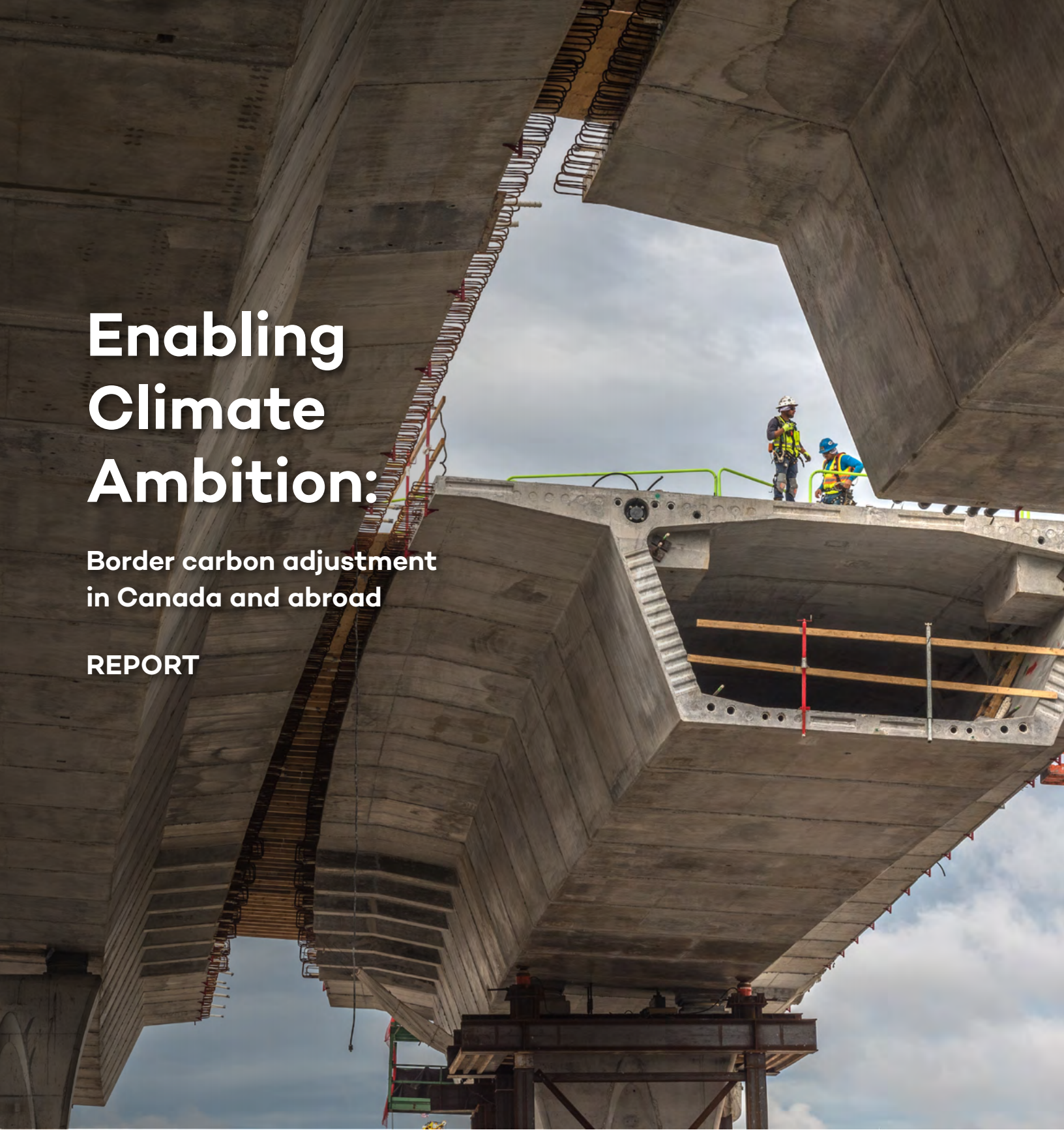

Enabling Climate Ambition:

Border carbon adjustment in Canada and abroad

REPORT

IISD International Institute for Sustainable Development

CLEAN PROSPERITY

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July 2021

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Written by Aaron Cosbey, Michael Bernstein, and Seton Stiebert.

Acknowledgements

The authors wish to express their deep gratitude to those that helped make this report possible. At various stages of the research we were fortunate enough to receive input from peer reviewers including: Catherine Cobden, Eddy Perez, Shuting Pomerleau, Matthew Porterfield, Katie Sullivan, Stewart Trew, and Todd Tucker.

The report was made possible by the generous support of Clean Prosperity and the Chisholm Thomson Family Foundation.

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Executive Summary

Introduction

As climate ambition ramps up in Canada and around the world, one of the key challenges governments face is how to impose meaningful carbon prices on domestic industries when not all trading partners are similarly ambitious. In countries that are pursuing ambitious climate policies there has been increasing interest in an instrument that could help enable that ambition: border carbon adjustment (BCA).

Without BCA, there is a risk that strong domestic environmental policies in Canada will simply displace greenhouse gas (GHG) emissions to other countries, as unregulated foreign goods outcompete costlier Canadian ones. This is called leakage, and it is particularly problematic for a small group of sectors that are emissions-intensive and trade-exposed (EITE)—sectors such as steel, aluminum, petrochemicals, cement, nitrate fertilizers, and refined fuels.

Canada currently addresses leakage by requiring firms to pay only for emissions that exceed a sectorally-determined free allocation level, and granting them tradeable surplus credits for emissions below that level. But at some point along the path to net-zero, EITEs will have to experience more than the muted carbon price they're now subject to.

The combination of increasing climate ambition and concerns about leakage and competitiveness has sparked a growing international interest in BCA. The European Union has a mandate to implement a BCA system by 2023, and the United States, the United Kingdom, and Canada have all committed to exploring or implementing BCA. This paper explores what a Canadian BCA might look like, given our regulatory and economic circumstances, and how Canada might anticipate, respond to, and coordinate with similar regimes contemplated in the United States and the European Union.

We explore options for an instrument that is focused on leakage prevention, though BCA has also been discussed as a means to increase domestic firms' competitiveness, and to incentivize foreign producers and governments to reduce emissions. We are also guided by Canada's legal obligations under the World Trade Organization (WTO). That said, we do not aim for complete certainty that a Canadian BCA would comply with WTO law; such a BCA regime could be imagined, but it would have to sacrifice too much in terms of leakage protection.

The Shape of a Canadian BCA

The Policy Instrument Connected to a BCA

BCA is not an independent instrument; it is an add-on to climate policy that puts a cost on carbon. Its job is to ensure that the costs of that climate policy do not disadvantage regulated

domestic firms vis-à-vis less strictly regulated foreign firms. So what form of climate policy would a Canadian BCA accompany?

There are two different possibilities. A **tax-based BCA** would accompany a carbon tax, adjusting at the border to ensure that imports face the same charges as goods produced domestically. Legally, this would be like existing GST border adjustments. A r**egulation-based BCA** would accompany some climate-related regulation that puts a cost on carbon. It would simply be an extension of the internal regulation to also cover imports.

If a Canadian BCA were to accompany our existing climate regime, it would probably be designed to extend the output-based pricing system (OBPS) at the border. The OBPS is a regulation; it is the federal backstop regime for large emitters vulnerable to leakage, covering 11 sectors and 38 industrial activities.

There are a few complications to extending the OBPS to the border, including that the federal backstop doesn't apply in all provinces, though we argue that it is probably legally safe to use it as if it did. Another complication is that firms covered under the OBPS don't always pay the federal carbon price; they can also pay by using offsets, or credits they've bought from other firms. And output-based allocation means they only pay for emissions above their sectoral benchmarks. One way to address these complexities would be to treat foreign firms just like domestic ones: they would only be obliged to pay for carbon intensity above the sectoral benchmark, they could receive credit for lower GHG intensity, and they could participate in the buying and selling of credits. This kind of equivalent treatment would be complicated, but would go a long way to satisfying WTO non-discrimination requirements.

