Creating a Canadian Advantage

Policies to help Canada compete for low-carbon investment

Bentley Allan, PhD
Transition Pathway Principal, Transition Accelerator

Michael Bernstein
Executive Director, Clean Prosperity

Contributing authors
Brendan Frank
Nick Martin
Travis Southin
Jake Wadland

CLEAN PROSPERITY

The Transition Accelerator
L'Accélérateur de transition

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About Clean Prosperity and The Transition Accelerator

Clean Prosperity is a Canadian climate policy organization. We advocate for practical climate solutions that reduce emissions and grow the economy. Learn more at **CleanProsperity.ca**.

The Transition Accelerator is a pan-Canadian organization that works with others to identify and advance viable pathways to a net-zero, prosperous and competitive Canada in 2050. Learn more at **TransitionAccelerator.ca**.

About the authors

Bentley Allan PhD, is a transition pathway principal at the Transition Accelerator, as well as an Associate Professor of Political Science at Johns Hopkins University.

Michael Bernstein is the executive director of Clean Prosperity and an economist by training.

Abbreviations

45V/Q/X/Y	Sections of the *United States Internal Revenue Code* on clean-energy tax credits
CCfD	Carbon contract for difference
CCS	Carbon capture and storage
CCUS	Carbon capture, utilisation and storage
DAC	Direct air capture
IRA	*Inflation Reduction Act*
ITC	Investment tax credit
LCFS	Low-carbon fuel standard
PPA	Power purchase agreement
PTC	Production tax credit
RINs	Renewable identification numbers
SAF	Sustainable aviation fuel
TIER	Technology Innovation and Emissions Reduction (Regulation)

Executive Summary

The global race to decarbonize economies is spurring competition between countries to secure the pole position in developing and producing key low-carbon technologies. Absent a clear and well-executed strategy, there is a risk that Canada could miss out on the huge opportunities available in the low-carbon transition because our investment environment is less attractive than that in the United States. Done right, a strategy to enhance the competitiveness of these opportunities could create a “Canadian Advantage” that delivers both economic and environmental benefits.

This working paper analyzes the incentive structure available for low-carbon technologies in Canada versus the United States, with a focus on “bankable incentives” that provide upfront certainty to potential low-carbon project developers and investors.

We find that, for many key low-carbon technologies—renewable electricity being a notable exception—Canada has a gap in “bankable incentives” relative to the United States. This bankable gap will make it difficult for Canada to systematically attract investment in key low-carbon technologies like hydrogen, battery manufacturing, carbon capture, direct air capture, sustainable aviation fuels and more. Instead, Canada will have to continue to rely on bespoke discretionary deals to make up for this incentive gap, such as the package offered to Volkswagen to set up a battery manufacturing facility in Ontario.

To illustrate the challenge, take the example of blue hydrogen (i.e. hydrogen produced from natural gas with carbon capture). Canada recently announced an investment tax credit (ITC) that provides up to a 40% refundable credit for investments in hydrogen production, with the precise credit amount tied to the carbon intensity of the produced hydrogen. Our analysis finds that this ITC offers the equivalent of $0.03 per kilogram in support for an at-scale blue hydrogen facility. In contrast, the US Inflation Reduction Act (IRA) would provide this same facility $1.10 (all dollar figures are in $CAD). This $1.07 gap means that a facility like the proposed Air Products blue hydrogen project in Edmonton would be leaving almost $500 million per year on the table by locating in Alberta versus in the US. There is also a bankable gap for green hydrogen. Taken together, these gaps will severely hamper Canada's ambition—as described in the federal government’s **hydrogen strategy** “to become a world-leading producer, user, and exporter of clean hydrogen.”

Based on our findings, we recommend the federal government take two key actions:

First, narrow the bankable gap by using carbon contracts for difference (CCfDs) to provide certainty around carbon credits that are generated under industrial carbon pricing systems across the country. This would partially or fully close the gap for a series of key technologies. For example, carbon credits could be worth up to 85 cents per kg of blue hydrogen, almost fully eliminating the incentive gap. The federal government announced an intention to explore a broad-based contracts for difference program in the 2023 federal budget. We encourage them to finalize details about such a program by the 2023 Fall Economic Statement.

Second, build on the Made-in-Canada plan announced in the 2023 federal budget by developing sector-specific strategies for high-priority opportunity areas such as battery materials, clean hydrogen, and sustainable aviation fuels. Each strategy should include financial incentives to close the gaps highlighted in this paper. These incentives must be complemented with other key elements of an effective strategy, including mechanisms for coordinating closely with industry, joint establishment of sectoral economic targets, and detailed analysis to identify and address supply chain-specific bottlenecks. Clear sectoral targets and initial strategy documents should be prepared by the Fall Economic Statement, with an eye to making concrete policy changes by the 2024 federal budget.

Introduction

There is a risk that Canada could miss out on the huge opportunities available in the low-carbon transition because our investment environment is less attractive than that in the United States.

In particular, the US *Inflation Reduction Act* (IRA) has opened up a wide gap between the revenue available from public-policy sources for new low-carbon technology production and deployment in Canada versus the US.

In this working paper, we analyze the differences in policy-based economic incentives for decarbonization in Canada and the US along two dimensions:

1. The bankable gap: This is the difference between economic incentives in the US and Canada that are clear ex-ante. Tax credits are the main focus of the bankable gap.

2. The total incentive gap: This takes into consideration a broader set of economic incentives—both bankable revenue streams like tax credits, and less certain revenue sources, like Canadian carbon-credit sales or grant programs.

This working paper reports preliminary findings of an ongoing research project to analyze the differences in policy-based economic incentives for decarbonization in Canada and the US. While the technologies discussed in the paper will support decarbonization, our focus in this paper is on whether Canada will be able to fully capitalize on the opportunity to attract low-carbon investment over the critical next decade as the energy system transforms and new supply chains are established.

This working paper examines 10 low-carbon technology cases and recommends two policy options to close the gap: a systematic narrowing of revenue gaps by converting uncertain carbon market revenues into bankable revenues, using a policy like contracts for difference; and the strategic deployment of production tax credits as part of an industrial policy push in high-priority sectors.

We have made a number of updates to this new version of the paper:

- All of the new investment tax credits announced in the 2023 federal budget are now included. We have also updated some additional assumptions in the calculations based on feedback from the previous version.
- Our policy recommendations have been updated to reflect the 2023 federal budget.
- New sections have been added on critical minerals and wind power.
- The sections have been reorganized to clearly illustrate which technologies stand to benefit from changes to industrial carbon pricing systems, and which do not.

In addition, new appendices have been added that describe the eligibility of greenfield versus brownfield investment in different provincial carbon pricing systems, and list provincial and state incentives for various project types.

All currency amounts in this working paper are in Canadian dollars, except where otherwise noted. For the assumptions underlying the analysis in this paper, see Appendix A.

Part A:

Technologies that benefit from industrial carbon pricing

The technologies analyzed in this section of the paper are covered by Canada's industrial carbon pricing systems and thus have the potential to benefit financially from generating credits or offsets from those pricing systems.

