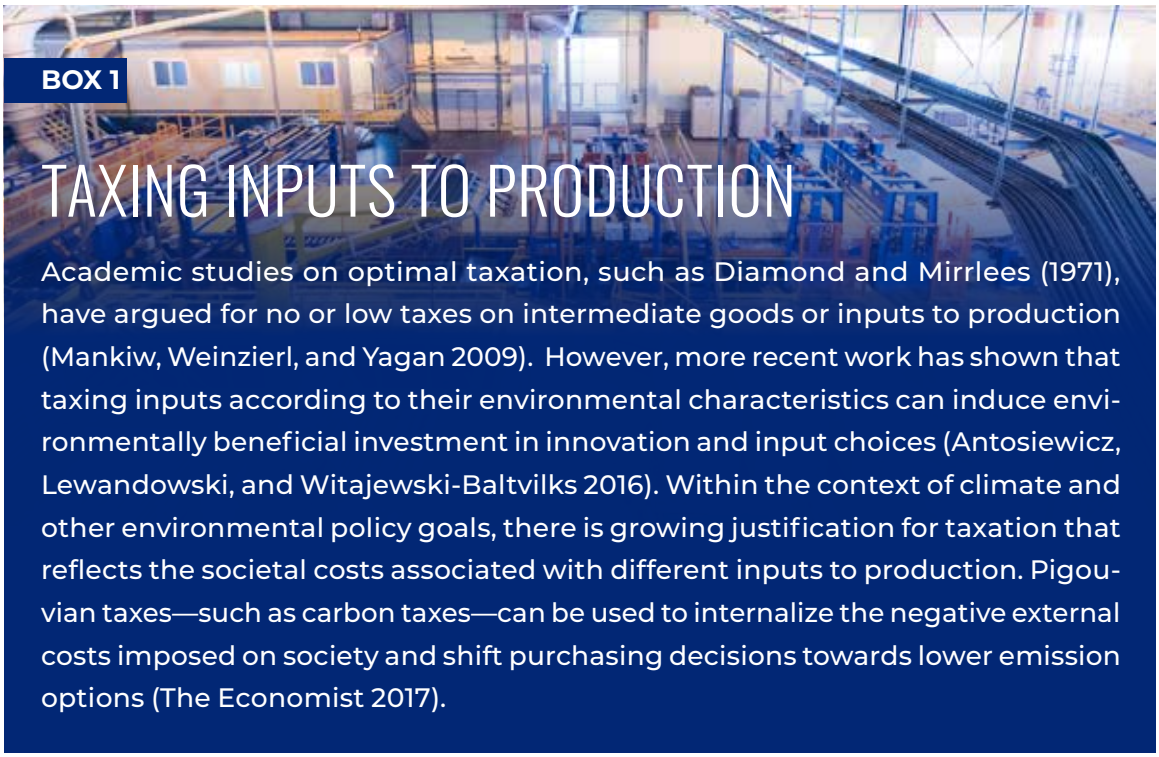
If the public policy goal is to support low-income households, there are other policy tools available that do not provide disincentives to reduce energy use and switch away from fossil fuels. Direct income support for low-income households, which is not tied to energy use, can be used to reduce financial burdens. Income-tested home and residential building retrofit financing and subsidies for electric vehicles or heat pumps can also reduce household vulnerability to fossil fuel price volatility (Kantamneni and Haley 2021). These measures could be combined with more stringent building codes and incentives for builders to reduce the reliance of new buildings on fossil fuels (Efficiency Canada 2020, Natural Resources Canada 2020).

Most provinces provide some form of tax-exempt fuel use for farmers, fishers, loggers, or other businesses, accounting for over $1 billion of estimated fossil fuel subsidies in 2020.

Many of these users can access tax-exempt coloured fuel for off-road vehicles or receive a refund for tax paid (Ontario Ministry of Finance 2019). One reason for this policy is that gasoline and diesel taxes were in many cases originally intended to provide governments with revenues to maintain road infrastructure. Since off-road vehicles do not use road infrastructure, there was less justification to pay the tax. Today, however, excise tax receipts end up in general government revenues. While most provinces provide the fuel tax exemption for farmers, others provide it to a broader range of sectors. Saskatchewan, for example, provides a fuel tax exemption for fuel use in peat harvesting, which is also an activity that works against climate goals (International Union for Conservation of Nature 2021).

> It is time to consider revisions to tax policies that work against climate policy signals.

The provision of tax-exempt fuels is intertwined with broader policy objectives relating to domestic food production and rural economic development. However, given domestic climate goals, technological change, and the growing importance of environmental performance in global markets, it is time to consider revisions to tax policies that work against climate policy signals (Box 1). This need not mean less overall support for farmers and rural economies. Instead, support could shift towards carefully designed incentives for transition-consistent investment (e.g., adoption of technologies that reduce fossil fuel use, or nature-based measures to sequester carbon, or replacement of fossil fuel-powered vehicles and machinery with electric alternatives). These incentives could help reduce the vulnerability of farmers to fuel price fluctuations and improve competitiveness in markets increasingly seeking



BOX 1

TAXING INPUTS TO PRODUCTION

Academic studies on optimal taxation, such as Diamond and Mirrlees (1971), have argued for no or low taxes on intermediate goods or inputs to production (Mankiw, Weinzierl, and Yagan 2009). However, more recent work has shown that taxing inputs according to their environmental characteristics can induce environmentally beneficial investment in innovation and input choices (Antosiewicz, Lewandowski, and Witajewski-Baltvilks 2016). Within the context of climate and other environmental policy goals, there is growing justification for taxation that reflects the societal costs associated with different inputs to production. Pigouvian taxes—such as carbon taxes—can be used to internalize the negative external costs imposed on society and shift purchasing decisions towards lower emission options (The Economist 2017).

low-carbon products, particularly while much of the sector remains outside of carbon pricing and regulatory frameworks. Phasing out tax exemptions could also start with larger agriculture corporations. The largest 10 per cent of farms generate two-thirds of all revenues (Government of Canada 2021).

Table 2

Evaluating consumer support

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
Residential energy use rebates	Energy use rebates work against market and policy signals that would encourage reduced energy use and investment in cleaner technologies and products.	Energy rebates for low-income households with few options can help to avoid energy poverty but may increase vulnerability to fuel price volatility".	Unclear employment impacts.	Support for low-income households can be provided directly, or through income-tested support for building retrofits (for communities, landlords or homeowners) or electric vehicles.
Tax-exempt fuels for farmers, loggers, fishers, and other businesses	Increases reliance on fossil fuels, and vulnerability to price volatility by diluting policy and market signals that would drive the adoption of cleaner energies and technologies.	Tax-exempt fuels may encourage some near-term economic activity but are unlikely to be a significant determinant of private investment.	There is a rationale for supporting small businesses and farms in rural and remote communities with high unemployment, but the employment benefits of this policy are unclear.	If the policy goal is local food production and economic development in rural and remote areas, there are other policy tools that can generate better climate outcomes (e.g., incentives for nature-based solutions or electric farm vehicles).

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

RECOMMENDATIONS FOR **CONSUMER SUPPORT**:

- All provinces and territories should gradually phase out residential energy use rebates, starting with higher income households. These measures could be replaced with direct income support or income-tested financing for residential building retrofits and/or electric vehicle purchases and would ideally be combined with stricter building codes to reduce the reliance of new buildings on fossil fuels.
- Provinces, in partnership with the federal government, should develop plans to phase out the provision of tax-exempt fossil fuels to farmers, fishers, loggers, and other businesses. These measures can be replaced with carefully designed incentives for actions that reduce emissions or sequester carbon.

3.3 PUBLIC FINANCING OF FOSSIL FUEL PRODUCTION

There are multiple commitments that will drive a phase-out of public financing for fossil fuel production, which includes loans, equity ownership, venture capital, insurance, and loan/export guarantees. Canada joined 19 other countries at the 2021 COP26 climate conference in committing to end public support for the international unabated (i.e., without carbon capture) fossil fuel energy sector by the end of 2022 (Broom 2021). G20 countries committed to align financial flows with a safe climate future (European Council 2021). The 2021 mandate letter for the Minister of Finance calls for the development of a plan to phase out public financing of the fossil fuel sector, and for mandatory climate-related financial disclosures and net zero plans for federally regulated institutions and government agencies (Trudeau 2021). Export Development Canada (EDC)—the main federal source of public financing for fossil fuel production in Canada—has committed to becoming a net zero institution by 2050 (Export Development Canada 2021).

In the near term, EDC has committed to reduce its exposure to carbon intensive sectors by 40 per cent by 2023 (from $22.4 billion to $13.5 billion) (Export Development Canada 2021). This covers lending, insurance, and other financial products used across six sectors, including upstream oil and gas production and thermal power generation, representing 26 per cent of their financing business in 2020. EDC will also be considering how to broaden targets to cover all sectors it supports. As noted in the *Sink or Swim* report, for instance, transition-vulnerable sectors extend beyond those that have high operational emissions and include traditional vehicle manufacturing and airlines.

EDC has said that it will continue to support emissions-intensive Canadian exporters that have a transition plan, while phasing out new direct government support for international carbon-intensive fossil fuel projects and companies (Cooper 2021). EDC has introduced sustainability-linked loans that come with climate-related performance conditions and is developing new sustainable finance products to support the transition to carbon neutrality.

Transparent reporting on progress will be key to determining whether EDC's continued financing of Canadian fossil fuel exporters is consistent with Canada's climate, economic and social policy goals. EDC has joined the international PCAF (Partnership for Carbon Accounting Financials) initiative, which provides detailed reporting standards for public and private financial institutions (Hendricks 2021). The federal Net Zero Emissions Accountability Act will also require crown corporations such as EDC to publish an annual report outlining measures taken to manage financial risks and opportunities related to climate change (Government of Canada 2021).