A second option for BCA design is as an accompaniment to a carbon tax, for example in the event that we transitioned the output-based pricing system to a full carbon tax on industry. In this case, the BCA would be an adjustment at the border, in the amount of the tax; non-discrimination would not be as big an issue. The key legal question would be whether a carbon tax could legally be adjusted in the same way we adjust value-added taxes like the GST. Some of the pros and cons of tax versus regulation-based BCAs are further described below.

Coverage of Trade Flows

If it were paired with a fully-priced carbon tax on industry, a Canadian BCA could legally rebate the carbon tax to exporters, meaning Canadian carbon costs would not render our exports uncompetitive in foreign markets. In contrast, one of the key challenges to a BCA accompanying a regulation like the OBPS is the fact that WTO law does not allow for rebates of the cost of these kinds of regulations. This would be a problem for many of the covered sectors in the OBPS; producers of crude oil and pulp and paper, for example, export more than 50% of their production.

Geographic Scope

Should a Canadian BCA exclude entire countries from coverage? It might, for example, exclude least developed countries, since they contributed very little to the climate crisis, and have limited means to address it. It might also exclude countries that Canada feels have sufficiently ambitious climate policies.

A least-developed country exemption might work, using a special WTO provision for poorer countries. A policy-based exemption very likely would not—it would violate core WTO non-discrimination provisions. Moreover, it would involve Canada making a unilateral determination of the adequacy of other countries' climate efforts, which would seem to be in conflict with the spirit of the Paris Agreement. Any national exemptions would also have to find a means to address illegal trans-shipment from non-exempt countries through exempt countries.

Sectoral Scope

A BCA should only cover those sectors at risk of leakage. Leakage is a particularly acute issue for sectors that are GHG-intensive—where carbon costs are high—and trade-exposed, meaning they can't pass those costs along to their customers or they will be undercut by competitors from jurisdictions with less climate ambition.

A Canadian BCA should probably cover the same sectors covered under the OBPS, especially if it aims to mirror the OBPS at the border. A challenge in setting the scope for any given sector is deciding how far down the value chain to stop the coverage. If steelmakers are covered but steel pipe makers are not, for example, this simply shifts the risk of leakage further down the value chain.

Emissions Scope

The OBPS only covers direct emissions—those emissions that are produced on site. It doesn't cover emissions embodied in purchased electricity; it doesn't need to, since electricity is one of the sectors covered by the OBPS. And it doesn't cover emissions embodied in input goods. For example when assessing the emissions from steel pipe making, it does not include the emissions embodied in the steel those pipes are made from—those emissions are counted at the level of steelmaking.

A BCA is supposed to only adjust for the costs of emissions covered by the domestic policy instrument it accompanies. But it could be argued that electricity costs are indirectly covered in the current OBPS system—i.e., a steel pipe maker might not directly pay carbon costs on electricity, but that electricity is regulated under the OBPS so carbon costs that utilities pay are likely passed on to steel pipe makers (and all other electricity customers). It could similarly be argued that BCA coverage should be extended to emissions embodied in the input goods that covered sectors buy. This is a complex determination, legally and environmentally, and is bound up with the entire discussion about scope of coverage. But if both those arguments prevailed, a

Canadian BCA would charge imports for emissions embodied in both the electricity and input goods used in their production.

Calculating Embedded Emissions

Goods that show up at the Canadian border probably wouldn't be forced to account for exactly how much carbon was emitted during their production; this would be unduly onerous. Instead, Canada should use a default value for foreign goods, for example, equivalent to the Canadian average GHG emissions intensity for that sector. To be fair to low-carbon producers, they could be offered the ability to challenge the default with third-party verified data.

Using the Canadian average would be looked on favourably by the WTO, but would offer less protection over time as Canada's industries decarbonized. Using a (presumably more GHG-intense) global average would be more punitive, and would offer better protection against leakage. But doing so would involve a risk that the BCA regime would be deemed unfairly discriminatory under WTO rules.

Crediting for Foreign Policies

If a foreign producer has been assessed a carbon price in its home country, a Canadian BCA should probably credit for that price, though it might be a complex calculation. What about foreign producers from a country that has ambitious climate policies but neither a carbon tax nor a regulatory price like an OBPS or a cap-and-trade scheme? These should not be credited. A BCA is an adjustment for a carbon price in the home country, so if we credit for non-price-based policies, we should also start charging an adjustment for the costs Canadian producers bear under non-price-based policies (which would be WTO-illegal). It would be a daunting challenge to calculate the price equivalent of regulations like, for example, environmental impact assessment requirements.

Use of Revenues

Whatever form a BCA takes, if it is effective it will almost certainly violate some WTO law and will need to be saved by exceptions in that law for environmental measures. One element that would be taken into account: where do the BCA revenues go? If the revenues go to Canadian firms to help them decarbonize, that doesn't help make the argument that the BCA is environmental; it looks more like protectionism. From a WTO legal perspective, giving the revenues to foreign countries to help them decarbonize would be best, and would help defray the impacts of the BCA on developing country exporters. But political reality probably dictates that the money will stay in Canada.

Canada's EITEs

We calculated the leakage potential of the sectors covered under the OBPS to see which sectors and activities are most at risk of leakage. Bitumen extraction faced by far the highest leakage risk, followed by pulp and paper, basic chemicals, synthetic crude oil, and conventional crude oil production. The 11 product categories we identified at highest risk of leakage comprise 34% of Canada's GHG emissions, and account for 18% of exports, but account for only 4.5% of Canada's total GDP.

While it would be useful to know how exposed Canada's sectors are to BCA in other countries, it is extremely difficult to compare Canadian and foreign emissions intensity in EITEs. For one thing, even when the data are available for other countries, they are at a highly aggregated level (e.g., chemicals and chemical products). Those sectoral averages mask all the important variations in GHG intensity among the many sub-categories of products. The few sectors we were able to compare to similar sectors in the European Union showed that, if foreign BCAs are designed to account for Canada's carbon pricing, many of our exports will not be significantly affected.

BCAs in the United States

The Biden administration has repeatedly called for an instrument like a BCA to accompany its climate ambition but, to date, there's been no indication that it is planning to implement anything that looks like a carbon price. So it is not clear what a U.S. BCA could look like, given that it is supposed to adjust for an internal carbon price (in the form of either a carbon tax or price-based regulation like the OBPS).

A few regulations might increase costs for U.S. EITEs: restrictions on oil and gas production, tougher standards for the petrochemicals sector, and a clean electricity standard. But, as noted above, adjusting at the border for the equivalent cost of non-price regulations is methodologically difficult and probably illegal under WTO law.

The U.S. might adopt low-carbon standards for goods like steel, which would also apply at the border and would probably be WTO-legal, but such a tool would not protect U.S. exports in foreign markets. The U.S. and Canada might find a collaborative way forward by harmonizing such standards.

Some in the U.S. have suggested the use of Section 232 tariffs, which assess a levy on imports based on national security grounds, arguing that climate change is a security threat. This would be a controversial use of an already-controversial tool.

If the U.S. does not ultimately find a way to enact a BCA, could Canada do so unilaterally, given our special economic and political relationship? While acting without our largest trading partner would be challenging, not acting comes with its own problems. It is hard to imagine Canada continuing to increase its climate ambition without effective policies to address leakage and competitiveness concerns, particularly in the event that the U.S. policies surveyed above do not

impose much in the way of carbon costs on U.S. producers. In a go-it-alone scenario, Canada would need to find ways to engage our American counterparts so as to reduce strain on the overall economic relationship.

The EU CBAM

The European Commission has proposed a BCA (called a carbon border adjustment mechanism, or CBAM) to come into force by 2023. It will likely be an extension of the European cap-and-trade scheme, with importers required to buy allowances on the same terms offered to domestic producers (but from a virtual pool of allowances). The CBAM is a central plank of a broader climate package that sees the European Union reducing its GHG emissions by 55% below 1990 levels by 2030—a highly ambitious goal.

The Commission is due to present a proposal for the CBAM in the summer of 2021, which will then be subject to negotiated agreement with the European Parliament and the European Council. As of this writing we do not know what the proposal will look like, but a widely circulated leaked draft of the proposal has it covering only five sectors in a two-year pilot phase. Key issues include the inability of the CBAM to protect exports, the question of whether to retain free allocation of allowances along with a CBAM (risking double protection), and whether to cover emissions from electricity (indirect emissions).