1. Blue hydrogen

FIGURE 1: Average gross revenue from policy sources for hypothetical 525,000tH2/year autothermal reforming project, 2025-2034 ($ per kg of hydrogen)

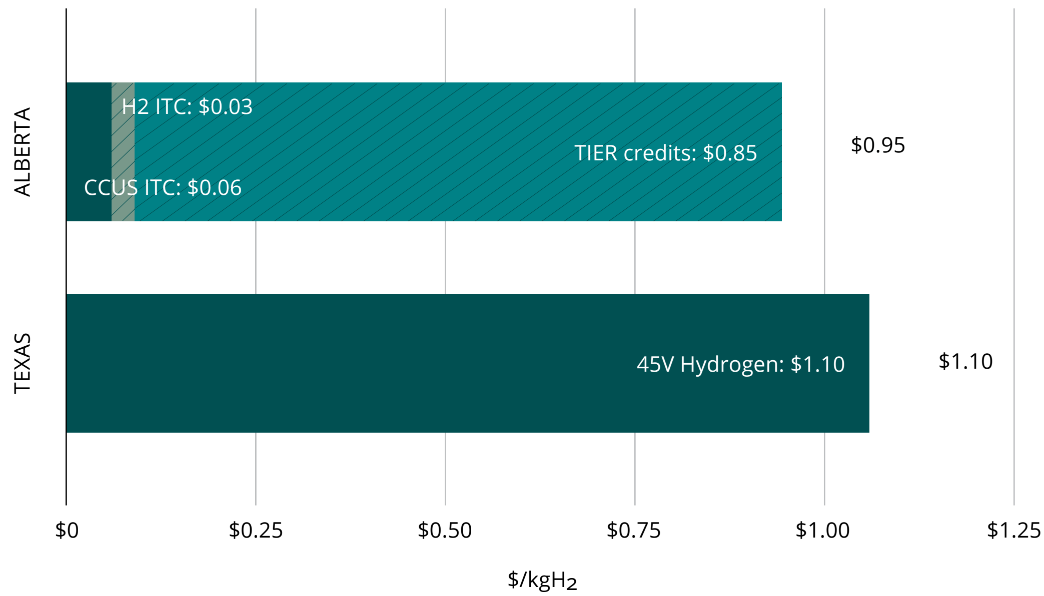


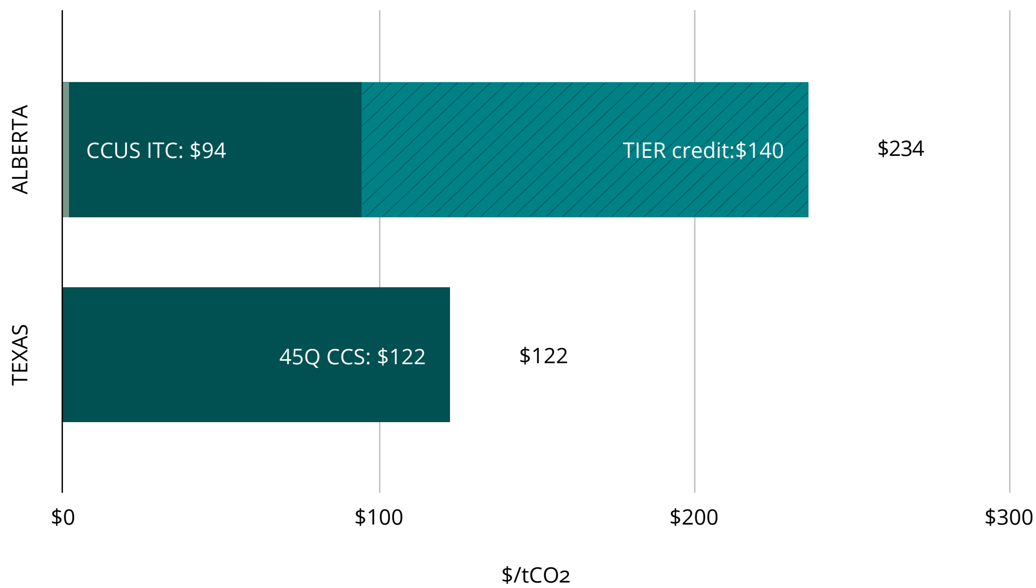
Figure 1 illustrates the gap between comparable facilities producing hydrogen via autothermal reformation in Texas and Alberta. Canada's carbon capture, utilisation and storage (CCUS) investment tax credit (ITC) is worth $0.06/kgH2 per year. **The bankable gap** between that amount and the IRA's 45V production tax credit (PTC) is **$1.04 per kilogram of hydrogen**. That would be worth almost $500 million a year to a facility producing 525 million kilograms of hydrogen annually.

Allowing Canadian producers to stack the hydrogen and CCUS ITCs would add another $0.03/kgH2 of revenue to the Alberta project (note: the US does not allow stacking of the corresponding 45V and 45Q production tax credits). If Alberta's Technology Innovation and Emission Reduction (TIER)[1] credits traded at 95% of the federal carbon price, this would deliver an additional average production tax credit equivalent of $0.85/kgH2 over the period 2025-2034, for a total of $0.95/kgH2.[2] This would nearly close the total incentive gap, putting Canada in a competitive position relative to the US.

[1] TIER is the Technology Innovation and Emissions Reduction Regulation, Alberta's industrial carbon-pricing system.
[2] Note that an earlier version of this paper calculated the TIER credit value at $0.96 under the assumption that carbon pricing continued to rise post 2030. In this version, we have assumed no growth in carbon pricing beyond 2030. Similar adjustments have been made in the other sections of the report.

2. Carbon capture and storage (CCS)

FIGURE 2: Average gross revenue from policy sources for hypothetical 1 $MtCO_2$ Cement CCS project, 2025-2034 ($ per tonne of captured CO_2)[3]



The **bankable gap** for proponents of equivalent 1 $MtCO_2$ CCS projects attached to cement plants in Alberta and Texas is **$28/$tCO_2$** on average over a 10-year period (Figure 2). That's **23% less** in Alberta. These figures are unchanged following Budget 2023.

If we consider **total incentives**, average revenue per tonne of captured CO_2 in Alberta could be nearly twice as high in Alberta ($234/$tCO_2$) relative to a comparable facility in Texas ($122/$tCO_2$). But this additional revenue is uncertain. It would require continued increases to the federal carbon price beyond 2030, and a TIER system where demand for credits consistently exceeds supply.

[3] Includes a negligible $2/$tCO_2$ for avoided compliance costs in Alberta, unlabelled in the figure.

The **bankable gap** *would be much wider for eastern provinces*. Only projects in British Columbia, Alberta and Saskatchewan currently qualify for the CCUS ITC, leaving any hypothetical cement plant in Manitoba, Quebec, Ontario or Atlantic Canada ineligible.[4] The lack of transportation options and viable pore space for long-term carbon storage in Eastern Canada is a serious physical limitation for closing the **bankable gap** for CCS across heavy industry. Any carbon capture projects in Eastern Canada will likely be forced to rely on utilization rather than storage.

[4] Only three of Canada's 15 integrated cement plants are located in Western Canada. The rest are ineligible for the CCUS ITC.

3. Direct air capture (DAC)

FIGURE 3: Average gross revenue from policy sources for hypothetical 1 $MtCO_2$ DAC project, 2025-2034 (\$ per tonne of captured CO_2)