EDC has an opportunity to support a successful low-carbon transition for Canada, driving more exporters to develop and implement transition plans and increasing financing for exporters positioned to capture global transition opportunities. In fact, EDC's role may become increasingly important as the cost of private capital increases for fossil fuel producers (Quinson 2021). EDC can also demonstrate leadership to private financial institutions

in its approach to reporting and through the financial instruments it uses to support the transition of export businesses. Canada's major banks are clients of EDC and are committed to align their own financing and reporting with low carbon transition under the Glasgow Financial Alliance for Net Zero (McCarthy 2021, Glasgow Financial Alliance for Net Zero 2021). They will need to develop their own transition plans and could learn from EDC.

EDC could also benefit from additional action by federal and provincial governments and regulators. Canadian Securities Administrators have proposed requiring publicly traded companies to report climate-related information in line with recommendations from the international Task Force on Climate-Related Financial Disclosures (Canadian Securities Administrators 2021, Task Force on Climate-related Financial Disclosures 2022). Improved disclosure will help financial institutions determine which Canadian companies are following through on transition plans.

The proposed Canadian Securities Administrators disclosure requirements will still rely heavily on qualitative information and allow flexibility in metrics and targets that will make it difficult to compare performance. EDC also provides financing to privately held exporters that will not face the same disclosure requirements. Federal and provincial efforts to improve the quality and comparability of information will support public and private financial institution efforts to align finance with Canada's low-carbon transition.

As noted in the *Sink or Swim* report, demand-decline sectors such as oil and gas and traditional vehicle manufacturing should be required to meet a higher bar for reporting that reflects the risk associated with shrinking global demand for their product (Samson et al. 2021). In 2021, the Institutional Investors Group on Climate Change released a proposed net zero standard for the oil and gas sector that goes beyond the reporting requirements and emissions targets of the Task Force on Climate-Related Financial Disclosures, including capital allocation and forward-looking investment strategies (Institutional Investors Group on Climate Change 2021). As a condition of providing access to financing, EDC could require oil and gas exporters to meet this higher standard of reporting and demonstrate that plans are transition consistent.

Table 3

Evaluating public financing of fossil fuel production

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
Export Development Canada financing and insurance for oil and gas exporters	Only if oil and gas exporters are required to demonstrate they are following through on credible transition plans.	Only if it drives greater export business toward new transition-consistent opportunity markets (e.g., clean energy and technology).	Only if it drives exporters located in vulnerable communities or areas with high unemployment to develop transition plans that make them more likely to retain employees.	Only if EDC places significant requirements on oil and gas companies in terms of reporting and performance benchmarks.

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

RECOMMENDATIONS FOR **PUBLIC FINANCING**:

- **Federal and provincial governments and regulators should require the disclosure of detailed and comparable climate-related information by public and large private companies to enable financial institutions to transparently align their portfolios with net zero commitments.**
- **Export Development Canada should be at the forefront of financial institution action on climate-related reporting and financial innovation and should require oil and gas exporters to meet stricter criteria for financing.**

3.4 PROJECT-SPECIFIC AND ONE-TIME FUNDING FOR THE OIL AND GAS SECTOR

Over the past decade, there have been several federal and provincial funding announcements to support the oil and gas sector. Some initiatives were intended to bridge the sector—and workers in the sector—through the early COVID pandemic period and the associated fall in oil prices. Others are aimed at securing specific project investments or enabling infrastructure to generate economic growth and employment. While there may be justification for earlier investments, global market conditions have changed and climate commitments have strengthened. Going forward, investments that support fossil fuel production should undergo significantly greater scrutiny to ensure that they are consistent with climate, economic, and societal policy goals. We analyze a selection of initiatives in table 4 below.

In 2020, the federal government announced it would spend $1.7 billion to help clean up orphaned and abandoned oil and gas wells in Alberta, Saskatchewan, and British Columbia (Anderson 2020). At the time, there was a significant risk of job loss—particularly affecting oil and gas service companies that undertake activities relating to exploration and drilling new wells. The funding helped provide near-term employment, while also addressing a significant environmental liability.

While the stop-gap measure could be justified under the circumstances, it should not become a permanent support mechanism for the sector and funding should only be provided to companies that are at financial risk. A 2022 report from the Parliamentary Budget Officer found that half of the federal orphan well funding allocated to Alberta went to just 10 companies who had a low likelihood of default in the next year (Forsyth and Nahornick 2022).

Oil and gas well reclamation should be part of the cost of doing business. Fixing the liability regime for wells and tailings ponds is even more urgent now, as the sector faces future market challenges that could lead to increased well orphaning and delayed clean up. In Alberta alone, the cleanup costs of oil and gas wells, tailings, and infrastructure could be as high as $260 billion in a worst-case scenario (Dion 2018). Experts have proposed requiring companies to provide more up-front reclamation funds, or use bonds, and either time limits for the cleanup of idle wells or requirements for insurance on inactive wells (Olszynski 2020, C.D. Howe Institute 2017). The Government of Alberta is making changes to the liability regime, but the changes are not expected to fully address the issue (Alberta Energy Regulator 2021).

Another federal initiative linked to the 2020 oil and gas downturn was the $320 million in federal funding for the Newfoundland and Labrador offshore oil industry (Government of Canada 2020). The amount was calculated to reflect the approximate value of the average revenue the Government of Canada received per year between 2009 and 2018 from its involvement in the Hibernia offshore oil project. The Government of Newfoundland and Labrador has transferred some of the funding to offshore oil and gas companies for various purposes, including emission reductions (Government of Newfoundland and Labrador 2021). However, the primary goal was to keep the offshore oil projects operating at levels that would maintain employment.

This initiative is similar to the orphan wells funding, in that it was a stopgap measure to help prevent significant job loss. However, in the future there will need to be greater emphasis on economic diversification and investment in areas that are consistent with global low-carbon transition, such as clean hydrogen production or offshore wind power (Newfoundland and Labrador Oil and Gas Industries Association 2021, Government of Canada 2017). While offshore oil generally has a relatively low emissions intensity, production costs could make it challenging to compete in a world with shrinking oil demand (Kaiser 2021).

There have also been federal and provincial investments in oil and gas projects aimed at securing large private investments: the federal TMX pipeline purchase, federal and B.C. funding for LNG Canada, and Alberta funding for the Sturgeon refinery. All three projects have near-term employment and growth benefits, but also work against market signals that will slow investment in new oil and gas production and infrastructure. The ultimate economic return on the investments also remains highly uncertain. For example, if the federal government can sell the TMX pipeline, it could have a net positive fiscal impact. The global liquified natural gas market is highly uncertain out to 2030, but the LNG Canada project could yield a return if it can stay competitive in a crowded market (Lindsay 2021, BloombergNEF 2021, Bentein 2019). The Sturgeon refinery could benefit under conditions where oil prices are high and bitumen values are low (Leach 2020).

The other question is whether the same type and magnitude of project finance is available to clean energy or emission reduction projects. To improve Canada's transition read-

iness, and meet climate goals, substantial private investment will need to be mobilized towards transition-consistent projects. Governments have made large investments in hydroelectric projects such as Site C in B.C. and Muskrat Falls in Newfoundland and Labrador (Kurjata and Bains 2021, Bolongaro and Duarte 2021). However, newer sectors with potential to capture a share of growing global markets—such as hydrogen, bioproducts, and clean technology—still struggle to obtain the financing they need to scale (Samson et al., 2021). Market and policy uncertainty continue to hold investors back, highlighting a role for greater government intervention. With limited funds, governments will need to carefully evaluate projects that receive financing.

Ramping up transition-consistent project investment is also critical for workers in the sector, who will face growing pressure as global demand for oil and gas declines and companies look to reduce production costs to remain competitive (Mortlock 2020). Governments should clearly signal planned shifts in support so that companies can plan accordingly.

Table 4

Evaluating project-specific and one-time funding

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
Funding to clean up orphaned wells (federal)	Funding for the historical liabilities of bankrupt companies is not inconsistent with transition goals, but if current oil and gas companies do not bear the cost of cleanup it effectively reduces the cost of oil and gas production and works against market and policy signals.	Environmental liabilities are a cost that needs to be paid over time—investment in the reduction of liabilities can be seen as a way to reduce the burden on future generations, and free up contaminated land for economic development.	Well clean up helped provide work for smaller oil and gas service companies that were vulnerable to job loss during the 2020 oil price decline.	If the policy goal is to reduce environmental liabilities while generating employment, funding should be open to all potential projects that would achieve this goal (e.g., a reverse auction using criteria such as cost, environmental benefit, and job creation).
Support for Newfoundland and Labrador offshore oil industry (federal)	Only if the funding is allocated towards projects that reduce the emissions intensity of offshore oil production.	Only to the extent the funding induces companies to undertake emission-reducing projects that would not otherwise have happened.	Newfoundland and Labrador has higher unemployment than other areas, and limited near-term employment alternatives (though long-term diversification should be a priority).	If the policy goal is to generate sources of sustainable employment in the province, then governments should consider allocating funding to transition-consistent forms of economic development instead.

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

Table 4

Evaluating project-specific and one-time funding, cont...