From Canada's perspective, there are three critical issues going forward:

- Ensuring that any CBAM is fairly elaborated, in ways that do not unduly penalize foreign producers (for example, by allowing challenges to the default values for embedded emissions in foreign goods, and crediting carbon pricing).
- The opportunity to work toward agreement with the European Union on principles and best practice in areas like calculating embodied emissions, setting benchmarks, and avoiding double protection.
- Preparing Canada's EITEs for the entry into force of the CBAM, with technical support and consultation.

Recommendations

Coordinate with key trade partners: Given the relatively small size of the Canadian economy and our reliance on trade with both the United States (in particular) and the European Union, Canada should collaborate closely with both of them, working to influence their policy development and looking for ways to coordinate approaches.

Consult broadly: It is essential that the federal government consult with industry and other stakeholder groups as it designs its policy, ensuring that the final result accounts for the various sectors' unique circumstances. They should also consult with provincial governments, as well as all major federal political parties.

Simplify where possible: A BCA involves many complex design choices. The need to satisfy a wide array of stakeholders will create the temptation to design bespoke rules for each industry, or even each trading partner. Where possible, that temptation should be resisted.

Future-proof the design: Any BCA should be designed to accommodate potential changes in the domestic carbon pricing system. In particular, the system should be designed to work both with the OBPS that exists today as well as the likely future scenario in which industrial emitters face the full carbon price in combination with a BCA.

Start now: Designing a BCA will take several years, and the carbon pricing regime that BCA would support is already moving ahead on its own ambitious timetable. Furthermore, the European Union is aiming to have its BCA in place by 2023, with international consultations starting in mid-2021. There is little time to waste.

Conclusions

Canada's climate ambition, with a net-zero target for 2050 and a roadmap to a significant carbon price, means that sooner or later we will have to grapple with how best to reduce emissions while avoiding leakage and maintaining competitiveness. BCA is one obvious choice for trying to meet these objectives.

A BCA is a powerful tool, but it is no silver bullet. This report aims to help policymakers be clear-eyed about the complex policy decisions that lie ahead in designing a BCA, and the importance of clarifying and balancing potentially competing objectives. Even the best-designed BCA should be seen as one tool in a suite of policies and measures that aim to prevent leakage and prevent competitiveness impacts. Depending on the policy objective, a BCA will need to be complemented by other policies to support competitiveness, such as government procurement, financial support, and investments in research, development, and deployment of low-carbon technologies and processes.

If Canada acts wisely, and coordinates with its international peers, it can help to accelerate the day when enough major economies have established domestic carbon pricing, or its equivalent, to make concerns about leakage and competitiveness insignificant. But in the meantime, Canada needs to both explore its own options for enabling high climate ambition, and be prepared for others to do the same.

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1.0 Introduction

The release of Canada's strengthened climate plan (Government of Canada, 2020b) in December 2020 marks the first time a Canadian government has laid out a credible plan for climate ambition.

As climate ambition ramps up in Canada and around the world, one of the key challenges governments face is how to impose meaningful carbon prices on domestic industries when not all trading partners are similarly ambitious. In countries that are pursuing ambitious climate policies there has been increasing interest in an instrument that could help enable that ambition: border carbon adjustment (BCA). At its simplest (and the analysis below makes it clear it is anything but simple), BCA levels the playing field by charging imports as if they had been subject to the same carbon pricing that domestic goods face in the implementing country. It can also involve rebating carbon pricing for exports.

Without BCA, there is a risk of leakage. Leakage is a phenomenon that undermines domestic environmental policies by simply displacing greenhouse gas (GHG) emissions to other countries, rather than reducing them overall. It can take several forms, but in the context of BCAs leakage involves three possible channels:

- Foreign firms facing lower effective carbon prices (and thus being more carbon-intense) taking domestic and global market share from domestic firms.
- Domestic firms relocating their operations to jurisdictions with lower effective carbon prices (and thus avoiding reducing emissions).
- Investment in new productive capacity being made by preference in jurisdictions with lower effective carbon prices.

Leakage is mostly a problem for a small group of sectors that are emissions-intensive and trade exposed (EITE)—sectors such as steel, aluminum, petrochemicals, cement, nitrate fertilizers, and refined fuels. Being energy-intensive, these sectors will be most directly affected by any sort of carbon pricing, absent any protection. And being highly traded, they will be limited in their ability to pass any increased costs on to their customers, since their international competitors can easily take their market share in their domestic and global markets.

To prevent carbon leakage, Canada's carbon pricing policy for EITEs currently includes output-based allocation. Explained in greater detail below, this involves requiring firms to pay for all emissions in excess of a sectorally-determined free allocation level, and being granted tradeable surplus credits for emissions below that level. The result is that firms still have incentives to reduce their emissions—to lower payments due from carbon pricing, and to gain more tradable surplus credits—but they are also sheltered from the full impacts of carbon pricing, and thus less vulnerable to the kind of competition that gives rise to leakage.

Such systems work well at moderate levels of climate ambition. The European Union, for example, has successfully used a similar sort of free allocation to shelter its EITEs through

three full phases of its emissions trading system, from 2005–2020 (see Section 6). But the pathway to net-zero by 2050 will eventually involve significant changes in how goods like steel, petrochemicals, and fertilizers are made, and the muting of the carbon price under output-based allocation will almost certainly make that price insufficient to motivate the necessary investment in R&D and new capital. At some point along the path to net-zero, EITEs will have to experience more than the muted carbon price they're now subject to.

Even under the existing regime, more significant carbon pricing will happen in the next 10 years. Canada's carbon price is set to rise from the current CAD 40/tonne to CAD 170/tonne by 2030. The per-unit cost of production increases that entails for the various EITEs will depend on their emissions profiles, but even at muted prices it will be significant for most, and will increase the risk of leakage and competitiveness impacts.

While leakage is a key motivator for BCAs—and the primary focus of this paper—there are other reasons that decision-makers might consider pursuing BCAs.

First, a BCA enables more ambitious domestic climate policy to decarbonize industry because it can reduce the economic impact on industry. Second, a BCA is a method for one country, or a bloc of countries, to incentivize other jurisdictions to adopt domestic carbon pricing. By enacting a border carbon adjustment in Country A on products being imported from any jurisdiction that doesn't have its own carbon price, Country A has now motivated Country B to adopt carbon pricing. After all, Country B would surely rather collect the money from their own businesses, instead of allowing that money to flow to Country A. Of course, among the challenges with this objective, using a BCA in this way risks creating significant adverse impacts for developing countries, who did little to contribute to the climate crisis and who have the least means by which to address it.

While more controversial than the objectives listed below, another motivation for some policymakers is to protect domestic industry and workers from foreign competition that they feel to be "unfair" for a variety of reasons including, but not limited to, lax environmental standards. While such a rationale for a BCA is clearly illegal under the WTO and is fraught with many other challenges, we mention it here only to acknowledge that there appears to be some political salience for BCAs that extend beyond the traditional considerations of leakage, competitiveness, and climate ambition.

Given all this, it's perhaps not surprising that there is growing momentum for border carbon adjustments. The European Union is leading the way. The European Commission is expected to release a detailed proposal for a Carbon Border Adjustment Mechanism (CBAM) in July of this year, with a target of implementing it by 2023. Other countries look keen to follow suit. British Prime Minister Boris Johnson has declared his intention to make border carbon adjustments a priority for his chairmanship of the G7 in 2021. U.S. President Biden has made several statements—including in a joint communique with Prime Minister Justin Trudeau—indicating that he supports a form of border carbon adjustments (See Section 5). And the Canadian federal government has expressed strong interest in exploring BCA in multiple policy statements (see text box).

Box 1. Federal Interest in Canadian BCA

The federal government has repeatedly raised the prospect of Canadian BCAs since the fall of 2020.

The 2020 Fall Economic Statement, in a section titled "Border Carbon Adjustments" (Government of Canada, 2020a):

> "The government will work with like-minded economies, including the European Union and our North American partners, to consider how this approach could fit into a broader strategy to meet climate targets while ensuring a fair environment for businesses."