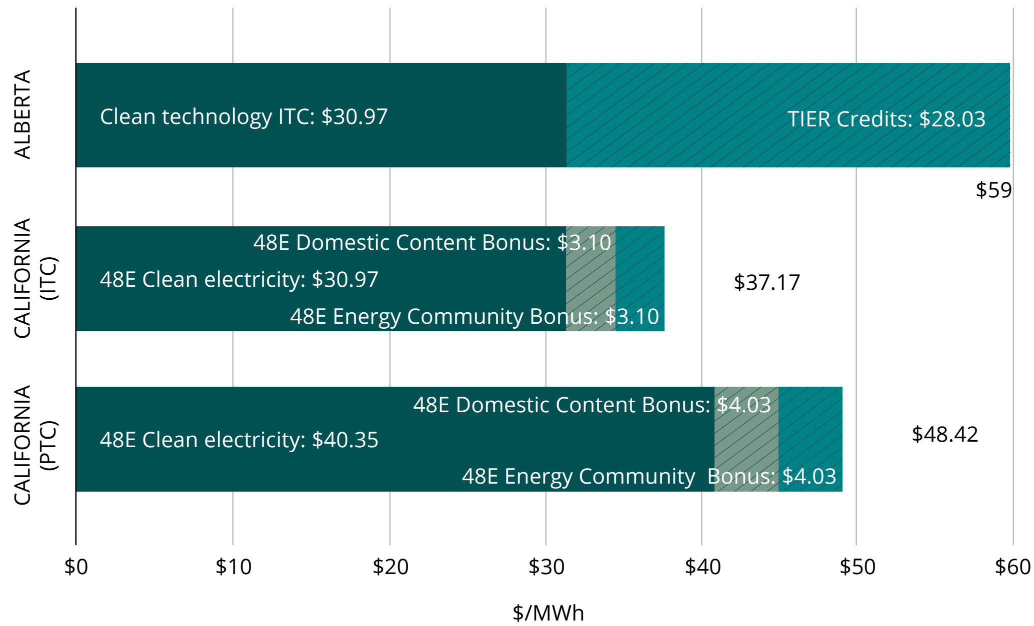
The bankable gap for proponents of the same 1 $MtCO_2$ DAC project in Alberta and Texas is **\$99/tCO_2** on average over a 10-year period. That's **38% less** revenue per tonne in Alberta versus Texas. There is no change to the bankable gap following Budget 2023.

Even when we consider the **total incentive gap**—which assumes a best-case scenario for Canada in which Alberta TIER credits traded at 95% of the federal carbon price—the average revenue per tonne of captured CO_2 is still **15% lower** for a DAC plant in Alberta (\$299/tCO_2) compared to the same plant in Texas (\$352/tCO_2), a gap of **\$53/tCO_2**.[5] The Texas figures include an estimated value of credits available via the California Low-Carbon Fuel Standard (LCFS).

[5] Fuels produced from captured carbon would be eligible for CC1 credits under the federal Clean Fuel Regulations, but this is not likely to be an economically viable choice for DAC operations in the near term.

4. Solar

FIGURE 4: Average gross revenue from policy sources for a hypothetical 300 MW solar energy project, 2025-2034 ($ per MWh of electricity generated)



The dramatic declines in solar development costs over the last decade plus make solar energy an attractive investment in many parts of Canada, even before incentives such as Canada's ITC and the US PTC. Although we do find an incentive gap with the US, as explained below, we do not believe this gap will materially compromise the attractiveness of new solar power projects in Canada. However, this gap could become a concern if solar is used as an input for new investments in downstream production (e.g. solar-powered hydrogen production).

For proponents of the same hypothetical 300 MW solar project, Canada's Clean Technology ITC is worth $30.97/MWh, while the US's 45Y Clean Electricity PTC is worth $40.35/MWh.[6] This creates a **bankable gap** of **$9.38/MWh**. While the IRA offers producers the flexibility to choose between an ITC and a 10-year PTC, the PTC is more attractive than the ITC for a commercial solar project in almost all circumstances.

The IRA offers a 10% bonus credit for projects that satisfy domestic content

[6] We assume these projects meet all labour and prevailing wage requirements in both jurisdictions. Canada's credit rate is reduced by 10% if labour and prevailing wage requirements are not met.

requirements, and an additional 10% bonus credit for projects that are located in "energy communities".[7] These are available for both the ITC and the PTC and are shown in Figure 4 for illustration. The domestic content bonus would gain bankability over time as American supply chains reconfigure, but the energy community bonus is all or nothing, depending on where the project is sited.

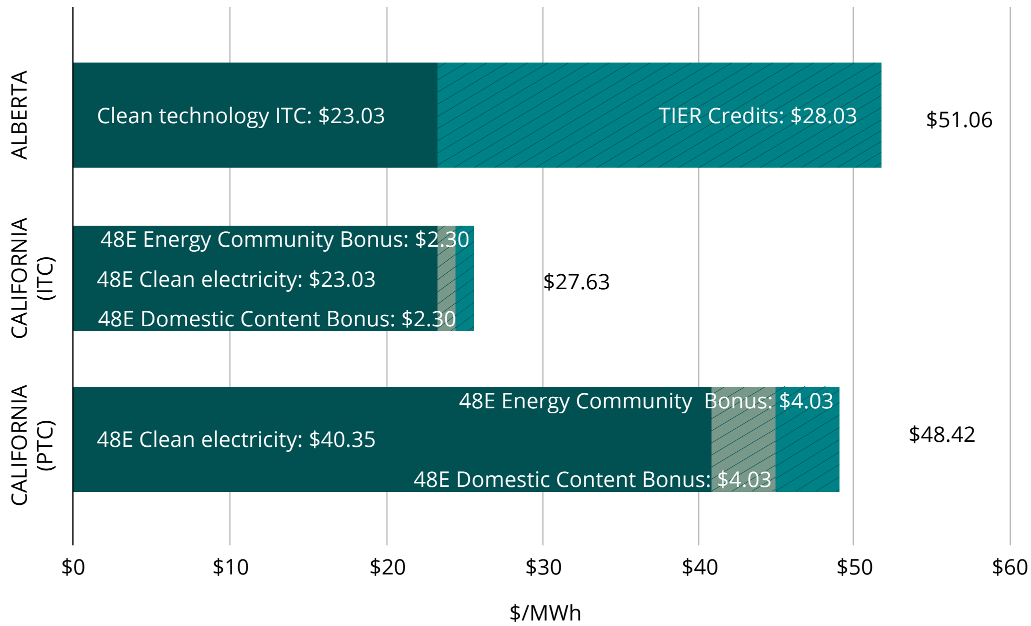
If the long-term value of TIER credits were guaranteed, it could open up a **bankable advantage** of **$10.58/MWh** for Alberta-based projects, even when factoring in bonus credits on offer in the US.

Beyond the **bankable gap**, other factors make California a more favourable investment destination than Alberta.[8] We assume a capacity factor of 22% for both projects, but California's solar resources are much higher quality than Alberta's. Sacramento, the state's northernmost major city, averages 3,470 hours of sunshine per year; Medicine Hat — the sunniest city in Canada — averages 2,544 hours of sunshine per year. Electricity prices are dynamic in both jurisdictions, but California prices are generally higher. Average wholesale electricity prices in Alberta were $101/MWh in 2021 and $162/MWh in 2022, which are unusually high compared to historical norms. Monthly wholesale prices in California typically return US$100/MWh, with prices occasionally exceeding US$300/MWh.

[7] Energy communities include brownfields or any census tracts where a 1) coal-fired facility closed since 2010, or 2) coal mine closed since 2000.
[8] A 22% capacity factor is the high end of the range for an Alberta project but very conservative for California, where solar capacity factors average 28%.

5. Wind

FIGURE 5: Average gross revenue from policy sources for a hypothetical 300 MW wind energy project, 2025-2034 ($ per MWh of electricity generated)



Although the incentives for wind are the same as solar, it is worth analysing wind separately because it has a unique cost structure. In Alberta, wind projects have lower capex costs than solar projects.[9] This results in a higher bankable gap between the US production tax credit and the Canadian investment tax credit. Wind projects have **a bankable gap** of **$17.32/MWh**, rising to **$25.38/MWh** if the US project is in an energy community and meets domestic content bonuses. If TIER revenues are factored in, then Canadian gross revenues are competitive with the IRA PTC (a **bankable advantage** of **$2.64/MWh**).