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
TMX pipeline purchase (federal)	Increased access to international oil markets could allow some oil producers to remain competitive for a longer period of time, but only low-emission production would be consistent with Canada's targets. Could support transition-consistent activity if the government follows through on its commitment to invest tax revenues and proceeds from the sale of the pipeline in clean energy transition.	If the investment leads to a slower decline in oil production, it could support substantial economic activity during the transition.	The pipeline could provide lead time for vulnerable communities and workers to attract new sources of investment and job creation, provided they start that process soon. It could also provide direct near-term benefits to Indigenous communities and contractors.	There were few policy tools available to secure access to international markets for Canadian oil, but the policy tool will not be fully successful until ownership is transferred to private entities.
LNG Canada project financing (British Columbia and federal)	Only if the LNG project can be lower emission than, and of comparable cost to, global competitors. It could be consistent with global 1.5-to-2-degree transition scenarios out to 2030 (and possibly 2035) but may face increased competitive pressure in later years.	Federal funding supported energy-efficient gas turbines, which may not have been used in the absence of funding. The long-term economic value from LNG production remains highly uncertain in the face of fierce competition and post-2030 pressures on demand.	The project will create near-term jobs and income for local communities (including Indigenous communities), but its longer-term prospects are uncertain. Going forward, communities should seek economic development in areas that face lower transition risk.	If the policy goal is increased economic development in rural and remote areas, greater consideration should be given to transition-consistent projects such as clean energy or bioproducts.
Sturgeon refinery (Alberta)	The refinery could help to insulate Alberta oil sands projects from decisions made at U.S. refineries, and result in a lower-emission final product (with CCS at the facility), but the profitability of the facility may be limited as oil demand declines through transition.	Provincial co-ownership and investment came at a substantial cost, with an uncertain economic return.	The project contributes to some direct jobs and helps increase knowledge and capacity on carbon capture and storage.	If the policy goal was to reduce dependency on U.S. refiners, there were limited policy options available. However, these types of investments should be done transparently and with substantial analysis to support the scale and direction of government support.

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

RECOMMENDATIONS FOR **PROJECT-SPECIFIC AND ONE-TIME FUNDING**:

- **Provincial jurisdictions with oil and gas production should bolster tailings reclamation and well clean-up liability regimes ahead of increasingly challenging market conditions for the sector, placing a greater proportion of the cost burden on private companies than is currently the case.**
- **Federal and provincial governments should shift regional economic development and employment-focused project finance away from fossil fuel production and towards transition-consistent economic activities such as clean energy production.**

3.5 PUBLIC FUNDING AIMED AT REDUCING EMISSIONS FROM FOSSIL FUEL PRODUCTION

Governments have argued that subsidies supporting emission reductions from fossil fuel production are not "inefficient" and are therefore justifiable. However, not all types of emission-reduction investments are consistent with climate, economic, or societal policy objectives.

With limited funds and a lengthy list of large, capital-intensive investments needed to improve Canada's transition readiness and meet climate goals, governments will have to make difficult choices. Incremental, least-cost emission reductions will largely be driven by carbon pricing and regulation. As noted in section 2, funding programs should be limited to uncovered emissions, areas where policy and market signals are insufficient to induce large-scale private investment, and projects that have broader benefits beyond greenhouse gas emission reductions.

Programs should also consider the future competitiveness of companies and facilities through global transition. As countries around the world take action to reduce emissions, demand for fossil fuels will decline. Coal use will peak first, followed by oil, and then natural gas. Uncertainty on the timing of peaks, and the slope of decline, increases the risk associated with large-scale emission reduction investments in fossil fuel production. As demand declines, high-emission and high-cost producers will be pushed out of the market. Government policies and programs should reflect this context. A substantial public investment in emission reducing technology at an oil production facility that has high costs of production could end up yielding little economic return if that facility is stranded before the anticipated end of its life. The choice on funding would need to weigh that risk against nearer term emission reduction benefits.

The other consideration is how the costs and risks of emission-reduction investments should be shared between governments and private companies. While the oil and gas sector faced substantial financial challenges in 2020, the rebound in oil and natural gas prices in 2021 has led to record profits. Oil sands companies alone were expected to have $28 billion in excess cash flow in 2021 (Shufelt 2021). The commitment of the federal government to implement a cap on oil and gas emissions, and consultations on revisions to the output-based pricing system that applies to the sector, will provide important policy signals for private investment.

Our *Sink or Swim* report showed that many oil and gas companies will need to move into new business lines by 2050 in order to remain profitable. Others may choose to wind down their business as demand declines. For those that choose to move into new business lines—including clean hydrogen, aviation biofuels, and carbon capture and storage as a service—near-term market and policy uncertainty is holding back investment. Greater domestic policy clarity could help increase demand certainty in these sectors while inducing oil and gas company investments that improve their readiness for global market change.

Once carbon pricing and regulatory policies are adjusted, governments can make clearer choices on where to allocate limited funding. As noted in section 3.3, fossil fuel producers—operating in a sector facing global demand decline—should be expected to meet a higher bar of disclosure to receive public funding (similar to our recommendation for EDC above).

Governments may get a greater long-term economic return on investment by supporting oil and gas company pivots into new business lines (such as blue hydrogen) and transition-ready infrastructure (such as CO_2 and hydrogen pipelines) that can be used by multiple companies. There may be a case for investment in carbon capture and storage at an oil or gas facility, but the company would need to show a need for public investment and demonstrate a pathway to competitiveness in a world that takes the action necessary to maintain global average temperature increase to well below 2 degrees. That would mean either the company is a low-cost, low-emission supplier or that the company has a credible plan to repurpose carbon capture infrastructure down the line.

Below we consider two recent initiatives from the federal government: the Emission Reduction Fund implemented by Natural Resources Canada, and the carbon capture tax credit proposed in Budget 2021.

The Emission Reduction Fund was launched by the Minister of Natural Resources in the fall of 2020, offering $750 million to oil and gas companies to reduce methane emissions and implement other greenhouse gas-reducing technologies (Government of Canada 2022). It was divided into a $675 million fund for onshore oil and gas companies, and $75 million for offshore. Companies are required to partially repay funding within five years after project completion, with repayment tied to the extent of emission reductions and project costs (Government of Canada 2022). The Emission Reduction Fund was also

touted as a job retention measure, given the financial stress companies faced during the drop in oil prices in 2020. There are several issues with the approach to the fund:

- It overlaps with methane regulations for the upstream oil and gas sector that enter into force between 2020 and 2023.
- There has been little detail provided on the specific projects funded through the initiative, making it difficult to determine whether there is any additional emission reduction benefit beyond what would have occurred through the regulations alone (Government of Canada 2021).
- The employment benefit of the initiative is not easily measured, given the rebound of the sector in 2021.
- A 2021 report by the Office of the Auditor General of Canada concluded that "Natural Resources Canada did not design and implement the Onshore Program of the Emissions Reduction Fund to achieve greenhouse gas emission reductions in the oil and gas sector in a manner that would ensure value for money for contributions" (Office of the Auditor General of Canada 2021).

In December 2021, the Minister of Natural Resources announced revisions to the Emission Reduction Fund to provide greater transparency and ensure that projects demonstrate emissions reductions beyond those anticipated from methane regulations (Government of Canada 2021).

The Carbon Capture Utilization and Storage Investment Tax Credit was proposed in Budget 2021, with a consultation period before introducing the measure in 2022 (Government of Canada 2021). The announcement also committed to determine how comparable tax support could be provided to producers of green hydrogen. The initial proposal was to exclude carbon capture projects that involved enhanced oil recovery, but final details were not available at the time of writing.

There is justification for government involvement in large-scale emission reduction projects that currently face significant barriers to private investment, particularly given the important role early investments will play in improving the resilience of Canada's economy to global market change. However, some barriers relate to the design of the output-based pricing system or uncertainty regarding the implementation of the planned carbon price increase (Sawyer et al. 2021). Those barriers may be better addressed through other means, including closing gaps in carbon pricing design and investing in carbon capture hubs and shared infrastructure (Dion 2021). Contracts for difference, where the governments guarantee a certain carbon price into the future, can also help to address policy risk (Gerres and Linares 2020).

The technology-specific focus of the CCUS tax credit may also lead to market distortions that drive companies to favour carbon capture adoption over other technologies. This could lead to worse overall economic outcomes. For example, if the tax credit leads steel

companies to choose CCUS technology over a shift to hydrogen it could lead to slower growth in hydrogen demand in Canada and stifle the development of promising hydrogen companies and investment (Bellona Europa 2021, Campbell 2022). It is also not clear how the tax credit will interact with the $8 billion Net Zero Accelerator Fund, which is intended to support the decarbonization of large industry (and lists carbon capture and storage as a potential eligible project) (Government of Canada 2021).

The Oil Sands Pathways to Net Zero Initiative, for example, has developed a proposal for oil sands producers to reach net zero scope 1 (operational) emissions by 2050 (Oil Sands Pathways to Net Zero 2021). The plan has an estimated cost of $75 billion, with around half of emission reductions coming from carbon capture and storage (The Energy Mix 2021). Oil sands company CEOs have suggested that governments should cover as much as two-thirds of the cost of relevant carbon capture investments, citing similar approaches taken in projects in Norway. These projects could eat up a substantial proportion of funds in programs such as the Net Zero Accelerator, even as oil sands facilities will be vulnerable to falling global demand (Hiar 2021).

The federal government therefore needs a clear framework to guide its financial support for large-scale emission reduction projects. That framework should first seek to "fix" barriers to private investment through carbon pricing and regulatory systems, and then look to invest in shared infrastructure or hubs that will benefit multiple companies and attract new, transition-consistent investment such as the Dow Chemical net zero petrochemical investment in Alberta (Morgan 2021). It should also aim to avoid distorting market decisions on technology choice wherever possible. For example, equivalent tax credits could be made available to alternative technologies that achieve similar emission reductions.