The December 2020 Strengthened Climate Plan in a section titled: "Maintaining Competitiveness and Managing against Carbon Leakage" (Government of Canada, 2020b):

> "The Government of Canada is committed to ensuring that Canada's transition to a low-carbon economy is achieved in a way that is fair and predictable for businesses, and supports Canada's international competitiveness. To this end, the Government is exploring the potential of border carbon adjustments, and will be discussing this issue with its international partners. The Government of Canada will work with like-minded economies – including the European Union and Canada's North American partners – to consider how this approach could fit into the broader strategy to meet climate targets while ensuring a fair environment for businesses."

The roadmap for cooperation that resulted from the first head of state summit between Canada and the United States following the 2020 U.S. elections, in the section titled: "Accelerating Climate Ambitions" (Government of Canada, 2021a):

> "The President also restated his commitment to holding polluters accountable for their actions. Both the President and the Prime Minister agreed to work together to protect businesses, workers and communities in both countries from unfair trade by countries failing to take strong climate action."

Formal consultations on BCA were announced in Canada's 2021 Budget (Government of Canada, 2021b):

> "The government intends to launch a consultation process on border carbon adjustments in the coming weeks. This consultation process will begin in the summer with targeted discussions, including with provinces and territories, importers, and exporters—especially those who deal in emissions-intensive goods. The broader public will be engaged this fall. Throughout this process, the government intends to continue its international engagement with like-minded partners."

While there is clear interest in the subject, and a clear need to address leakage and competitiveness concerns in the near term, too little has been written about how Canada could design a BCA, or about how the federal government might coordinate its efforts in this space with those of the other two major jurisdictions considering BCA: the United States and the European Union. This report aims to contribute to the discussion, by deepening the understanding of Canada's options. Section 2 describes what a BCA adapted to the Canadian context might look like, going through each of the various design elements that would define the final shape of such a tool. Section 3 then focuses on which Canadian sectors/goods might be most appropriate for coverage under a BCA. Section 4 considers the complexities involved in comparing Canadian producers to their international counterparts on the basis of GHG intensity. Sections 5 and 6 look at what shape a BCA might take in the United States and the European Union respectively, and consider how Canada might best coordinate efforts with those two. Sections 7 and 8 offer closing thoughts on the way forward.

2.0 The Shape of a Canadian BCA

A BCA is not a single well-defined instrument. It is more like a decision tree; at multiple junctures, the designers must make choices that fundamentally alter the final shape of the tool. This section explores the decisions to be made in the Canadian context, framing them around eight design elements (Marcu, Mehling, et al., 2020):

- The underlying policy instrument
- Coverage of trade flows
- Geographic scope
- Sectoral scope
- Emissions scope
- Calculating embedded emissions
- Crediting for foreign policies
- Use of revenues

The final shape of any BCA will be fundamentally altered depending on the underlying objectives of the policy. As described in the introduction, a BCA may be intended to prevent leakage, increase competitiveness, and/or raise climate ambition domestically or abroad. A BCA focused on changing trading partner behaviour, for example, would grant country-based exemptions based on ambitious foreign climate policies. A BCA focused on preventing leakage would not—it would focus instead on the goods coming from those countries, granting preferential treatment (if any) to those goods with the lowest GHG intensities, regardless of national policies in their countries of origin.

In what follows, we assume the objective for a Canadian BCA would be to prevent carbon leakage. We do so partly because a BCA focused on leakage prevention is more legitimately an environmental measure, partly because such a measure would raise fewer objections from Canada's trading partners, and partly because measures aimed at either of the other two objectives would very likely be found illegal under the rules of the World Trade Organization (WTO) (Cosbey et al., 2012; OECD, 2020a).

All that said, in many respects competitiveness and leakage prevention are two sides of the same coin. That is, for the most part preventing leakage also serves the objective of preserving the competitiveness of domestic producers in the face of domestic climate ambition that runs ahead of ambition from trading partners.

Box 2. Some Context on WTO Law

WTO law is one of the primary restricting considerations in choosing design options for a BCA. Canada has long been a champion of a multilateral rules-based trading system, and would no doubt seek to craft a BCA that respected its international obligations as a WTO member. The options described in this paper are guided by the same principle. But to be clear, the approach taken here does not strive for complete certainty about the WTO legality of a BCA, which could only be achieved at an unacceptable cost in terms of effectiveness. As noted below, some of the BCA options described here risk being found in violation of General Agreement on Tarrifs and Trade (GATT) provisions on non-discrimination because they treat foreign goods less favourably than like Canadian goods. But they can nonetheless be designed so as to have good odds of being saved by GATT's Article XX exceptions, which allow GATT provisions to be breached for certain agreed goals such as environmental protection. Good odds, though, are not the same as certainty.

The WTO's Appellate Body has declared WTO law to be situated in the larger body of international law, including accords such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. And it has over the years found ways to make the law as written relevant to the circumstances of the day—including circumstances like climate change that were not foreseen at the time of drafting. Climate change is an existential threat—certainly among the most important threats facing humanity today—that requires extraordinary measures. We can expect that this fact would not be lost on any dispute settlement body constituted to rule on a Canadian BCA.

It is worth noting that any measure challenged in the WTO is not in immediate danger of being rescinded. An appealed case in the WTO would take several years to come to conclusion (more, in more complex cases).[1] In the event of a loss, Canada would have the choice to remove the measure, or just those parts of it found in breach, or to retain it and suffer trade retaliation from the complaining WTO members in the form of penalizing tariffs on Canadian exports.

2.1 The Policy Instrument: Fitting BCA to the Canadian Context

BCA is not an independent instrument. It is an accompaniment to some form of climate ambition, meant to adjust at the border so that the costs of that climate ambition do not result in cost differentials between regulated domestic firms and less strictly regulated foreign firms. So the first design question is: what form of climate ambition, what domestic policy instrument, is the BCA accompanying?

[1] As of this writing, the WTO has no functioning Appellate Body, so technically could not hear appeals, but that problem will likely be resolved some time in the next year or so.

There are two fundamentally different possibilities for BCA. One is tax-based, and the other is regulation-based. A tax-based BCA would accompany a carbon tax, and would function as a separate instrument from that tax, adjusting at the border to ensure that imports face the same charges as the internal charges assessed under the carbon tax. The legal space for such an adjustment in the WTO is GATT's Article II:2(a)—the same provision that allows for adjustment of value-added taxes like Canada's Goods and Service Tax (GST). It is not clear that a carbon tax would be treated like a value-added tax under WTO law, though most observers believe it would be (Holzer, 2014).

A regulation-based BCA would accompany some climate-related regulation. But it would not in fact be an entirely separate instrument. It would, rather, be an extension of the internal regulation to also cover imports. So, for example, the European Union is contemplating an extension of its emissions trading system to force importers to surrender emission allowances in the same way as domestic firms must. This form—extension of an existing internal regulation—is the only way such an "adjustment" could be legally performed under WTO rules. GATT's ad Article III allows that internal regulations that are applied at the border can be treated as regulations under GATT Article III as opposed to being treated as illegal border measures (e.g., excess tariffs, or quantitative restrictions). But it notes first that only regulations described in GATT Article III:1 are eligible for such treatment, and second that any such regulations must accord with GATT's Article III:4, which demands that ultimately foreign goods be treated no less favourably than domestic ones.

The first requirement, per GATT Article III:1 means that not all regulations are adjustable, or able to be applied at the border. To be eligible, the regulations in question should affect the internal sale, offering for sale, purchase, transportation, distribution or use of products. That means they should be internally focused, and not triggered solely by the fact of importation. A mandatory low-carbon standard for cement, for example, would in effect be applied like a ban at the border, but would fundamentally be an internal regulation governing the conditions under which cement could be sold in Canada. It also means the regulations in question should affect treatment of *products*. Worker safety regulations, aimed at producers rather than products, would not be eligible for application at the border under Article III:4.

In Canada's case, the policy instrument that complements a BCA could either be the existing output-based pricing system (OBPS), or it could be a carbon tax that replaced that system.