[9] We used the data on capex per MW provided by Alberta Major Projects: https://majorprojects.alberta.ca/#/?type=Power_Wind,Power_Solar&includeNoEstimates=1

Part B:

Technologies that do not benefit from industrial carbon pricing

The technologies analyzed in this section of the paper are either not covered by industrial carbon pricing systems and thus would not benefit financially from generating credits or offsets, or their qualification varies by provincial/territorial system. For example, it is unclear whether first-of-a-kind projects like industrial green hydrogen production will be covered by certain industrial carbon pricing systems—particularly if the project proponent has no other emitting assets covered by that system (see Appendix B).

6. Green hydrogen

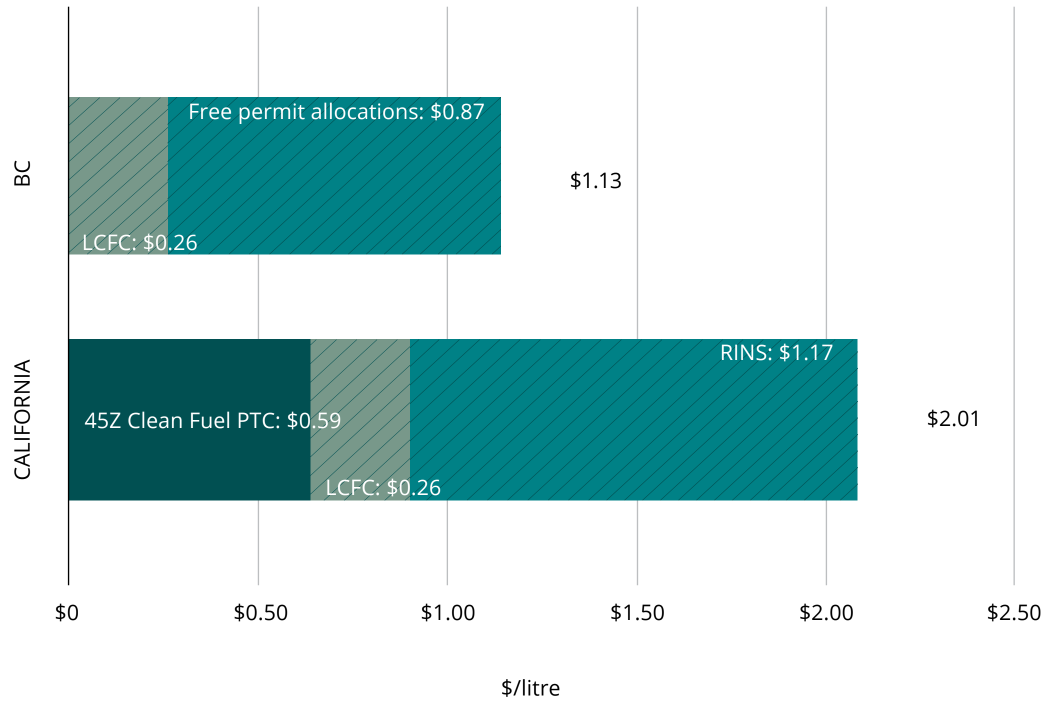
FIGURE 6: Average gross revenue from policy and other sources for hypothetical 300,000tH2/year green hydrogen project, 2025-2034 ($ per kg of hydrogen)

Our analysis compares policy-source revenue earned by hypothetical green-hydrogen plants in Quebec and New York.[10] The IRA's 45V clean-hydrogen PTC is worth \$4.40/kgH2 per year over 10 years. Canada's ITC delivers \$0.31/kgH2 in this project. Sites with existing obligations under Quebec's cap-and-trade system could also receive free allocation of emission units worth \$0.32/kgH2. However, many greenfield projects would not be eligible for this revenue source. Thus, for new investments, the **bankable gap** is **\$4.09/kgH2**.

[10] Hydrogen is currently expensive and inefficient to transport over longer distances, so North American markets are likely to be regional. A project considering setting up in Quebec would more likely view New York or other nearby northeast states, rather than California, as alternatives.

7. Sustainable aviation fuel (SAF)

FIGURE 7: Bankable revenue from government sources for hypothetical gasification with forest residues project, 150 million litres/year, 2023-2032
($ per litre of SAF produced)

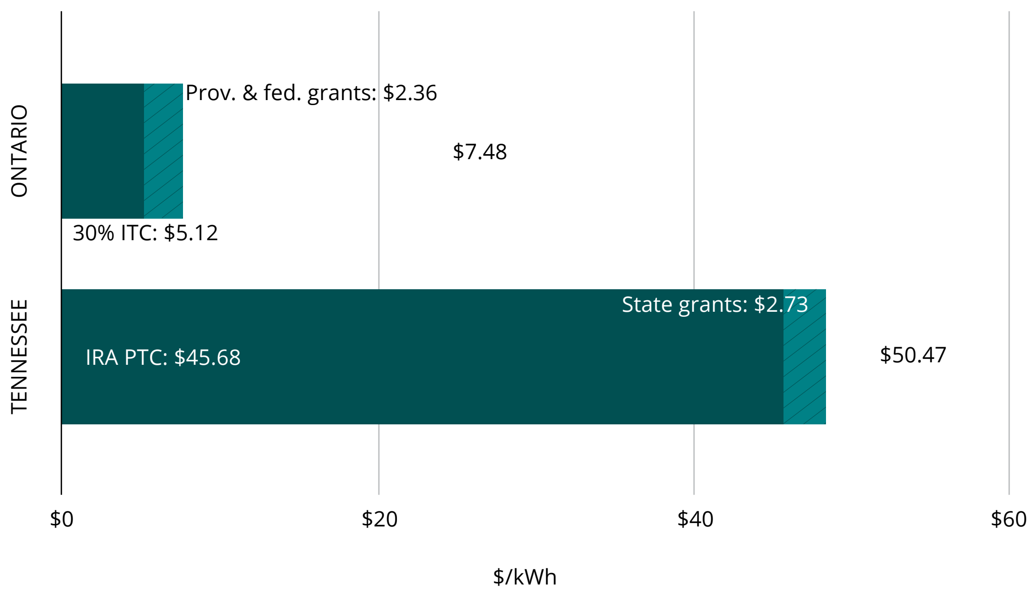


Considering comparable projects producing sustainable aviation fuel in California and BC, the **bankable gap** is equal to the value of US production tax credits for SAF, which total $0.58 per litre over the first five years. Since Congress only authorized the credit for five years, the 10-year average bankable gap would decline to $0.29 per litre.

It is difficult to calculate the total incentive gap for SAF because Canadian fuel-standard markets (British Columbia's low carbon fuel standard and the national Clean Fuel Regulations) are not mature. Even if we make optimistic assumptions about the prices in those markets, revenue from California low-carbon fuel standard and RINs credits increases the **total incentive gap** to an average of $0.61 per litre for the 10-year period 2023-2032—even if we assume that the US tax credits are not extended.

8. Battery manufacturing

FIGURE 8: Average gross revenue from policy sources for 45 GWh/year hypothetical battery production facilities, 2024-2033 ($ per kWh of battery capacity produced)



Section 45X of the IRA contains a list of 13 targeted manufacturing production tax credits. One of the most striking is a US$35/kWh incentive for battery cells and a US$10/kWh incentive for modules. This benefit is reduced by 25% per year beginning in 2030. The Made-in-Canada Plan included a 30% ITC for batteries that runs from 2024 to 2034 (11 years).

The impact of these two credits is that a combined cell and module manufacturing plant in Ontario, for example, would have a **bankable gap** compared to a similar plant in Tennessee of **$40.36/kWh** between 2024 and 2034. For a factory with a $5.58 billion capital cost and producing 45 GWh of battery capacity per year between 2024 and 2034, the IRA's PTCs would generate a **total benefit** of approximately C$19.3 billion, or approximately C$1.76 billion on average per year over the nine years (2024-2032) of its IRA-eligible operating window.[11]

In contrast, a 30% ITC for the same plant in Canada would generate a **total benefit** of approximately C$1.68 billion, or approximately $152.3 million per year if spread evenly over the 11 years (2024-2034) of its Canadian ITC-eligible window.