Harvard economist Dani Rodrik recommends that industrial policy initiatives be based on a clear understanding of barriers to private investment, involve a mix of carrots and sticks for recipients, and incorporate high levels of accountability through setting specific objectives, establishing criteria for decision making, and requiring transparent reporting (Rodrik 2008).

Table 5

Oil and gas emission reduction programs

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
Emission Reduction Fund	Only if the fund results in emission reductions beyond what would have occurred with the methane regulations coming into force between 2020 and 2023.	Methane emission reductions are some of the most cost-effective reductions available to companies, which means there is limited additional economic value generated by government funding.	The measure was billed as a means of job retention during the pandemic but, given the recovery of companies in 2021, it is not clear that there was a significant job return on the investment.	Regulations and carbon pricing are better policy tools to drive low-cost emission reduction investments—funding is better focused on pivoting oil and gas companies into new business lines.
Carbon Capture Utilization and Storage Investment Tax Credit	Carbon capture will likely play a critical role in several areas of transition-opportunity for Canada, such as blue hydrogen, low-carbon petrochemicals, low-carbon ammonia, and low-carbon cement, but is not transition consistent for fossil fuel production that will not be competitive under changing global market conditions.	The value for money will depend on the uptake of the tax credit. It could provide significant value if it attracts investment in low-carbon chemical and blue hydrogen production, for example. It would provide little value if it is used for assets that are then stranded due to demand decline.	Increased investment in shared carbon capture infrastructure can help attract new investments (and employment), but carbon capture will only help retain oil and gas employment if projects can remain competitive in a shrinking global market.	If the policy goal is to overcome barriers to private investment in large-scale emission reduction projects for large emitters, the tax credit or funding mechanism could be extended to alternative technologies that achieve similar emission reductions.

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

RECOMMENDATIONS FOR **PUBLIC FUNDING AIMED AT OIL AND GAS EMISSION REDUCTIONS**:

- Governments should first seek to address barriers to private investment through adjustments to carbon pricing and regulations and should not finance emission reduction projects that companies would likely undertake anyway in response to those policies.
- Public funding for oil and gas companies should undergo significant scrutiny to ensure that projects are transition-consistent, supporting either transformation into new business lines or projects that have a high chance of competitive success under global low-carbon scenarios.

RECOMMENDATIONS FOR **PUBLIC FUNDING AIMED AT OIL AND GAS EMISSION REDUCTIONS**:

- **Tax credits and funding for carbon capture and storage should be open to alternative technologies that achieve similar emission reductions.**
- **The federal government should implement a clear framework to guide public funding and avoid overlap of initiatives, targeting barriers to private investment and requiring transparent reporting against established objectives.**

3.6 UNDERPRICING EXTERNALITIES

As noted above, the International Monetary Fund considers pricing and taxing fossil fuels below levels that would account for societal costs to be fossil fuel subsidies (International Monetary Fund 2022). While this is not currently a widely held view, it could gain traction over time as carbon pricing becomes more widely established, governments expand policies and programs to reduce greenhouse gas emissions, and domestic concerns about competitiveness and fairness increase.

The IMF's 2021 analysis shows that Canada's taxation of fossil fuels (including gasoline, diesel, and natural gas) is far below levels that would reflect the societal costs of greenhouse gas emissions, air pollution, traffic congestion, accidents, and wear and tear on the road[2] (Parry, Black, and Vernon 2021). It estimates Canada's fossil fuel subsidies—the gap between current fossil fuel prices, including taxes, and socially optimal levels—at roughly US$64 billion per year (approximately CDN$80 billion).

Government measures will help reduce the IMF's estimated subsidy over time. Canadian carbon levies are scheduled to increase as the carbon price rises to $170 per tonne in 2030 (Government of Canada 2021). The Clean Fuel Standard will also require gasoline, diesel, and home heating oil suppliers to gradually reduce the carbon intensity of fuels, with an expected 13 per cent reduction below 2016 levels in carbon intensity by 2030 (Government of Canada 2021).

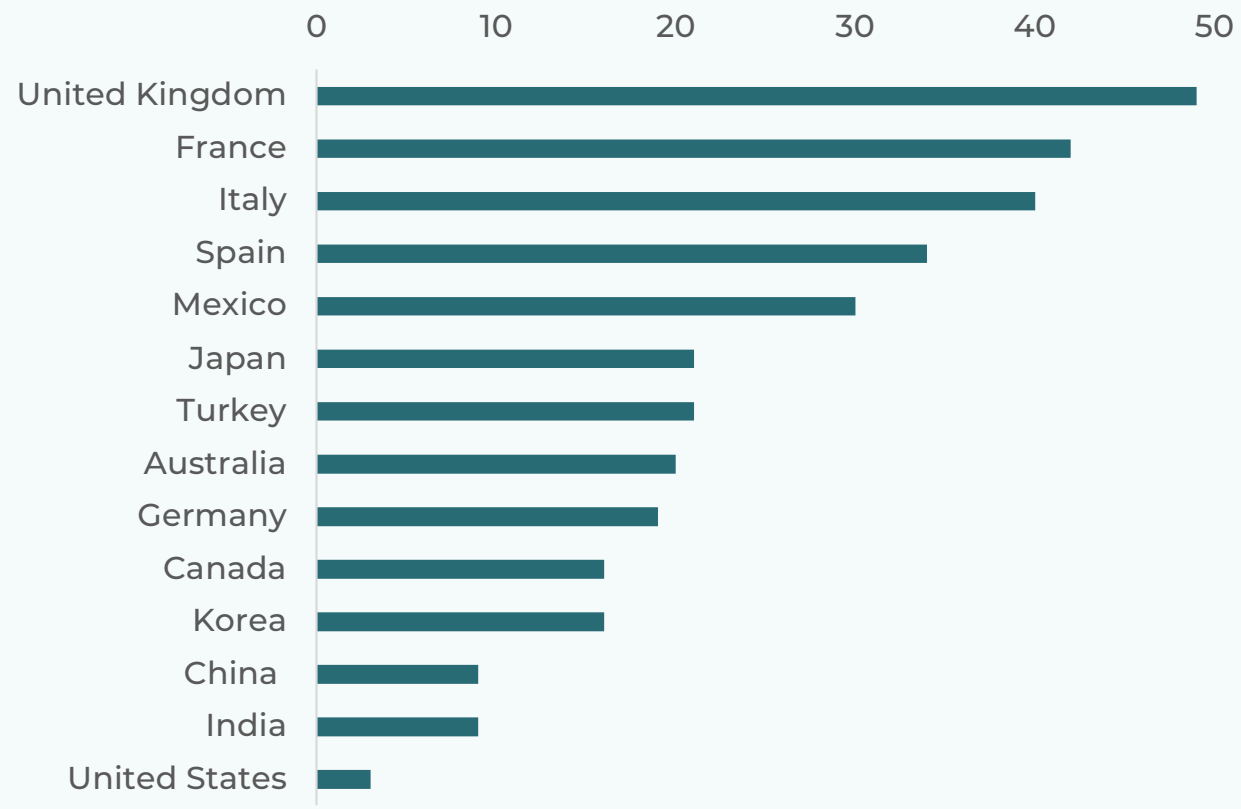
There is growing interest in international comparisons of carbon pricing, particularly when analyzing the impact of policies on competitiveness. The OECD has developed a measure it refers to as the effective carbon rate, which is a combined measure of

2 The IMF analysis values greenhouse gas emissions at US$60 per ton in 2020 based on modelling of carbon prices needed to achieve the global 2-degree temperature goal. Air pollution costs are estimated using local air quality modelling and OECD estimates of the monetary value of health risks.

carbon taxes, cap and trade systems, and fuel excise taxes (Organisation for Economic Co-operation and Development 2021). It is then possible to compare the percentage of a country's emissions that face a price higher than an established benchmark. Figure 4 below uses a baseline of EUR 30 per tonne (roughly CDN $ 43 per tonne), and illustrates that in 2018, Canada's pricing coverage fell below many other countries internationally, but well ahead of the United States. A more recent measure would show Canada's improvement, with the federal benchmark carbon price moving to CDN $50 per tonne in 2022 (Government of Canada 2021). However, EU countries have also made progress, with the EU ETS hitting EUR 80 in early 2022 (European Union Emissions Trading System (EU ETS) 2022).

Figure 4

Percent of emissions priced above EUR 30 per tonne of CO_2, select countries, 2018



Source: OECD Green Growth Indicators (2018) (Organisation for Economic Co-operation and Development 2021)

Eventually, these types of metrics could be used at the national or sectoral level to evaluate trade measures such as border carbon adjustments or trade agreements.

Similar comparisons can also be made across provinces and territories. A 2021 analysis by the Canadian Institute for Climate Choices of Canadian found variation in the coverage of carbon pricing, and marginal and average costs (Sawyer et al. 2021). This is particularly true for large emitters. Addressing this discrepancy could also improve incentives for private investment in technologies such as carbon capture and storage.

Comparisons can also be made across sectors. A 2021 analysis by the Parliamentary Budget Officer estimated that the federal government lost $1.5 billion in forgone revenue as a result of the carbon levy exemption for fuel use in agriculture (Bagnoli and Scholz 2021). Provincial systems also exempt agricultural fuel use from carbon pricing (Government of British Columbia 2021). A recent federal decision to reject calls for further exemptions to carbon levies placed on natural gas shows that it is possible to financially support farmers while preserving the incentive to reduce emissions (Brethour 2022). The approach provides rebates to farmers that are not tied to natural gas consumption, similar to the approach taken for household rebates.