The OBPS, along with fossil fuel charges, is a pillar of the carbon pricing regimes established under the Greenhouse Gas Pollution Pricing Act (GGPPA). It applies to Canada's large final emitters, covering 38 industrial activities under the headings:

- Oil and gas production
- Mineral processing
- Chemicals
- Pharmaceuticals

- Iron, steel and metal tubes
- Mining and ore processing
- Nitrogen fertilizers
- Food processing
- Pulp and paper
- Automotive
- Electricity generation

Covered facilities in these sectors are those that have emitted 50 ktCO_2e or more per year, and are located in provinces or territories that do not have equivalent regimes in place ("backstop jurisdictions").[2] As of April 2021, this includes only 4 of the 13 provinces and territories, the others having implemented their own versions of OBPS or cap-and-trade. It is worth noting that while those schemes are assumed to be equivalent to the federal OBPS, they have different coverage, different thresholds for inclusion, and different ways of setting the benchmark.

The OBPS requires covered facilities to compensate for any emissions above a limit determined by the facility's output multiplied by a standard equal to some percentage of the sector's average emissions intensity. For example, the standard for styrene is 0.925 tonnes of CO_2e per tonne of styrene, so a facility producing 100,000 tonnes of styrene would have a limit of 92,500 tonnes of CO_2e. For most sectors, the standard is set at 80% of the sectoral average emissions intensity, but for a few sectors at high risk of leakage, it is set at up to 95%. The granting of those 80%–95% credits toward compliance is called output-based allocation (OBA). Those facilities that emit less than their limit are granted tradable surplus credits. Compensation for emissions above the standard can be in cash, surplus credits, or offsets (though the offset regime is not yet operational). Cash payments (an "excess emissions charge payment") would be at the prevailing carbon price under the GGPPA, currently slated to rise to $170/tonne by 2030.

Scenario 1: Canadian BCA Accompanying a Regulation

The starting question in thinking about BCA design is whether the underlying instrument is a carbon tax or a regulation. If the instrument is the OBPS, then from a Canadian legal perspective the answer is clear; the Supreme Court of Canada in March 2021 ruled that the GGPPA was a regulation, not a tax (Supreme Court of Canada, 2021). That ruling does not necessarily mean the WTO would find similarly; the Supreme Court of Canada made its distinction based on Canadian constitutional law, and the WTO would make its distinction based on its own body of law (primarily GATT). But any WTO dispute proceedings would consider the Canadian ruling, and it would undoubtedly be influential. For the purposes of the analysis going forward, this paper assumes that the GGPPA is in fact a regulation under WTO law. The next section considers the

[2] As well, facilities emitting 10 kt/year of CO_2e or more, in sectors at risk of leakage, can voluntarily opt in to the OBPS.

implications for BCA of the underlying policy instrument being a tax, whether it be the existing OBPS interpreted as such, or a carbon tax as an alternative to the OBPS.

A Canadian BCA based on the existing regime would therefore be an extension of the OBPS, an internal regulation, to imports. It would aim to treat those imports similarly to the way in which Canadian goods are treated. Importers would have to compensate at the border for the emissions embodied in their goods. How to estimate the quantity of those emissions is considered in Section 2.6. Here we will consider the price and manner of compensation due from importers in an extension of the OBPS to imported goods.

There are a few complications. The first is that the OBPS doesn't apply across all of Canada, but rather applies only in the backstop provinces and territories. However, the reasoning behind not applying the OBPS in other provinces and territories is that their regimes are deemed equivalent in effect to the federal regime. While we know that this is not always the case, the presumption is reasonable enough to allow the federal benchmark price to be used as the basis for a national BCA. If it came to a WTO challenge, this presumption would probably be considered necessary to make the regime workable, and not disproportionately distortive.

The second complication is that domestic firms will not always pay for their excess tonnes at the full benchmark carbon price. Their compensation can be in cash, surplus credits, or offsets, and presumably the use of those last two will involve savings over the benchmark carbon price. So what per-tonne CO_2e price should be used in calculating the burden that should be borne by foreign firms? The simplest and least accurate option is just to use the full benchmark carbon price. This would make the regime much more burdensome for imports, however. More accurate options would try to build in actual prices, for example a weighted average of the previous year's compensation values, whether at the carbon price, or at the prices paid for surrendered offsets or surplus credits.

Another option would be an "equivalency" solution: allow importers to participate in trading of surplus credits and purchasing of offsets on the domestic market, on the same terms available to domestic firms. They could be assigned allocation based not on total output, but shipment by shipment. Presumably such an option would also see importers of relatively clean foreign goods granted tradeable surplus credits if they beat the OBPS standards. The increased demand for domestically generated offsets would raise prices, which sellers would welcome and buyers would curse. The increased demand for and supply of tradeable surplus credits would be a complication; there would need to be an assessment of what this would do to prices. While such an arrangement would go a long way toward satisfying GATT national treatment requirements, it would greatly complicate the regime. By itself, however, administrative complication is not a justification for discrimination.[3]

The third complication is that domestic firms, while they pay fully for exceeding the standard, also get an output-based allocation that reduces their average cost of carbon. This would not

[3] WTO. *United States – Gasoline.* Panel Report WT/DS2/R, adopted 20 May, 1996, paras. 6.26 and 6.28.

be an issue if foreign firms were participating in the OBPS as described in the "equivalency" solution above, since foreign firms too would receive output-based allocation, but it would be a concern if they were instead being assessed a calculated charge. The regime couldn't charge foreign producers the *marginal* cost of carbon (the benchmark carbon price, or some variation of it as suggested above) when domestic firms are facing a much lower *average* cost, with OBA factored in. One option would take the previous year's total firms' compensation for a given good (whether at full benchmark carbon price or at an estimate of actual prices, as above) and divide by the previous year's sectoral emissions for that good, yielding the average per-tonne assessment imposed on the makers of that good.[4] This would be the amount of the basic adjustment that importers of that good would have to pay at the border. Because of OBA, the per-tonne adjustments would be well below the prevailing carbon price, but as OBA was ramped down in the run-up to net-zero, the BCA would ramp up accordingly.

The most straightforward option for a BCA accompanying the OBPS, avoiding the complications broached above, would be to use the BCA to completely replace OBA—that is, retain output-based pricing, but replace output-based allocation with BCA. Both are instruments designed to protect against risk of leakage and competitiveness impacts, and so at a conceptual level they could be substituted. They are not perfect substitutes; for example, as discussed below, a Canadian BCA probably could not protect export market shares as OBA does because export rebates would probably be WTO-illegal. But while they might be roughly comparable as instruments for leakage protection, the two instruments are completely different on another criterion: the OBA mutes the carbon price for covered sectors, while BCA would see them exposed to the full benchmark carbon price.

Scenario 2: A Canadian BCA Accompanying a Tax

If Canada were at some point to transition from its current regulatory regime for carbon pricing to a full carbon tax, it would make applying BCA more straightforward. From a legal perspective, there is less concern about treating foreign producers no less favourably; they would simply be charged the prevailing tax, the same way imports are charged Canada's value-added tax: the GST.

The only legal questions remaining would be whether a carbon tax was adjustable in the first place. There is clear legal allowance under GATT Article II:2(a) for a tax adjustment on value added taxes such as GST, but some uncertainty on whether a carbon tax is legally like a value added tax. While border tax adjustment can be imposed on a product's inputs, carbon is not exactly like the input steel that goes into a steel pipe—it is not present in the final product. Furthermore, only some types of taxes are adjustable: those "indirect" taxes that are imposed on the products or inputs, like GST. So social security charges levied on producers are not adjustable, for example, and neither is corporate income tax; these are "direct" taxes. Again, it's not clear where carbon taxes would fall in this dichotomy. The only real guidance from the WTO

[4] In practice, the delay in compiling the previous year's data would mean that such a system could not be in effect on January 1.

on this question is a 1970 Working Party convened to look at border tax adjustment, and it did not definitively answer either of these questions (WTO, 1970).

It is our opinion that, in this day and age, if a WTO dispute settlement body were to reject a BCA it would not be on these grounds, over these sorts of unclear legal boundaries. While the WTO panel and Appellate Body decisions technically don't respond to political realities, their interpretation of the law does take into account the broader international legal and policy context, and they have appeared in the past to search hard for an interpretation that did not directly pit the WTO against the reality that climate action of *some* sort is necessary (Cosbey & Mavroidis, 2014).