The gap between the Canadian and American jurisdictions remains relatively similar after estimates of Canadian federal and provincial grants, and US state grants are factored into the analysis of the **total incentive gap**. For example, government grants and direct incentives were similar for the **Stellantis plant in Windsor** and the Ford **Blue Oval City plant in Tennessee**.

The Government of Canada **recently announced** that it would spend up to $13 billion to match the IRA incentives for a Volkswagen (VW) battery factory in St. Thomas, Ontario. Our analysis can help make sense of that number. Table 1 presents one way to arrive at the $13bn valuation.

The IRA's credit is indexed to production of kWh of cells and modules. VW has **stated** that the St. Thomas facility will have the potential for up to 90 GWh. This would make it VW's largest facility in the world. VW's current facilities are **designed** as 40 GWh facilities. If we assume that the facility will begin producing in 2027 at 40 GWh, only ramping up to 90 GWh in 2031, the estimated cost of matching the IRA's credits for both cells and modules is just over $13 billion.[12]

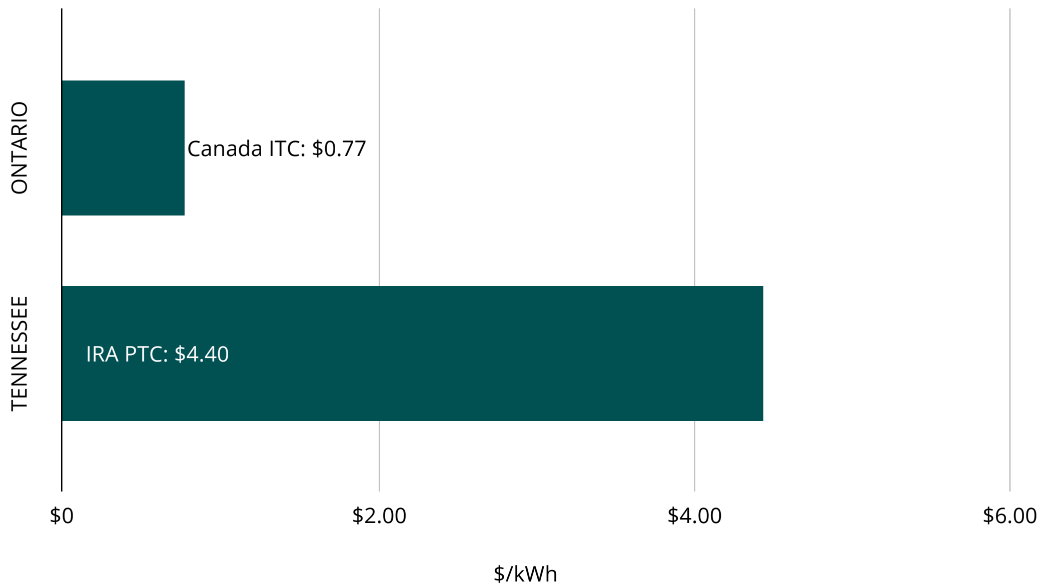
TABLE 1. Potential battery factory incentives under the IRA:

	2027	2028	2029	2030	2031	2032	TOTAL
Production (GWh)	40	40	40	40	90	90	340
Credit Value	100%	100%	100%	75%	50%	25%	
Cells (PTC: $46.90)	$1.88B	$1.88B	$1.88B	$1.41B	$2.11B	$1.06B	$10.2B
Modules (PTC: $13.40)	$536M	$536M	$536M	$402M	$603M	$302M	$2,915M
TOTAL	**$2.41B**	**$2.41B**	**$2.41B**	**$1.81B**	**$2.71B**	**$1.36B**	**$13.1B**

[11] This model assumes that output is 55% (25GWh) of maximum annual capacity (45GWh) for the first year of production (2024)
[12] Based on these calculations, we would expect a similar package of incentives to Stellantis for its planned facility in Windsor to generate incentives in the range of $19 billion.

9. Battery active materials

FIGURE 9: Average gross revenue from policy sources for a hypothetical cathode active material facility producing enough material for 75GWh of batteries, 2025-2032 (C$ per kWh of battery capacity produced)



The IRA's advanced manufacturing tax credits also cover critical minerals (10% of production costs) and electrode active materials (10% of production costs).[13] The latter credit covers cathode active materials (see Figure 9), anode active materials, electrolyte salts, and more.

[13] Credit values here rely on cost estimates. We take the US Department of Energy's average pack price ($153/kWh) and calculate cathode and anode cost based on International Energy Agency estimates of the share of the battery pack, reduced by standard internal rates of return to convert prices to costs. Production costs for mining credits are estimated directly from preliminary engineering assessments for US mining projects.

The 2023 federal budget establishes an ITC for critical minerals and battery materials worth 30% of all capital expenditure. One critical battery material is cathode active material.Canada has already staked out a key position in the North American cathode active material market and is seeking to become a supplier of choice.[14] However, even after these measures, there remains a significant bankable gap of **$3.63/kWh.**[15]

[14] On March 31, 2023 the US Treasury released proposed guidance that categorized cathode as a critical mineral, rather than a battery component, for the purposes of calculating eligibility for the consumer incentives. The consumer incentive has two parts worth $3750 each. The first part requires that 50% of components (rising 10% per year to 100% by 2029) be sourced from North America. The second part requires that 40% of critical minerals (rising 10% a year to 80% by 2027) are sourced from North America or free-trade partners. This opens up the consumer credit to non-North American cathode producers that have a free trade agreement (namely Japan and Korea), thereby reducing the value of Canadian processed minerals.

[15] This report estimates the US PTC incentive at $5.41 per kWh, up from $5.25 per kWh in the previous version, due to changes in the exchange used to estimate costs.

10. Critical minerals production

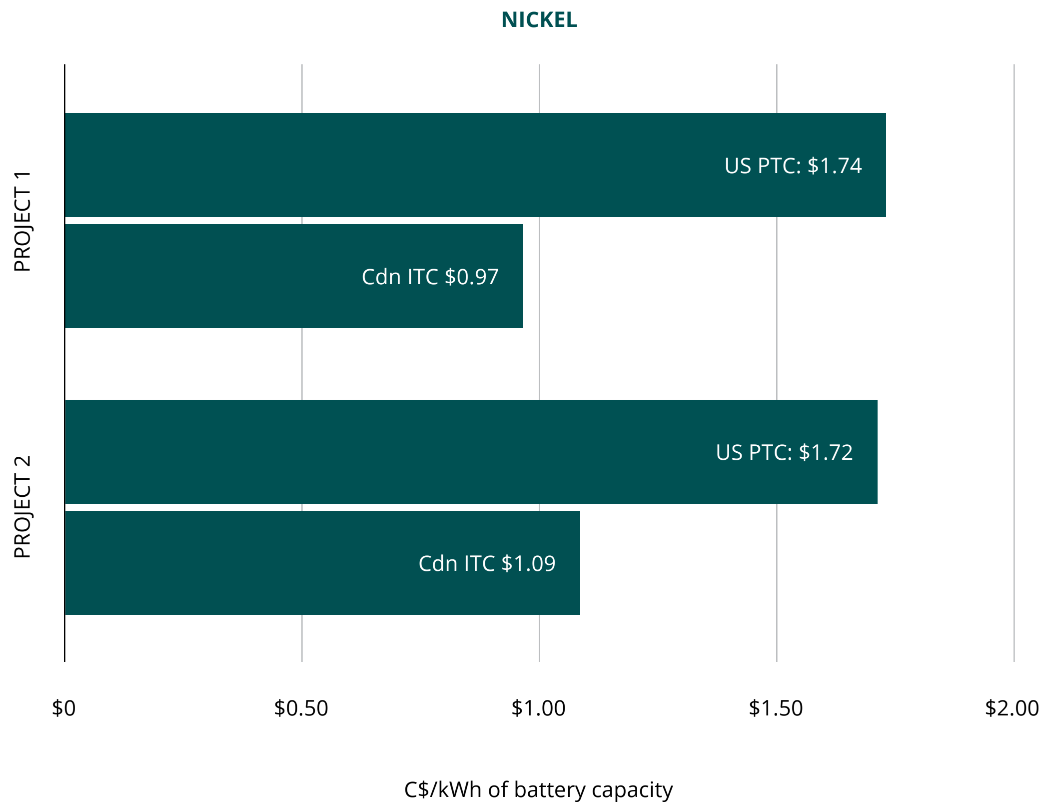
The 2023 federal budget included a 30% ITC for critical minerals. The IRA 45X manufacturing incentives included a PTC worth 10% of production costs. How do these compare? We compared the value of these credits for lithium, nickel, and graphite projects. To estimate costs, we used preliminary economic assessments for projects in development. Since costs vary widely, we look at two projects for each metal.