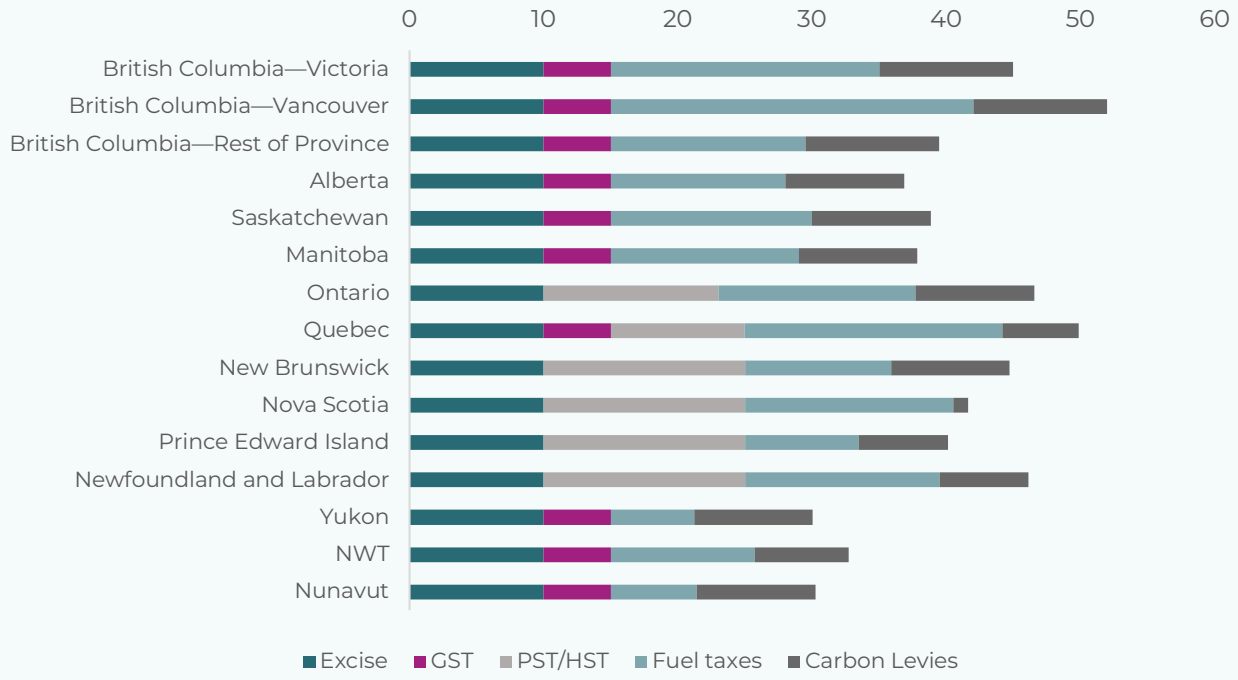
The OECD effective carbon price measure includes carbon levies and fuel excise taxes. Figure 5 compares gasoline taxes and levies by province and territory, including excise taxes, fuel taxes, PST/GST/HST, and carbon levies. The total amount of taxation is highest in Vancouver and lowest in the territories and prairies.

Changes in any type of gasoline taxation will lower the "effective carbon price" and reduce the price signal to reduce gasoline use (through reducing driving, selecting more energy efficient vehicles, or shifting to electric vehicles). For example, the Government of Ontario announced in November 2021 that it would be lowering its fuel tax by 5.7 cents per litre (The Canadian Press 2021). The measure will partially offset carbon levies and will result in forgone revenue from a source that has a lower marginal cost of public funds than corporate or personal income taxes. The forgone revenue will mean less funding available for government programs such as health care or education, or to reduce provincial debt. It is also not the most effective policy tool to support low-income Ontario households and small businesses, as it will be available to everyone who purchases fuel in the province (including high-income households and large businesses).

Ontario's fuel tax reduction would bring the province's overall gasoline taxation to a similar level to prairie provinces. New Brunswick also lowered its fuel tax when the federal carbon price was introduced (Brown 2021). Bringing cumulative fuel taxation up to similar, and increasing, levels across Canada would help enhance signals to businesses and consumers to shift their vehicle choices and driving practices.

Figure 5

Gasoline taxes and levies by province and territory (May 2021, cents/litre)



Source: NRCan (Government of Canada 2021)

Table 6

Evaluating externality pricing

	Transition-consistent?	Good value for money?	Improved employment outcomes?	The best policy fit?
Underpricing externalities associated with fossil fuels	Fossil fuel levies and taxation do not fully reflect the costs imposed on society today, but carbon pricing and regulatory standards are expected to reduce this gap significantly by 2030	Policies that reduce overall fossil fuel taxation widen the gap between current prices and socially optimal levels, and result in forgone revenue from a form of taxation that has a lower marginal cost of public funds than income taxes.	Reductions in fossil fuel taxation may provide some relief to fuel-reliant small businesses but could also delay switching to alternatives that would reduce future vulnerability to price fluctuations and could increase the risk of trade measures if Canada is deemed to have low effective carbon prices.	If the policy objective is to support businesses and low-income households, there are other policy alternatives that would more directly support Ontarians (income support, rebates for purchases of low-carbon goods) and result in better climate outcomes.

Meets criteria | Could meet criteria with changes or implementation | Meets criteria in short term but not long term | Does not meet criteria | Insufficient information to assess

RECOMMENDATIONS FOR **PROJECT-SPECIFIC AND ONE-TIME FUNDING**:

- The federal government should establish a minimum national benchmark for cumulative taxes and levies applying to fossil fuels. It could then issue an annual report comparing provincial and territorial levels to the benchmark. The report could inform decisions on transition-related investments and carbon price or regulatory equivalency negotiations between federal and provincial governments.
- Governments at all levels should avoid reductions in fossil fuel taxation as a measure to support low-income households and small businesses, as there are more effective and efficient policy tools available.

4 CONCLUSIONS AND RECOMMENDATIONS

Our analysis shows that there are many government measures working against Canada's best climate, economic, and societal interests. Without substantial reform, and greater transparency, these measures could slow the transformation that Canada needs to succeed through global low-carbon transition. Ideally, Canada would have a coherent and coordinated policy framework across all levels of government that works in tandem to mobilize private investment and smooth the transition for Canadian workers and communities.

Any relief provided by government measures aimed at slowing the transformation, or fighting the tide of global market change, is likely to be short-lived. Such measures will ultimately be futile in the face of structural shifts and could delay investments that would improve the transition-readiness of Canada's economy and generate new areas of job growth.

Our analysis points to four overarching recommendations:

1. CANADIAN GOVERNMENTS SHOULD PIVOT THEIR ECONOMIC DEVELOPMENT STRATEGIES TO SUPPORT SUCCESS IN THE FACE OF CHANGING MARKET CONDITIONS

Many of the measures assessed in this analysis are aimed at generating economic growth and jobs, often for rural and remote areas. However, the outlook for fossil fuel production has changed, within the context of growing global commitments to reduce greenhouse gas emissions. With countries representing over 90 per cent of global GDP committed to reach net zero emissions by mid-century, governments need to pivot their approaches to economic development (Vaughan 2021). Fossil fuel production is—in most cases—no longer a secure source of growth and job creation. In fact, the strongest and most resilient economies will be those with diversified sources of growth that are attracting transition-consistent investment.

Government measures that accelerate and support economic transformation will drive long-term economic growth and job creation more than those that work against market signals and slow progress. Oil and gas companies have an opportunity to be part of the transformation by decarbonizing assets that have a strong chance of remaining competitive through global transition and moving into new, transition-consistent business lines

such as clean hydrogen, biofuels, and low-carbon chemicals. Communities dependent on fossil fuel production may need additional support, but that support should increasingly shift towards transition-consistent economic activities and worker skills and education.

2. PROVINCES AND TERRITORIES SHOULD MAKE THEIR OWN COMMITMENTS ON FOSSIL FUEL SUBSIDY REFORM TO SUPPORT LONG-TERM PROSPERITY

The federal government has committed to phase out fossil fuel subsidies and to align financing with its net zero commitment. However, many of Canada's remaining fossil fuel subsidies fall under provincial and territorial jurisdiction. This leads to policies working at cross purposes and unclear market signals that slow regional economic transitions and ultimately hurt long-term prosperity. For example, as the federal government ramps up carbon prices, some provincial governments are reducing gasoline taxes and increasing financial support for fossil fuel use.

There may be valid policy goals behind the policies and programs in place, including supporting low-income households struggling to make ends meet, or supporting local food production and rural economic development. However, there are ways of achieving these policy goals that work *with* transition objectives instead of against them. In the long run, households and farmers will be more resilient to the fossil fuel price volatility that could characterize global energy transition if they have near-term support to shift away from their dependence on fossil fuels. Provinces and territories can help smooth the transition by realigning policies and programs to mobilize private investment towards transformative change.

3. GOVERNMENTS SHOULD DEVELOP A CLEAR DECISION-MAKING FRAMEWORK FOR PUBLIC INVESTMENT IN EMISSION-REDUCING PROJECTS AND TECHNOLOGIES

Government assessments of fossil fuel subsidies often assume that all tax incentives and programs aimed at reducing emissions from fossil fuel production are justifiable uses of public funds. However, this is not the case.

The best uses of public funds will be in areas where the greatest combined long-term climate, economic, and societal benefit can be achieved for the smallest public investment. This requires a more strategic approach than most governments have pursued to date.

First, investments should focus on addressing gaps in carbon pricing and regulatory policies instead of financing company compliance. This could mean targeting uncovered emissions or overcoming remaining barriers to private investment (such as policy or market uncertainty). Canada's transition success will require many large capital-intensive, risky investments. Government funding can play a critical role in accelerating

these projects, resulting in earlier emission reductions and greater economic readiness for global market change. However, it will be most effective if policies are coordinated and complementary (rather than overlapping or working at cross purposes).