On the export side, a tax is legally much easier to handle than a regulation. If it is in fact an adjustable tax, a carbon tax could be rebated to exporters in the same way GST is currently rebated. The main concern would be that any rebate cannot exceed the actual tax borne, so account would have to be made for any free allocation Canadian producers received.

Table 1. A BCA with an output-based allocation versus a full carbon price.

Full Carbon Price	Output-based Allocation
• Greater incentive to decarbonize • More likely to have a WTO compliant path to rebate exports • More straightforward to apply the same measure to imports as being levied on domestic production, especially since all goods would face a similar pricing structure • Provides flexibility to cover a greater number of goods (not just those in the OBPS system) • May reduce risk that foreign BCAs could be levied against us	• Leakage risk needing to be addressed is lower • More established system so less likely to have unintended economic impact in the short-term • More likely to allow scope 2 (and scope 3) emissions to be included from a WTO perspective

2.2 Coverage of Trade Flows

All BCA proposals cover imports. The question is: would a Canadian BCA also cover exports? That is, would it rebate the costs of climate pricing in Canada to goods as they exit the country?

As noted above, such a feature would be legally easier for Canada if its regime were considered a carbon tax, or if Canada at some point in the future replaced the OBPS with a carbon tax. However, given that the OBPS has been found by the Supreme Court of Canada to be a regulation, and assuming that the WTO would agree with that assessment (an uncertain prospect), there is no obvious legal way for it to "adjust" at the point of export. Footnote 1 of the Agreement on Subsidies and Countervailing Measures (SCM Agreement) allows for the exemption of exports from some taxes borne by like domestic products, or the rebate of such

taxes, specifying that they should not be deemed export subsidies.[5] But there is no similar provision exempting exports from the cost of internal regulations. Any rebates of that sort would almost certainly be deemed prohibited export subsidies.

From an environmental perspective, it's not clear whether export coverage is a good idea in the first place. If the rebate were calculated to represent the specific tax burden borne by a product, and a given producer had facilities with varied emissions intensity, export rebates would encourage "dirty" production to be routed for export and "clean" production to be routed to domestic markets. If the rebate instead was calculated as the average tax burden, aligned with the option proposed above for imports, then those incentives would not exist.

There is also the concern that Canada might be sending goods shorn of any carbon pricing to jurisdictions where the domestic firms do bear the costs of such pricing. If those jurisdictions did not impose carbon pricing at the border, Canadian goods would erode the market share of those low-carbon high-cost foreign producers. It would be challenging to address this problem by rebating the cost of carbon to exports only destined for some countries (i.e., those that have no carbon pricing). Such a regime would be easily circumvented by traders importing Canadian goods in countries with no carbon price and then trans-shipping them to countries with carbon pricing. The only obvious solution to this problem is for other high-ambition jurisdictions to also adopt BCA, all adjusting on import and export, in the same way most countries now handle value added taxes. The problem would be getting from here to there, and the history of international adoption of value added taxes is instructive as to the transitional pain involved.

How important would it be to Canadian firms to have exports covered by a BCA? If the sectors covered by the OBPS export significant shares of their production, then from a competitiveness perspective it is important. As Table 2 shows, in many of the key sectors exports are a significant share of total Canadian production.

[5] WTO case law has made clear that these taxes must be indirect, so the distinction and uncertainty raised above apply on the export side as well.

Table 2. Export profiles of major Canadian EITE Sectors.

Sector	Exports, as a % of total production
Oil sands extraction (non-conventional)	78%
Pulp, paper, and paperboard mills	65%
Oil and gas extraction (conventional)	39%
Basic chemical manufacturing	29%
Iron and steel mills	23%
Petroleum refineries	19%
Pesticide, fertilizer and other agricultural chemical manufacturing	13%
Cement and concrete product manufacturing	7%

Source: authors' own calculation, based on Canada's 2017 input-output table and including only the major emission-intensive products within each sector.

From an environmental perspective, however, again the answer is not as clear. If Canadian producers of a particular good were relatively cleaner than the foreign production that would displace them in the event of no rebates, then we would be talking about leakage, and there would be an environmental argument for export coverage. If the Canadian goods were relatively more GHG-intense, on the other hand, there is an environmental argument for no coverage. The challenge is that, as Table 4 shows, the answer varies by individual goods, and by trading partners. It would be challenging to try to construct a BCA regime that addresses this challenge by rebating only for some goods and some export destinations, with those parameters dynamically changing over time.

2.3 Geographic Scope

This design element boils down to the question: will the BCA contain country-wide exemptions? Those exemptions could be based on any number of criteria, but two of the most likely would be:

- Exemptions for least-developed countries, who have contributed very little to climate change. This would be in line with the UNFCCC principle of common but differentiated responsibilities and respective capabilities.
- Exemptions for countries that have effective and ambitious climate policies.

To be clear, we are not talking here about crediting for foreign policies—in effect adjusting the adjustment to take account of carbon pricing abroad (dealt with below). We are talking about full exemption from the coverage of a BCA for select countries.

One challenge for such a design element is legal. GATT Article I (most-favoured-nation) obliges members not to discriminate among like products on the basis of country of origin. One might argue that a tonne of steel from a climate laggard is not legally "like" a tonne of steel from a climate leader, but that's a hard argument to make if the basis of the exemption is national policy as opposed to the specifics of the product. There may well be low-carbon steel produced in countries that we'd label climate laggards. For that reason, such a measure might have a tough time defending the breach of Article I under the GATT's General Exceptions (Article XX), which allows breach of other GATT disciplines in the pursuit of specific agreed objectives, including environmental objectives. Two hurdles in such a defence would be demonstrating that the measure is purely environmental in its intent and application, and demonstrating that the measure is not arbitrary in its application. Neither would be easy for national-based exemptions.

It is possible that an exemption for least-developed countries might be saved by another GATT exemption, embodied in the so-called Enabling Clause, as long as the criteria for exemption are based exclusively on development indicators, and countries in similar conditions are treated the same way.[6]

Beyond the legal difficulties, a national exemption based on climate policies might face serious political opposition from trading partners. It would put Canada in the position of unilaterally determining whether a given country's climate policies were, in some sense, adequate. Such a determination runs completely counter to the principles of the Paris Agreement—the premier international venue for climate cooperation—in which commitments are nationally determined and are never judged for adequacy.[7]

There would also be methodological difficulties. What if a country's climate policies were very strong in most sectors but not in forestry? Would we ignore the potential for leakage in pulp and paper and still issue a blanket exemption? More fundamentally, what would be the criteria for assessing climate ambition?

Finally, any national exemptions would give rise to the challenge of trans-shipment. Producers in non-exempt countries would have incentives to route their goods through exempt countries and present them as products of those countries. Any national exemptions would need to be accompanied by strong regimes of monitoring and enforcement—similar to the institutions to enforce rules of origin in free trade areas—to prevent such gaming of the system.

[6] The WTO's Enabling Clause is a 1979 agreement that allows developed-country members of the WTO to give developing-country members more favourable treatment. Such treatment would otherwise be a violation of the Most-Favoured Nation obligation not to discriminate among goods on the basis of country of origin.

[7] This might become a legal problem as well, if sidestepping international law on climate action was seen as arbitrary or anti-environmental in the course of an Article XX defence.

2.4 Sectoral Scope

What sectors or goods would most appropriately be covered by a Canadian BCA? If the objective of the BCA is to prevent leakage, then the answer is: those sectors or goods that are most vulnerable to leakage. Two characteristics are important in defining that vulnerability: emissions intensity and trade exposure.

Emissions intensity, for the purpose of assessing leakage potential, is usually measured in terms of GHG emissions per unit of gross value added. Trade exposure is typically a measure of how much a good is exported and imported, derived with the formula:

$$\frac{\text{(value of exports + imports)}}{\text{(value of domestic production + imports)}}$$

Emissions intensity is important because the higher it is, the more impact any domestic carbon pricing will have on costs. Trade intensity is important because the higher this is, the less able a sector is to pass through those increased costs to consumers; if it tries, it will be undercut by foreign competitors.