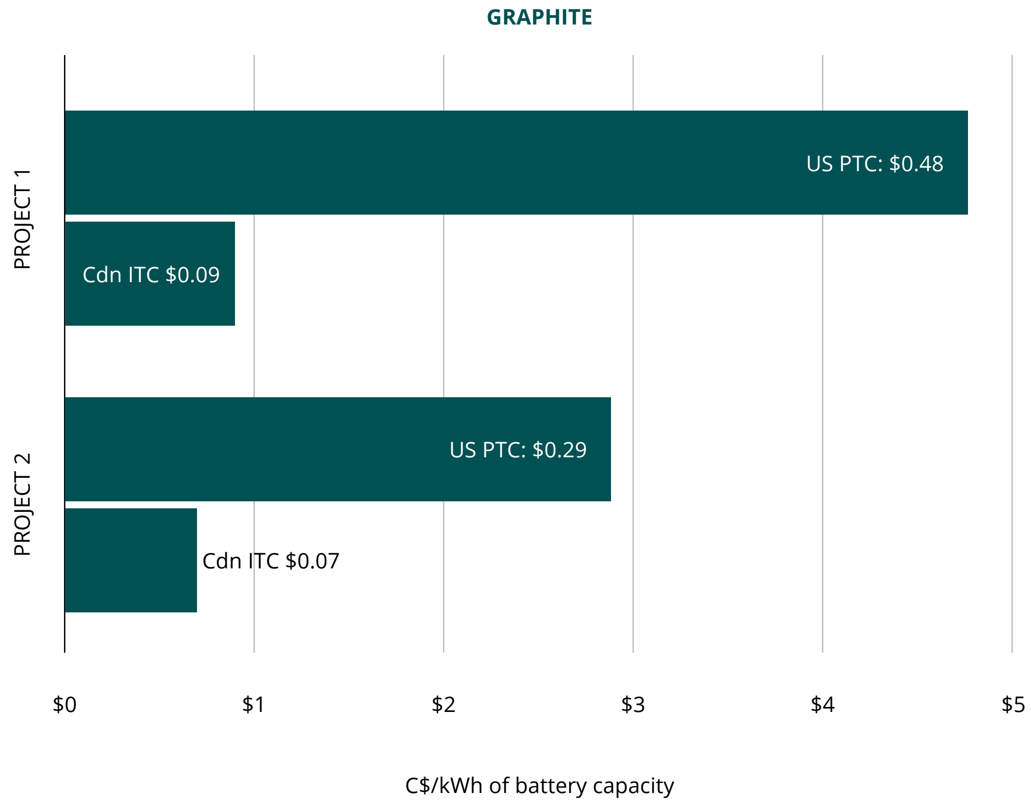
Across these sample projects (Figure 10), there are substantial bankable gaps between the IRA's mining incentives and the 2023 federal budget's mining ITC. For example, the figures under the "Project 1" nickel mine from Figure 10 show a **bankable gap** of **$0.77/kWh**. This incentive gap would translate into an estimated $700 million in lost incentives by locating this mine in Canada. There are substantial bankable gaps in nickel and graphite, but Canada's ITC is almost competitive for lithium.

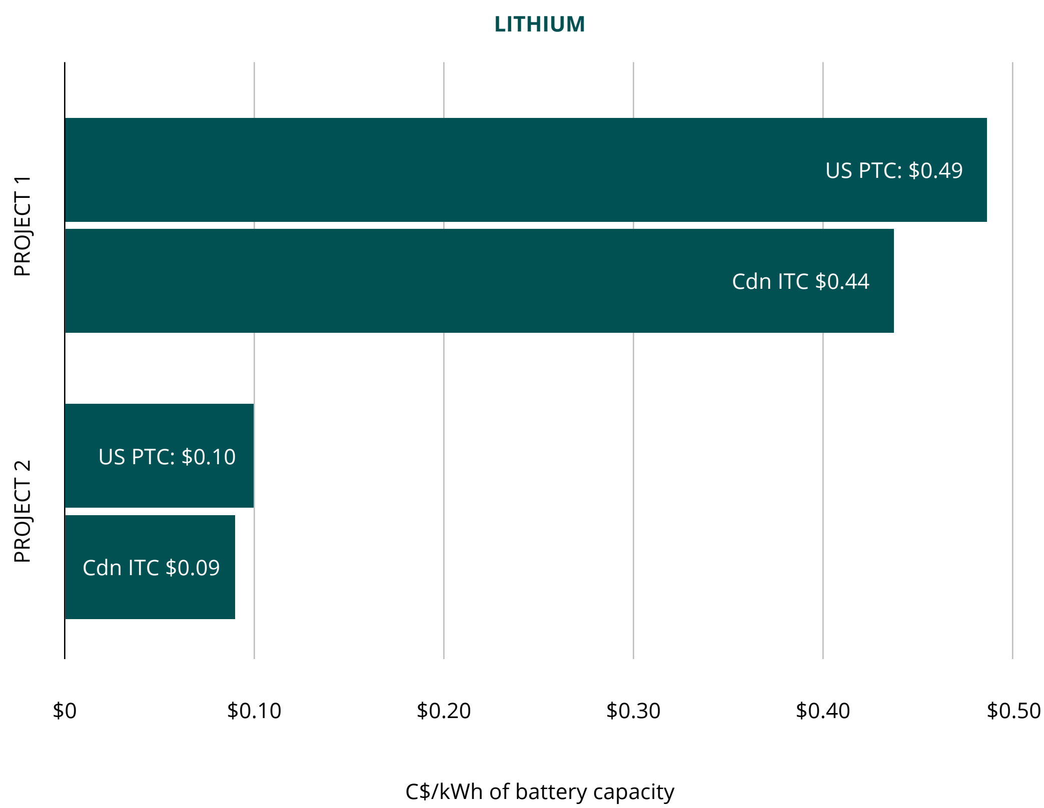
The bankable gaps are driven by the fact that Budget 2023's language suggests that only the capital expenditure (capex) itself will be eligible for the ITC. This excludes financing costs on the capex, which are considerable. Canada could make the ITC here, and in other areas, more competitive by allowing financing costs to be included in the full capex cost.

If these mines were not developed, Canada would forgo a major source of revenue. A large nickel project could generate $1.1 billion a year while a moderate lithium project could generate $400 million a year.