Second, investments should consider anticipated future market conditions through global transition. A major public investment to reduce emissions in a coal mine will not be of significant value if the mine shuts down due to shrinking global demand for coal. Coal workers would receive a greater long-term benefit from a public investment aimed at attracting new, transition-consistent sources of growth and jobs. Subsidizing the coal mine—even if it is to reduce emissions—reinforces dependency and increases vulnerability to global market forces.

Third, public funds should mobilize private investment and share risk with the private sector rather than fully taking on responsibility. It is in the public interest to have Canadian companies succeed through transition, but success will be more likely for projects where private sector proponents have substantial skin in the game. This requires programs and incentives to provide enough support to overcome investment barriers, but to avoid blunting market signals that could lead to different decisions. For example, an oil producer facing significant competitive pressures from declining global demand and the rising cost of capital may push for governments to finance their emission reductions. However, left to market forces alone that same producer might consider a long-term plan to phase down oil production and shift into new, transition-consistent business lines such as aviation biofuels or carbon capture and storage as a service for chemical producers. Government funding might be better placed supporting that shift.

One of the ways to assess projects is to require a higher burden of proof for public financing for demand-decline sectors such as oil and gas production and traditional auto manufacturing. Our *Sink or Swim* report proposed an additional set of climate-related reporting metrics for demand-decline sectors, including scope 3 emissions, investment in transition-consistent business lines, and cost competitiveness.

4. GOVERNMENTS SHOULD FIRST ENSURE NEW MEASURES SUPPORT TRANSITION SUCCESS BEFORE ADDRESSING ESTABLISHED POLICIES

Governments need not tackle all recommendations immediately. The first priority should be to ensure that new measures—such as programs supporting emission reductions or economic development—are transition-consistent, good value for money, support sustainable jobs, and use the best policy tools available. Outcomes can also be improved through minor adjustments to existing programs, or careful implementation.

The second priority should be to address existing measures that have the greatest amount of dark red in our assessment tables. This includes British Columbia's package of financial incentives and tax and royalty provisions that support fossil fuel development,

residential energy rebates that are not tied to income, programs like the federal emission reduction fund, and provincial reductions of fuel taxes.

Governments can then start to address some of the measures that have a larger amount of orange and light orange. For example, Alberta could adjust royalty reductions to encourage storage of CO_2 from enhanced oil recovery. Provinces can also work with the federal government to phase out tax exemptions for fuel for farmers and other businesses.

Reforming government financial support to achieve the best overall climate, economic, and social outcomes for Canadians is a critical step towards creating the conditions for Canada's long-term success through the global low-carbon transition.

REFERENCES

Alberta Energy Regulator. 2021. "Liability Management." https://www.aer.ca/providing-information/by-topic/liability-management

Anderson, Drew. 2020. "$1.7B to Clean Up Orphaned and Abandoned Wells Could Create Thousands of Jobs." *CBC.* April 17. https://www.cbc.ca/news/canada/calgary/federal-oil-and-gas-orphan-wells-program-1.5535943

Antosiewicz, Marek, Piotr Lewandowski, and Jan Witajewski-Baltvilks. 2016. "Input vs. Output Taxation—A DSGE Approach to Modelling Resource Decoupling." *Sustainability 8, 352* 1-17.

Arnold, Jonathan, Rachel Samson, Weseem Ahmed, Dale Beugin, and Julien Bourque. 2020. *11 Ways to Measure Clean Growth.* Canadian Institute for Climate Choices. https://climatechoices.ca/reports/clean-growth/

Bagnoli, Philip, and Tim Scholz. 2021. *Energy Sector and Agriculture: Federal Revenue Forgone from Tax Provisions.* Office of the Parliamentary Budget Officer. December 7. https://www.pbo-dpb.gc.ca/en/blog/news/RP-2122-022-M—energy-sector-agriculture-federal-revenue-forgone-from-tax-provisions—secteur-energie-agriculture-recettes-auxquelles-renonce-gouvernement-federal-titre-certaines-disposi

Ballingall, Alex. 2021. "Canada Would Support International Deadlines to Eliminate Coal and Fossil Fuel Subsidies, Steven Guilbeault Says." *Toronto Star.* November 12. https://www.thestar.com/politics/federal/2021/11/12/canada-would-support-international-deadlines-to-eliminate-coal-and-fossil-fuel-subsidies-steven-guilbeault-says.html

Bank of Canada. 2022. "Assessing Climate Change Risks to Our Financial System." January 14. https://www.bankofcanada.ca/2022/01/assessing-climate-change-risks-to-our-financial-system/

Bellona Europa. 2021. "Hydrogen in Steel Production: What Is Happening in Europe – Part One." March 4. https://bellona.org/news/climate-change/2021-03-hydrogen-in-steel-production-what-is-happening-in-europe-part-one

Bentein, Jim. 2019. "Canadian LNG: Global Opportunity, Global Competition." *JWN Energy.* December 17. https://www.jwnenergy.com/article/2019/12/17/canadian-lng-global-opportunity-global-competition/

BloombergNEF. 2021. "Global LNG Outlook 2021-25 Overview." June 28. https://www.bloomberg.com/professional/blog/global-lng-outlook-2021-25-overview/

Bolongaro, Kait, and Esteban Duarte. 2021. "Ottawa to Invest Billions in Newfoundland's Troubled Muskrat Falls Power Project." *Financial Post.* July 28. https://financialpost.com/commodities/energy/renewables/canada-to-invest-billions-in-newfoundlands-troubled-muskrat-falls-power-project

Bone, Carrie. 2021. "Group of Governments Commit to Green Steel Buying Pledge: COP 26." *Fastmarkets MB.* November 9. https://www.metalbulletin.com/Article/4015799/Group-of-governments-commit-to-green-steel-buying-pledge-COP-26.html

BP p.l.c. 2021. "Oil | Energy economics." https://www.bp.com/en/global/corporate/energy-economics/energy-outlook/demand-by-fuel/oil.html

Brethour, Patrick. 2022. "With Rebates for Farmers, Ottawa Is Nudging the Sector Away From Fossil Fuels." *The Globe and Mail.* January 7. https://www.theglobeandmail.com/business/article-ottawas-rebates-for-farmers-provides-some-relief-from-added-costs-of/

Broom, Fiona. 2021. "COP26: Countries Sign Pledges to Phase Out Coal and Fossil Fuel Finance." *Global Landscapes Forum.* November 5. https://news.globallandscapesforum.org/55654/cop26-countries-sign-pledges-to-phase-out-coal-and-fossil-fuel-finance/

Brown, Silas. 2021. "New Brunswick to Cut Income Tax Using Carbon Tax Revenue." *Global News.* May 11. https://globalnews.ca/news/7853009/new-brunswick-income-tax-cut-carbon-tax-revenue/

Business Development Canada. 2022. "Financing and Advisory Services for the Oil & Gas Sector." https://www.bdc.ca/en/industries/oil-gas

C.D. Howe Institute. 2017. "Alberta Needs to Address Its $8 Billion Oil and Gas Well Cleanup Risk." September 28. https://www.cdhowe.org/media-release/alberta-needs-address-its-8-billion-oil-and-gas-well-cleanup-risk

Campbell, Francis. 2022. "Hydrogen: an Emerging Innovation in Canada's Renewable Energy Industry." *Invest in Canada.* https://www.investcanada.ca/blog/hydrogen-emerging-innovation-canadas-renewable-energy-industry

Canada Energy Regulator. 2021. "CER—Canada's Energy Future 2021—Scenarios and Assumptions." December 9. https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2021/scenarios-and-assumptions.html

Canada Energy Regulator. 2021. "Market Snapshot: Steady Growth for Heat Pump Technology." January 29. https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2018/market-snapshot-steady-growth-heat-pump-technology.html

Canadian Securities Administrators. 2021. "Canadian Securities Regulators Seek Comment on Climate-related Disclosure Requirements." Press release. October 18. https://www.securities-administrators.ca/news/canadian-securities-regulators-seek-comment-on-climate-related-disclosure-requirements/

Cooper, Rachel. 2021. "Justine Hendricks on EDC's Role in Tackling Climate Change." *Climate Action.* October 26. https://www.climateaction.org/climate-leader-interviews/justine-hendricks-on-EDCs-role-in-tackling-climate-change

Corkal, Vanessa. 2021. *Federal Fossil Fuel Subsidies in Canada: COVID-19 Edition.* International Institute for Sustainable Development. https://www.iisd.org/publications/fossil-fuel-subsidies-canada-covid-19

Dahlby, Bev, and Ergete Ferede. 2011. "What Does it Cost Society to Raise a Dollar of Tax Revenue? The Marginal Cost of Public Funds." C.D. Howe Institute. March 16. https://www.cdhowe.org/public-policy-research/what-does-it-cost-society-raise-dollar-tax-revenue-marginal-cost-public-funds

Dion, Jason. 2018. "Cleanup Liabilities in Alberta's Oil patch: Risks vs. Costs." *Canada's Ecofiscal Commission.* November 7. https://ecofiscal.ca/2018/11/07/cleanup-liabilities-in-albertas-oil-patch-risks-vs-costs/

Dion, Jason. 2021. "Policy Implementation Will Be Tricky on Carbon Capture and Storage." *Policy Options.* June 8. https://policyoptions.irpp.org/magazines/june-2021/policy-implementation-will-be-tricky-on-carbon-capture-and-storage/

Efficiency Canada. 2020. "Better Building Codes." https://www.efficiencycanada.org/better-building-codes/

European Council. 2021. "G20 Rome Leaders' Declaration." Press release. October 31. https://www.consilium.europa.eu/en/press/press-releases/2021/10/31/g20-rome-leaders-declaration/