The European Union's ETS uses these two statistics to decide whether an activity is vulnerable to leakage. Canada's list of covered sectors was chosen on the basis of scale of emissions; those where at least one facility emits 50 kt or more were deemed to be emissions-intensive and trade-exposed. Special treatment in that list of covered sectors is accorded to those with particularly high potential for leakage.

All this helps answer the question of sectoral coverage. Those upstream basic material producers in sectors like steel and chemicals all score high in both emissions intensity and trade exposure (although basic chemicals and basic steel are not so highly traded internationally as downstream products). As we go further down the value chain to processed goods like steel pipes and basic plastics, the emissions-intensity scores are still high, but not as much so; there is more value-added and less energy-intensive production. Further down the value chain to manufactured final goods like automobiles and children's toys, the GHG-intensity per gross value added is quite low. As such, the risk of leakage is also reduced. The ratio of environmental benefit to administrative effort becomes very low as well; it is not a simple matter to calculate the embodied emissions in an automobile. As such, there are clear advantages to staying relatively upstream on the value chain.

But setting the actual threshold is a thankless task. Any processing industries downstream of the cut-off are buying more costly inputs, but receiving none of the protection afforded to the makers of those inputs. Steel pipe makers, for example, would be purchasing more costly steel from domestic and foreign steelmakers because of the domestic carbon price and the BCA. But if they are not covered by BCA they are competing against foreign steel pipe makers that can buy cheaper steel, and whose exports don't face a BCA at the Canadian border. The risk—especially in sectors with long and complex downstream value chains like chemicals, steel, and pulp and

paper—is that the downstream manufacturing, even if it is at less risk of leakage, will still suffer some leakage and competitiveness impacts.

2.5 Emissions Scope

There are three kinds of emissions associated with all goods:[8]

- **Scope 1:** These are direct emissions, the result of the processes owned and controlled by the facility: stationary combustion like furnace heat, mobile combustion like trucks, fugitive emissions like methane leaks, and process emissions like the nitrous oxide created in the chemical process for making nitrate fertilizers.
- **Scope 2:** These are a form of indirect emissions, specifically those from the production of any purchased electricity, steam, heat or cooling.
- **Scope 3:** These are all other indirect emissions, and there are a lot of them. Some of the biggest categories include emissions from the final consumption of goods (e.g., combustion of products like gasoline), emissions embodied in the intermediate goods purchased (e.g., in basic steel, if you're a makers of pipes), in corporate operations (including business travel), in the transport and storage of goods going to market, etc.

Any BCA scheme would cover at least scope 1 emissions. That is, it would impose a carbon price at the border on imported goods' embodied scope 1 emissions, and perhaps would rebate those costs for exports. The question is whether any other emissions would also be covered.

In answering that question, we first need to know what emissions are covered by the domestic policy instrument. A tax-based BCA is supposed to be adjusting for the costs imposed by that instrument, and a regulation-based BCA is supposed to mirror that instrument at the border. In Canada's case, the instrument would be the output-based pricing system, which just covers direct emissions.[9] Electricity generation has its own standard under the OBPS, so emissions associated with electricity are not covered in the standards of other industrial activities. As such, if the BCA were strictly mirroring the underlying policy instrument, it would only cover direct (scope 1) emissions. An argument could be made, however, that the OBPS does (indirectly) impose the costs of scope 2 emissions on producers, by dint of including electricity generation in the OBPS. This would probably be irrelevant in the case of a carbon tax—those kinds of costs would not be considered an adjustable tax—but including scope 2 costs might be defendable in the case of a regulation.

Excluding scope 2 and 3 emissions from coverage has potential downsides. First, excluding scope 2 emissions means that in sectors where such emissions are high, producers will face high costs

[8] This taxonomy is standard for talking about embodied emissions. It is set out in the widely used *GHG Protocol,* a joint product of the World Resources Institute and the World Business Council for Sustainable Development. See https://ghgprotocol.org/.

[9] It also includes a small element of scope 2 emissions: industrial steam and heat, even if they are generated off site.

of electricity (which in Canada is covered under the OBPS) but would only be protected by BCA for a fraction of their products' increased costs: those coming from direct emissions. In sectors using large amounts of electricity this means producers would be at risk of leakage and loss of competitiveness. Most provinces in Canada have a relatively clean electricity regime, so this isn't as acute a concern as it would be in other countries.

Excluding scope 3 emissions—specifically, emissions embodied in input goods—would create problems in sectors like chemicals and steel that are part of long and complex value chains. Primary (upstream) producers, at the most emissions-intensive part of the value chain, would be protected by BCA for cost increases. Downstream producers, who buy basic steel and chemicals and transform them into finished and semi-finished products, would pay higher costs for their basic inputs, but would be protected by BCA (if they were covered) only for cost increases related to their direct emissions. In other words, as argued in the discussion on sectoral scope, the risks of leakage and competitiveness impacts just get shifted down the value chain to processors and manufacturers—adders of value.

It is an empirical question which sectors specifically are subject to this kind of risk; not all are. Not all sectors have complex downstream value chains. For those that do, the risk of leakage gets diluted as we move down the value chain since, as noted above, the costs of carbon keep shrinking relative to gross value added. As well, the further down the value chain we go, the more goods are differentiated, and compete on more than just price.

An effective BCA for Canada would require an assessment of the actual risk of leakage downstream in the covered sectors, and in producers with high shares of indirect emissions. Where indirect emissions are high, and including scope 2 was deemed too legally risky, BCA might be accompanied by a compensatory mechanism for high indirect costs, similar to the instrument used in the European Union by some member states in the context of the ETS. Where there is a high level of emissions embodied in input goods, BCA might consider special treatment such as allowing coverage of those scope 3 emissions, but only if the OBPS were amended to allow such coverage.

2.6 Calculating Embedded Emissions

How might a Canadian BCA estimate the carbon embodied in goods that show up at the border? There are two basic options. The first is product-based; this approach would demand data on the actual emissions associated with each shipment, or associated with the products of a particular facility over time. The second is benchmark-based; this approach would set a default value for carbon in a tonne of imported material, based on a standard benchmark for that good or that sector. The benchmark could reference Canadian practice (e.g., average emissions intensity for Canadian production), or global practice, or practice in the country of origin. It could be set at average emissions intensity, or any percentile along that spectrum.

A product-based approach demands data that may not exist in some exporting countries, and would need rigorous regimes of accountability stretching to other countries, involving certification

by an accredited body according to a designated reporting protocol. The complexity of this approach, and the hostility it could be expected to engender in exporters, are strong arguments for a benchmark approach.

But a benchmark approach unfairly discriminates against foreign producers that are cleaner than the default.[10] A solution to this would be to allow producers to challenge the default with third-party verified data attesting to their actual practice. The final result would be a sort of hybrid of the product-based and benchmark approaches.

If a benchmark approach were used, where should the default value be set? Given the need to mirror the domestic regime with the arrangements that treat foreign products no less favourably than like domestic products, one option is to set the default at the average emissions intensity for the relevant sector. This would involve foreign producers as a whole getting no less favourable treatment, even if that were not true for individual producers. As noted above, cleaner foreign producers would have to be allowed to challenge the default. Foreign producers with higher emissions intensity would be getting off easy; this is an unfortunate hallmark of the benchmark approach. A problem with this approach is that as Canadian industry decarbonized on the path to net-zero, the protection offered by a BCA using that assumption would diminish. Canadian average emissions intensity would be falling, and low-carbon investments might create higher risk of leakage, but our assumptions about foreign emissions intensity would be getting more generous.

One way around this would be to set the default at the global average emissions intensity for the relevant sector. Given Canada's relatively clean production methods, in most sectors this would be a more stringent default than a Canadian average. If the global average were to fall, it would indicate a diminished risk of leakage, and so it would be appropriate for the BCA to offer less protection. Setting the default assumption at a very carbon-intensive level, above the Canadian sectoral average, would risk being found in violation of GATT's national treatment provisions. Adding the ability for foreign producers to challenge the benchmark would make it fairer, but at a punitive enough default such a regime becomes pretty close to a *de facto* product-based approach, with the attendant challenges. It is possible that a global average default could be justified in a GATT Article XX defence as an anti-leakage feature of the regime, but we have no case law to suggest whether such an argument would succeed.