FIGURE 10: Annual production tax credits and ITC equivalents for mining projects in Canada and the US for three critical minerals (C$ per kWh of battery capacity produced)




GRAPHITE
PROJECT 1
US PTC: $0.48
Cdn ITC $0.09
PROJECT 2
US PTC: $0.29
Cdn ITC $0.07
$0
$1
$2
$3
$4
$5
C$/kWh of battery capacity


LITHIUM
PROJECT 1
US PTC: $0.49
Cdn ITC $0.44
PROJECT 2
US PTC: $0.10
Cdn ITC $0.09
$0
$0.10
$0.20
$0.30
$0.40
$0.50
C$/kWh of battery capacity

Conclusion:

Policy should close the bankable gap and open up strategic bankable advantages

The federal government should pursue two important actions in the near-term to help create a Canadian advantage in priority sectors.

First, policymakers should immediately provide greater certainty about the future value of carbon credits and offsets within industrial pricing systems, such as Alberta's TIER market. This would narrow the bankable gap across many of the sectors and technologies discussed in this working paper. In CCS for cement, solar and wind power generation, guaranteeing the future value of carbon credits could even create a bankable advantage for Alberta-based projects, versus similar projects in the United States. In the case of blue hydrogen, guaranteeing the future value of carbon credits would substantially narrow the bankable gap.

We recommend that the government act through a broad program of carbon contracts for difference (CCfDs), or through forward purchases of carbon credits. Either option can provide a bankable signal to low-carbon project proponents, providing them the assurance they need to proceed with projects that will be in operation for decades. Furthermore, if designed effectively, these policy options impose no net financial cost on the government beyond the time and efforts of the public service.

We are encouraged that the federal government announced in the 2023 federal budget an intention to consult on a broad-based program of CCfDs. We encourage the government to move swiftly to begin consultations, and design and implement such a program by the 2023 Fall Economic Statement.

Second, building on the Made-in-Canada plan announced in the 2023 federal budget, policymakers should develop sector-specific strategies for high-priority opportunity areas as part of a broader industrial strategy. An effective strategy for priority sectors would include clear targets, granular analysis of the economic opportunities and challenges, and mechanisms for effective coordination between governments and the private sector. Combined with greater confidence in carbon markets, prudent use of PTCs and other tools could create a bankable *advantage* for Canada in these strategic sectors. Clear sectoral targets and initial strategy documents should be prepared by the Fall Economic Statement, with an eye to making concrete policy changes by the 2024 federal budget.

Recommendation 1: Narrow the bankable gap by making existing carbon pricing revenues bankable

Project proponents currently lack confidence that provincial carbon markets will be sufficiently stringent to support credit prices at levels close to the headline federal carbon price. Based solely on the expectation of softening demand for credits, proponents may choose not to proceed with the decarbonization projects needed to meet Canada's 2030 emissions target. **Clean Prosperity's analysis** indicates that there is significant risk of credit/offset oversupply in carbon markets prior to the 2027 midterm program review. Ensuring that credit prices rise in step with the headline carbon price will narrow the bankable gap for low-carbon projects across a wide range of sectors and technologies.

Policymakers have a short window of opportunity to provide a systematic, economy-wide signal about the future value of carbon credits. Dozens of industrial decarbonization projects yet to be built will be essential to reach Canada's 2030 target. In order to be operational by 2030, many of these projects realistically require final investment decisions within the next 18 months.

In Budget 2023, the federal government announced an intention to consult on a broad-based program of contracts for difference. We recommend the federal government move swiftly to finalize and roll out such a program by the 2023 Fall Economic Statement.

Through this program, the federal government should sign long-term CCfDs (e.g., 15 years) with low-carbon project proponents, at an agreed strike price. The government should commit to pay the project proponent the difference between that strike price and a market reference price (i.e., the average price of credits/offsets in a given year) if the market price fell below the strike price. In the opposite case, the project proponent would pay the difference to the government.

For example, if the average price of credits/offsets sold in the Alberta industrial-emitter system in 2025 was $80 and the federal government had signed a contract with an emitter at a strike price of $85 in 2025, then the government would pay out $5 per credit. If the average price of credits/offsets was $90 in 2025, the counterparty would owe the government $5 per credit.

The federal government could also consider administering CCfDs through a reverse auction mechanism, though this would reduce the upfront certainty provided to project proponents.[16]

Currently, industrial pricing systems in Canada do not collect or publish information about credit/offset sale values. Publishing this information would be a prerequisite to signing CCfDs. We recommend a voluntary program that incentivizes the provinces to act based on the prospect that their companies and economies will benefit from accessing these contracts for difference.

An alternative to contracts for difference—which would achieve the same result—is for government to use forward purchase agreements. Through forward purchase agreements, the federal government would enter into long-term contracts (i.e., at least 15 years) to purchase credits and/or offsets from industrial emitters and/or offset generators. This mechanism would help absorb surplus credits and ensure that a price floor is maintained. These credits could then be sold back into the market at a later date with the potential for profit (they could also be retired at significant cost).[17]

[16] Reverse auction of contracts would enable price discovery and reduce economic inefficiencies. However, reverse auctions would likely need to be designed sector by sector.
[17] Clean Prosperity has studied design considerations for backstopping carbon-credit markets in greater depth. A paper detailing the findings is available on request.

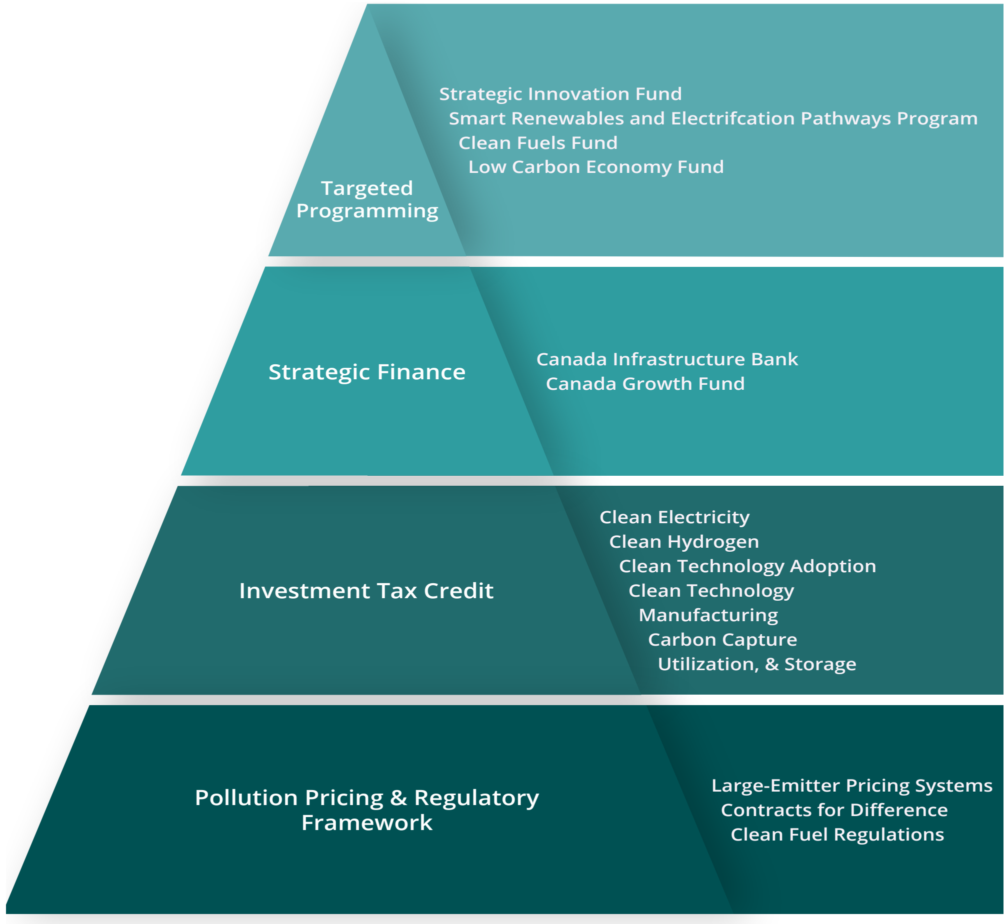
Recommendation 2: Close the bankable gap in priority sectors with targeted supports that are part of a broader industrial strategy

The second recommendation is that the government work to design processes and policy tools that operate as targeted supports in priority sectors. As this analysis shows, even after the new tax credits announced in the 2023 federal budget, a bankable gap remains in a number of strategically important sectors (hydrogen, biofuels, and CCS). Canada lacks the fiscal firepower to compete dollar for dollar with the United States on PTCs. But even if it could, it might not make sense for Canada to simply copy US industrial policy.