European Union Emissions Trading System (EU ETS). 2022. "EU Carbon Permits." *Trading Economics.* https://tradingeconomics.com/commodity/carbon

Export Development Canada. 2021. "Export Development Canada Commits to Net Zero by 2050." Press release. July 22. https://www.edc.ca/en/about-us/newsroom/edc-net-zero-2050.html

Forsyth, Jamie, and Nora Nahornick. 2022. "Estimated Cost of Cleaning Canada's Orphan Oil and Gas Wells." Office of the Parliamentary Budget Officer. January 25. https://www.pbo-dpb.gc.ca/en/blog/news/RP-2122-026-S—estimated-cost-cleaning-canada-orphan-oil-gas-wells—cout-estimatif-nettoyage-puits-petrole-gaz-orphelins-canada

G20 Research Group. 2011. "G20 Leaders Statement: The Pittsburgh Summit." November 29. http://www.g20.utoronto.ca/2009/2009communique0925.html

Gerres, Timo, and Pedro Linares. 2020. "Carbon Contracts for Differences: Their Role in European Industrial Decarbonisation." *Climate Strategies.* https://climatestrategies.org/publication/carbon-contracts-for-differences-their-role-in-european-industrial-decarbonisation/

Glasgow Financial Alliance for Net Zero. 2021. "Amount of Finance Committed to Achieving 1.5°C Now at Scale Needed to Deliver the Transition." November 3. https://www.gfanzero.com/press/amount-of-finance-committed-to-achieving-1-5c-now-at-scale-needed-to-deliver-the-transition/

Government of British Columbia. 2021. "Motor Fuel Tax and Carbon Tax Exemptions." https://www2.gov.bc.ca/gov/content/taxes/sales-taxes/motor-fuel-carbon-tax/business/exemptions

Government of British Columbia. 2021. "Natural Gas Royalty Review." https://engage.gov.bc.ca/royaltyreview/

Government of Canada. 2021. "Backgrounder: Emissions Reduction Fund Onshore Program." November 18. https://www.canada.ca/en/natural-resources-canada/news/2021/11/backgrounder-emissions-reduction-fund-onshore-program.html

Government of Canada. 2021. "Canadian Net-Zero Emissions Accountability Act." January 14. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050/canadi-

an-net-zero-emissions-accountability-act.html

Government of Canada. 2021. "Clean Fuel Standard." July 26. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-standard.html

Government of Canada. 2019. "Discussion Document for Canada's Assessment Framework of Inefficient Fossil Fuel Subsidies." April 2. https://www.canada.ca/en/environment-climate-change/services/climate-change/consultation-approach-non-tax-inefficient-fossil-fuel-subsidies/discussion-document.html

Government of Canada. 2022. "Emissions Reduction Fund: Working Together to Create a Lower Carbon Future." January 12. https://www.nrcan.gc.ca/science-and-data/funding-partnerships/funding-opportunities/current-funding-opportunities/emissions-reduction-fund/22781

Government of Canada. 2021. "Fuel Consumption Levies in Canada." May 14. https://www.nrcan.gc.ca/our-natural-resources/domestic-and-international-markets/transportation-fuel-prices/fuel-consumption-taxes-canada/18885

Government of Canada. 2020. "Government of Canada supports Newfoundland and Labrador's Offshore Energy Sector Workers." Press release. September 25. https://www.canada.ca/en/department-finance/news/2020/09/government-of-canada-supports-newfoundland-and-labradors-offshore-energy-sector-workers.html

Government of Canada. 2022. "Infrastructure Canada—The Canada Community-Building Fund." January 14. https://www.infrastructure.gc.ca/plan/gtf-fte-eng.html

Government of Canada. 2021. "Investment Tax Credit for Carbon Capture, Utilization, and Storage." December 3. https://www.canada.ca/en/department-finance/programs/consultations/2021/investment-tax-credit-carbon-capture-utilization-storage.html

Government of Canada. 2021. "Minister Wilkinson Refocuses Emissions Reduction Fund Onshore Program." Press release. December 21. https://www.canada.ca/en/natural-resources-canada/news/2021/12/minister-wilkinson-refocuses-emissions-reduction-fund-onshore-program.html

Government of Canada. 2021. "Net Zero Accelerator Initiative." August 6. https://www.ic.gc.ca/eic/site/125.nsf/eng/00039.html

Government of Canada. 2021. "Overview of Canada's Agriculture and Agri-food Sector." November 5. https://agriculture.canada.ca/en/canadas-agriculture-sectors/overview-canadas-agriculture-and-agri-food-sector

Government of Canada. 2022. "Steps to Apply for the Onshore Program." January 12. https://www.nrcan.gc.ca/science-and-data/funding-partnerships/funding-opportunities/current-funding-opportunities/emissions-reduction-fund/steps-apply-for-onshore-program-funding/steps-apply-for-onshore-program-funding/23051#download-the-applicant-guide

Government of Canada. 2021. "The Federal Carbon Pollution Pricing Benchmark." August 5. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information.html

Government of Canada. 2017. "Western Newfoundland Becoming a 'Rock Solid' Investment for Offshore Wind Energy." December 18. https://www.nrcan.gc.ca/cleangrowth/20417

Government of Newfoundland and Labrador. 2021. "Provincial Government Announces Support for Oil and Gas Supply and Service Sector Projects." Press release. November 23. https://www.gov.nl.ca/releases/2021/exec/1123n06/

Hendricks, Justine. 2021. "EDC Commits to Net Zero Emissions by 2050." Export Development Canada. July 22. https://www.edc.ca/en/blog/edc-net-zero-emissions-2050.html

Hiar, Cordin. 2021. "Coal, Oil Sands Companies Feel Growing Insurance Squeeze." *E&E News.* September 20. https://www.eenews.net/articles/coal-oil-sands-companies-feel-growing-insurance-squeeze/

Hittle, Ann-Louise, Massimo Di Odoardo, Alan Gelder, and Erik Mielke. 2021. "Reversal of Fortune: Oil and Gas Prices in a 2-Degree World." Wood Mackenzie. April. https://www.woodmac.com/horizons/reversal-of-fortune-oil-and-gas-prices-in-a-2-degree-world/

Institutional Investors Group on Climate Change. 2021. "Investors Representing USD 10.4 Trillion Set Out Standard for Net Zero Transition Plans in the Oil and Gas Sector." Press release. September 15. https://www.iigcc.org/news/investors-representing-usd-10-4-trillion-set-out-standard-for-net-zero-transition-plans-in-the-oil-and-gas-sector/

International Energy Agency. 2021. “Overview – World Energy Outlook 2021 – Analysis.” https://www.iea.org/reports/world-energy-outlook-2021/overview

International Institute for Applied Systems Analysis. 2021. “NGFS Scenario Explorer.” June 28. https://data.ene.iiasa.ac.at/ngfs/#/login?redirect=%2Fworkspaces

International Institute for Sustainable Development and Organisation for Economic Co-operation and Development. 2021. “Country Data—Fossil Fuel Subsidies.” ***Fossil Fuel Subsidy Tracker.*** https://fossilfuelsubsidytracker.org/country/

International Monetary Fund. 2022. “Fossil Fuel Subsidies.” https://www.imf.org/en/Topics/climate-change/energy-subsidies

International Union for Conservation of Nature. 2021. “Peatlands and Climate Change.” November. https://www.iucn.org/resources/issues-briefs/peatlands-and-climate-change

Johansson, Åsa, Chistopher Heady, Jens Matthias Arnold, Bert Brys, and Laura Vartia. 2008. “Taxation and Economic Growth.” OECD Economics Department Working Papers.https://www.oecd-ilibrary.org/economics/taxation-and-economic-growth_241216205486

Kaiser, Mark J. 2021. “A Review of Exploration, Development, and Production Cost Offshore Newfoundland.” ***Natural Resources Research 30.*** https://doi.org/10.1007/s11053-020-09784-3

Kantamneni, Abhilash, and Brendan Haley. 2021. “A National Energy Poverty Strategy for Canada?” ***Efficiency Canada.*** December 13. https://www.efficiencycanada.org/national-energy-poverty-strategy/

Kurjata, Andrew, and Meera Bains. 2021. “Site C Dam Budget Nearly Doubles to $16B, but B.C. NDP Forging On with Megaproject.” ***CBC.*** February 25. https://www.cbc.ca/news/canada/british-columbia/site-c-announcement-Friday-1.5928719

Leach, Andrew. 2020. “Opinion: This ‘Bitumen Boondoggle’ Is Costing Alberta Taxpayers Billions.” ***CBC.*** September 14. https://www.cbc.ca/news/canada/calgary/alberta-bitumen-sturgeon-refinery-nwrp-1.5718044

Lindsay, Bethany. 2021. “Trans Mountain Pipeline Expansion Will Lead to $11.9B in Losses for Canada, Study Says.” ***CBC.*** April 1. https://www.cbc.ca/news/canada/british-columbia/bc-trans-mountain-losses-sfu-study-1.5970802

Loveday, Steven. 2021. “EV Battery Cell & Pack Prices Dropping At Surprising Rate.” ***InsideEVs.*** December 2. https://insideevs.com/news/552010/electric-car-battery-prices-dropping/

Mankiw, N. Gregory, Matthew Weinzierl, and Danny Yagan. 2009. “Optimal Taxation in Theory and Practice.” https://scholar.harvard.edu/files/mankiw/files/optimal_taxation_in_theory.pdf

McCarthy, Shawn. 2021. “Will a New Climate Pledge from Canada’s Big Six Banks Overhaul Their Fossil Fuel Financing?” ***Corporate Knights.*** October 19. https://www.corporateknights.com/climate-and-carbon/canadas-big-banks-join-climate-alliance/