To achieve the federal government's stated objective of creating a "**level playing field**", Canada would be better off developing its own industrial strategy that matches incentives in high-priority areas, concedes a disadvantage in others, and seeks to open up bankable advantages in areas not covered by the IRA. Indeed, one of Canada's advantages over the US is its ability to legislate multiple times. It can deploy an active and adaptable strategy, whereas a divided government in the U.S. limits its ability to update its plan.

The Made-in-Canada plan in the 2023 federal budget recognizes the need to align existing tools in priority sectors. The Plan's pyramid argues, in line with the framework offered in this analysis, that carbon pricing mechanisms, tax credits, and direct financing tools like loans and CCfDs should work together (Figure 11). This is an appropriate approach. The Plan is a clear step in the right direction toward an industrial strategy that aligns the government's policy tools. But the plan needs to be supplemented with a series of additional actions in strategic sectors.

FIGURE 11: Strategy and main tools in Canada's plan for a clean economy (Budget 2023)



Source: [2023 Federal Budget, Chapter 3]

This enhanced approach would begin by identifying high-priority opportunity areas: industries where Canada can compete globally and which could produce significant economic benefits in the form of good jobs and manufacturing value added. Many of the opportunities analysed here are good candidates: battery materials, green hydrogen, SAF, and critical minerals all need strategic attention.[18] For these high-potential industries, the data in this working paper can be used to highlight if and where additional economic support—beyond the contracts for difference recommended above—are merited.

However, industrial policy is not exhausted by tax credits and contracts for difference. Modern industrial policy is also about developing targets, detailed analysis, and setting up processes for strategic collaboration between government and industry in priority sectors.

[18] Allan, B., Eaton, D., Goldman, J., Islam, A., Augustine, T., Elgie, S., and Meadowcroft, J. (2022). Canada's Future in a Net-Zero World: Securing Canada's Place in the Global Green Economy. Smart Prosperity Institute, Transition Accelerator and Pacific Institute for Climate Solutions. https://transitionaccelerator.ca/canadas-future-in-a-net-zero-world/

Targets are needed to create focus, set out clear objectives, and guide policy decisions. Such targets must be developed in close collaboration with industry. Industrial policy targets complement greenhouse gas emissions reductions targets, and must be concrete economic goals that help guide real world deployment.

The government also needs good analysis of the opportunities and market conditions in priority sectors. This analysis must be done for each specific sector, as the needs of each sector are unique, and are affected by different sets of policy tools. As the complexity of the analysis reviewed here suggests, it takes careful work in the sectors to get things right. This work is best done in collaboration with the private sector.

Collaboration ensures that there are good flows of information between the government and industry. This allows the government to develop a press strategy with clear market knowledge and provide clarity for industry on the direction and intention of policy. Such collaborations are best mediated by independent expertise that can provide deep analytics and provide candid advice to both government and industry.

Previous efforts, such as the Industrial Strategy Tables, as well as current efforts, like the Regional Energy and Resource Tables, are good avenues for these conversations. Such initiatives should be made a political priority and given the time and resources needed to succeed. If they are elevated in this way, they can be used as vehicles to solve difficult problems together. A well-designed and executed industrial policy process helps to share strategic and financial responsibility with provinces, territories, Indigenous communities, industry, and other stakeholders. It is this broad mobilization that we need to create a Canadian Advantage, delivering both economic and environmental benefits.

Appendix A:

Modelling assumptions

This appendix outlines the major assumptions made in modelling the incentive gaps for low-carbon technology between Canada and the United States; however it is not an exhaustive list. For questions about the modelling methodology, please contact the authors.

US policy incentives

- All models assume that the IRA's prevailing-wage and apprenticeship requirements are satisfied, in order to maximize the value of US tax credits. Bonus credits for domestic content requirements and energy community requirements are not satisfied unless explicitly noted.

- DAC: 45Q production tax credit (PTC): $240 per tonne of captured CO_2, increasing at the rate of inflation from 2026 onwards (bankable)DAC:

- DAC: California Low-Carbon Fuel Standard (LCFS) credits: current spot price of $87 per tonne of captured CO_2, assumed to increase at the rate of inflation (not bankable)

- Hydrogen: IRA 45V production tax credit (bankable)

- SAF: IRA SAF addition to the Blender's tax credit (2023-2024); Clean Fuels Production Credit (2025-2027) (bankable)

- SAF: California Low-Carbon Fuel Standard (LCFS) credits: current spot price of $87 per tonne of avoided CO_2, assumed to increase at the rate of inflation (not bankable)

- SAF: Renewable Identification Number credits (RINs) at current price, assumed to increase at the rate of inflation (not bankable)

- Batteries: IRA cell ($35/kWh), module ($10/kWh), electrode active materials (10% of costs), and critical minerals (10% of costs) production tax credits (bankable)

Canadian policy incentives

- All models assume that the prevailing-wage and apprenticeship requirements described in Budget 2023 are satisfied, in order to maximize the value of tax credits.
- DAC: Investment tax credit (ITC) for carbon capture and storage: 60% of capital costs for direct air capture projects (bankable)
- CCS: Investment tax credit (ITC) for carbon capture and storage: 50% of capital costs for direct air capture projects (bankable)
- DAC, CCS, Hydrogen: Offset carbon credits for sale within a provincial industrial carbon pricing system like Alberta's TIER (not bankable: too much uncertainty about future credit values)
- SAF: BC LCFS, prices benchmarked to California LCFS. Clean Fuels Regulation, prices estimated at industry standard $300 per tonne of CO_2 (not bankable).
- SAF: Assuming no fuel charge on the carbon-free portion of the fuel under the federal carbon pricing system in a 50% SAF blend jet fuel (as indicated **draft changes**; not bankable)

Other

- DAC, CCS, hydrogen, solar, wind, advanced manufacturing, critical minerals: Canadian ITC can be claimed starting in Year 1 and is amortized over 10 years to match the duration of the PTC. To enable more direct comparison with the US PTCs, the value of avoided interest is included across ITCs (capital cost of 7%).
- DAC, CCS, hydrogen: Carbon credit value assumes an average spread of 5% between credit prices and the headline federal carbon price (optimistic scenario).
- Solar: Carbon credit value assumes an average spread of 30% between credit prices and the headline federal carbon price (mid-range scenario).
- DAC, CCS, hydrogen, solar, wind: Canadian federal carbon price holds at $170 per tonne after 2030.

Appendix B:

Coverage and opt-in thresholds for industrial carbon markets in Canada

Each carbon market in Canada has different rules around coverage and opt-in thresholds, which may affect whether first-of-kind greenfield projects can participate in these markets. Details of coverage and opt-in thresholds in various Canadian jurisdictions are available **here**.

Appendix C:

Subnational incentives for low-carbon technology deployment

This working paper focuses on incentives that are available to project proponents at the federal level. A more comprehensive list of incentives available at the provincial and state levels for projects discussed is available **here**.