McKenzie, Kenneth J., and Jack Mintz. 2011. “The Tricky Art of Measuring Fossil Fuel Subsidies: A Critique of Existing Studies.” ***The School of Public Policy Publications, 4, 14 (September).*** October 11. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3068334

Morgan, Geoffrey. 2021. “‘Staggering’—Dow Plans Major Petrochemical Expansion, Shift to Net-zero in Alberta.” ***Financial Post.*** October 6. https://financialpost.com/commodities/energy/oil-gas/staggering-dow-plans-major-petrochemical-expansion-shift-to-net-zero-in-alberta

Mortlock, Lance. 2020. “Rethinking the Oil and Gas Workforce in 2040.” ***EY.*** August 8. https://www.ey.com/en_ca/oil-gas/rethinking-the-oil-and-gas-workforce-in-2040

Mountford, Helen, David Waskow, Lorena Gonzalez, Chirag Gajjar, Nathan Cogswell, Mima Holt, Taryn Fransen, Molly Bergen, and Rhys Gerholdt. 2021. “COP26: Key Outcomes from the UN Climate Talks in Glasgow.” ***World Resources Institute.*** November 17. https://www.wri.org/insights/cop26-key-outcomes-un-climate-talks-glasgow

Natural Resources Canada. 2020. “Investing in Net-Zero Energy Residential Buildings Across Canada.” Press release. June 24. https://www.canada.ca/en/natural-resources-canada/news/2020/06/investing-in-net-zero-energy-residential-buildings-across-canada.html

Network of Central Banks and Supervisors for Greening the Financial System. 2020. “NGFS.” https://www.ngfs.net/en

Newfoundland and Labrador Oil and Gas Industries Association. 2021. “Hydrogen Potential of Newfoundland & Labrador Is ‘Compelling’ – Report.” Press release. July 23. https://www.noia.ca/2021/07/hydrogen-potential-of-newfoundland-labrador-is-compelling-report/

Office of the Auditor General of Canada. 2021. *Report 4—Emissions Reduction Fund—Natural Resources Canada.* https://www.oag-bvg.gc.ca/internet/English/parl_cesd_202111_04_e_43912.html

Oil Change International and Friends of the Earth United States. 2021. *Past Last Call: G20 Public Finance Institutions Are Still Bankrolling Fossil Fuels.* http://priceofoil.org/2021/10/28/past-last-call-g20-public-finance-institutions-are-still-bankrolling-fossil-fuels/

Oil Sands Pathways to Net Zero. 2021. "Helping Canada Achieve Its Climate Goals." https://www.oilsandspathways.ca/

Olewiler, Nancy, and Jennifer Winter. 2021. "A Review and Assessment of the Natural Gas Royalty System in British Columbia." September. https://engage.gov.bc.ca/app/uploads/sites/716/2021/10/BC-Royalty-Review-Independent-Assessment-Sep-2021.pdf

Olszynski, Martin. 2020. "Alberta's Underfunded Environmental Liabilities Problem: Inactive Wells and Oil Sands Tailings Or: The Value of Alberta: The Other Side of the Ledger (presentation, January 18)." https://cirl.ca/sites/default/files/SMLS/2020/Olszynski_SMLS_Jan-2020.pdf

Ontario Ministry of Finance. 2019. "Attention Truckers: No Dyed Diesel on the Highway." September 3. https://www.fin.gov.on.ca/en/bulletins/ft/pamphlet_truckersdyeddiesel.html

Organisation for Economic Co-operation and Development. 2021. "Effective Carbon Rates 2021: Pricing Carbon Emissions through Taxes and Emissions Trading." May 5. https://www.oecd.org/tax/tax-policy/effective-carbon-rates-2021-0e8e24f5-en.htm

Organisation for Economic Co-operation and Development. 2021. *OECD Statistics.* https://stats.oecd.org/

Parry, Ian, Simon Black, and Nate Vernon. 2021. "Still Not Getting Energy Prices Right: A Global and Country Update of Fossil Fuel Subsidies." International Monetary Fund. September 24. https://www.imf.org/en/Publications/WP/Issues/2021/09/23/Still-Not-Getting-Energy-Prices-Right-A-Global-and-Country-Update-of-Fossil-Fuel-Subsidies-466004

Petroleum Technology Research Centre. 2022. https://ptrc.ca/

Principles for Responsible Investment. 2021. "The Inevitable Policy Response 2021: Forecast Policy Scenario and 1.5C Required Policy Scenario." October 18. https://www.unpri.org/inevitable-policy-response/the-inevitable-policy-response-2021-forecast-policy-scenario-and-15c-required-policy-scenario/8726.article

Quinson, Tim. 2021. "Cost of Capital Widens for Fossil-Fuel Producers." *Bloomberg.* November 9. https://www.bloomberg.com/news/articles/2021-11-09/cost-of-capital-widens-for-fossil-fuel-producers-green-insight

Rabb, Maxwell. 2021. "61 Percent of Consumers Now Prefer Plant-Based Sources of Protein." *The Beet.* December 14. https://thebeet.com/study-61-of-consumers-prefer-plant-based-sources-of-protein/

Radwanski, Adam, and Paul Waldie. 2021. "Ottawa Pledges to End Financing for Foreign Fossil-fuel Projects in 2022." *The Globe and Mail.* November 4. https://www.theglobeandmail.com/world/article-ottawa-pledges-to-end-financing-for-foreign-fossil-fuel-projects-in/

Ragan, Chris, Elizabeth Beale, Paul Boothe, Mel Cappe, Bev Dahlby, Don Drummond, Stewart Elgie, et al. 2017. "Supporting Carbon Pricing: How to Identify Policies that Genuinely Complement an Economy-wide Carbon Price." *Canada's Ecofiscal Commission.* June. http://ecofiscal.ca/wp-content/uploads/2017/06/Ecofiscal-Commission-Report-Supporting-Carbon-Pricing-June-2017.pdf

Resource Works. 2020. "Digging Deeper Into Deep-well Credits." November 25. https://www.resourceworks.com/digging-deep-well

Rodrik, Dani. 2008. "Normalizing Industrial Policy." *World Bank.* https://openknowledge.worldbank.org/handle/10986/28009

Samson, Rachel, Jonathan Arnold, Weseem Ahmed, and Dale Beugin. 2021. *Sink or Swim: Transforming Canada's economy for a global low-carbon future.* Canadian Institute for Climate Choices. https://climatechoices.ca/reports/sink-or-swim/

Sawyer, Dave, Seton Stiebert, Renaud Gignac, Alicia Campney, and Dale Beugin. 2021. *The State of Carbon Pricing in Canada: Key findings and recommendations."* Canadian Institute for Climate Choices. https://climatechoices.ca/reports/the-state-of-carbon-pricing-in-canada/

Shufelt, Tim. 2021. "With Banks and the Oil Patch Leading the Way, Canada Is Headed to a Dividend Boom." *The Globe and Mail.* October 28. https://www.theglobeandmail.com/investing/article-with-banks-and-the-oil-patch-leading-the-way-canada-is-headed-to-a/

Singh, Inayat. 2021. “Canada’s Energy Regulator Criticized for Not Modelling a Net-zero Future.” *CBC*. December 14. https://www.cbc.ca/news/science/cer-report-missing-net-zero-1.6285394

Task Force on Climate-related Financial Disclosures. 2022. “Task Force on Climate-related Financial Disclosures.” https://www.fsb-tcfd.org/

The Canadian Press. 2021. “Doug Ford Says 5.7-cent Gas Tax Cut Is Coming Before Next Year’s Budget.” *CTV News*. November 10. https://toronto.ctvnews.ca/doug-ford-says-5-7-cent-gas-tax-cut-is-coming-before-next-year-s-budget-1.5660268

The Economist. 2017. “Pigouvian taxes.” August 19. https://www.economist.com/schools-brief/2017/08/19/pigouvian-taxes

The Energy Mix. 2021. “Fossils Want $50-Billion Taxpayer Subsidy to Decarbonize Tar Sands/Oil Sands.” July 11. https://www.theenergymix.com/2021/07/11/fossils-want-50-billion-taxpayer-subsidy-to-decarbonize-tar-sands-oil-sands/

Timperley, Jocelyn. 2017. “Explainer: The Challenge of Defining Fossil Fuel Subsidies.” *Carbon Brief*. June 26. https://www.carbonbrief.org/explainer-the-challenge-of-defining-fossil-fuel-subsidies

Trudeau, Justin. 2021. “Deputy Prime Minister and Minister of Finance Mandate Letter.” December 16. https://pm.gc.ca/en/mandate-letters/2021/12/16/deputy-prime-minister-and-minister-finance-mandate-letter

Turner, Logan. 2021. “Ontario’s Most Northern First Nation Goes Green with Their First Solar Project.” *CBC*. November 5. https://www.cbc.ca/news/canada/thunder-bay/fort-severn-solar-1.6237812

United Nations. 2021. “Biggest Financial Players Back Net Zero.” https://www.un.org/en/climatechange/biggest-financial-players-back-net-zero

Vaughan, Adam. 2021. “COP26: Why India’s 2070 Net-zero Pledge Is Better News Than It Sounds.” *New Scientist*. November 2. https://www.newscientist.com/article/2295762-cop26-why-indias-2070-net-zero-pledge-is-better-news-than-it-sounds/

ACKNOWLEDGMENTS

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The authors thank the following experts who provided valuable comments and suggestions on earlier versions of this paper. They may not agree with everything in the final product, but in our view their contributions improved it substantially.

Bev Dahlby, Distinguished Fellow, Tax and Economic Growth, University of Calgary

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