2.7 Crediting for Foreign Policies

If foreign producers are subject to carbon pricing in their home jurisdictions, should a Canadian BCA take that into account? Not doing so would mean assessing a double carbon price on those goods, which is both environmentally perverse and unfair. It would be a disadvantage in any GATT Article XX defence, precisely because it would depart so significantly from environmental

[10] WTO. *US – Gasoline.* Panel Report WT/DS2/R, January 29, 1996, paras. 6.14–6.16. These findings are with respect to an internal tax, but would probably also apply to an internal regulation.

objectives, and would seem to be a disguised restriction on international trade. For those reasons a Canadian BCA should probably credit for carbon pricing, whether under a carbon tax, an emissions trading system, an output-based pricing system, or some other pricing regime in the country of export.

But what about crediting for *non*-price policies—regulatory policies that are not like Canada's OBPS or the European Union's ETS? Not all countries choose to address climate change through carbon pricing. Should a Canadian BCA grant credit for other sorts of policies as well? This is obviously important to the Canada-United States conversation, and is discussed in greater depth below.

To answer this question, recall that whether a BCA is tax-based or regulation-based, the point is to apply treatment at the border equivalent to what the foreign producer would have experienced had it been domestic. The tax adjustment, or the regulatory treatment, are a sort of debit based on what Canadian firms experience. It would make no sense, then, to credit for things we are not debiting for. We are not debiting imports for the costs imposed on Canadian firms by non-pricing regulations like our Environmental Impact Assessment requirements, or our methane emissions regulations. So it would be inconsistent to *credit* for such costs incurred abroad. If non-price-based regulations abroad are in fact effective in forcing down emissions intensity, foreign firms can be credited for that by challenging the Canadian default emissions intensity.

Where there *are* price-based policies abroad, crediting for them would be no simple matter. Every carbon tax, every emissions trading scheme, every regulatory regime like the OBPS, has its own specific features. Another country's tax might cover sectors ours doesn't, or involve tax credits ours doesn't, and vice versa. While the European Union's ETS and Canada's OBPS are both price-based regulations, they differ in important ways. The exemptions and alternatives to carbon taxes and regulatory regimes will usually differ markedly from jurisdiction to jurisdiction. For example, Canada will eventually implement an offset system for the OBPS. How would the European Union determine what that does to the effective carbon price paid by Canadian producers? Finding a common metric between an emissions trading regime and a carbon tax regime would add another layer of complexity. In the end, crediting for foreign carbon pricing would involve a bilateral process of mutual recognition—a negotiated agreement—for each trading partner that had such a regime.

2.8 Use of Revenues

The final design element is based on the question: what would we do with the money? There are two basic options: keep it, or send it abroad.

The simplest variation on keeping it would be directing any collected charges to general revenue, as we would a tariff. Other variations would see the revenue hypothecated to be used in furtherance of a low-carbon transition, either for the covered sectors specifically, or more generally.

Sending it abroad could be a way to soften the impacts on foreign exporters, for example by subsidizing their costs to certify their low-carbon products when challenging a default carbon intensity under our BCA. It could also be sent to the governments of the affected countries, either with no strings attached, or as part of an agreed effort to reduce the carbon intensity of their producers. In a sense this would mirror the refund of revenues that goes to Canada's backstop provinces. Or it could be sent to any number of international funds aimed at addressing climate change, some specifically in developing countries, such as the UNFCCC's Green Climate Fund or its Adaptation Fund. In that respect, the funds could be part of the ongoing and urgent effort to scale up climate finance for developing countries.

It's likely that any BCA challenged under WTO rules would end up being defended under GATT's Article XX, described above as the General Exceptions to GATT rules. In such an event, the most important feature of any scheme will be its ability to be justified as a purely environmental measure. As such, while it would not in itself be determinative, giving the money to domestic producers would be a legal liability. At the other end of the spectrum, giving the money to foreign producers would be a clear indication that the regime is about protecting the environment, not protectionism.

That said, depending on the details of the scheme there is a lot of money involved; the European Commission has budgeted between 5 and 14 billion euros of revenue from the EU CBAM over the next seven-year financial framework, to be used as part of its Recovery Plan. Ultimately a BCA raises money by raising the price of imported goods. Though foreign producers would be directly paying the costs, they would pass on some percentage of those costs to domestic consumers of those goods. The optics of sending BCA revenues away to foreign competitors is poor, and unlikely to be a selling feature in any democratic party's election campaign. For historical reference, international emissions trading under the UNFCCC's Kyoto Protocol was explicitly rejected by the Harper government as sending Canadian money abroad in the name of climate change (Bueckert, 2007). Politically, it would be very tempting to keep the revenues within Canada.

3.0 What Sectors Should Be Covered in a Canadian BCA?

This section considers which sectors or activities in the Canadian economy are most in need of protection against carbon leakage. Up to this point we have explored the shape of a Canadian BCA accompanying either the OBPS or a potential future carbon tax, but in this section we will focus exclusively on the existing regime. Our starting point for candidate sectors was the 38 covered activities, comprising 78 output-based standards, under Canada's OBPS.[11] For each of those sectors we estimated carbon intensity per unit of value, and trade exposure. Estimates were made by mapping 2017 National Inventory Report emissions (Environment and Climate Change Canada, 2020) to the appropriate industrial categories in Canada's 2017 Supply Tables (Statistics Canada, 2020).

We applied three thresholds to eliminate those activities that were least subject to risk of leakage, or were a small part of the Canadian economy:

1. Emission intensity less than 1 kgCO_2e/$GDP
2. Trade exposure (total imports + total exports)/(total domestic production + total imports) less than 20%
3. Overall contribution to GDP less than CAD 1 billion

The results are presented in Table 3: eight activities covered under the OBPS, encompassing 11 products. These, then, are the products we consider most at risk of leakage, and most in need of protection.

Our filter eliminated a number of sectors, which failed to meet all three thresholds.[12] According to our criteria cement should also be excluded, but we have retained it—the trade intensity figures for cement are national, and mask the fact that cement is highly traded on Canada's coasts. International trade in cement does not reach far inland because the weight of the product makes truck and rail transport cost-prohibitive. So risk of leakage is very real for coastal manufacturers, and for some that are very close to the U.S. border, even if the national figures make it look otherwise.

[11] Note that the OBPS is currently under review, and Environment and Climate Change Canada has proposed adding additional activities.

[12] The eliminated sectors are: lubricants basestock, isopropyl alcohol, hydrogen, lime, glass, gypsum, nylons and resins, pharmaceuticals, iron ore pellets, metal tubes, smelting or refining metal ores, potash, coal, metals, diamonds, char, activated carbon, food processing, automotive, and electricity.

Box 3. The Special Case of Electricity

Electricity is covered under the OBPS, and so might be considered a candidate for coverage under a BCA that mirrored the OBPS at Canada's border. But Canadian electricity has some unique characteristics that may make it unsuitable for a BCA designed to accommodate trade in goods.

Fuel-burning electricity generation is covered under the OBPS, so any imports of electricity from the United States would be assessed a BCA, making them more costly. But in those few places where Canada does import significant amounts of electricity—these tend to be provinces blessed with hydro resources—more costly imports might work against our climate objectives.

Manitoba, for example, often imports electricity from the Midcontinent Independent System Operator when prices are low due to surplus energy from U.S. wind generators, storing that energy in its reservoirs and returning it when demand is higher. The result is significant cost savings for U.S. consumers and higher utilization of U.S. wind power. Under this scenario, low-priced imports are not undermining clean Canadian production, as is the case for goods in other EITE sectors.

A BCA would dampen or even stop such transactions, depending on how the embodied carbon was calculated. It would be unfortunate for BCA to disrupt the dynamic described above, because the more the grid operates as an interconnected system, the more renewable energy penetration is possible.

A more traditional risk of leakage might exist in provinces like Alberta, where domestic electricity has a high GHG emissions factor. Absent a BCA, relatively clean natural gas generators there, saddled with the cost of carbon in Canada, might be undercut by cheaper high-GHG electricity from the United States (though import capacity is relatively low). There may be non-BCA mechanisms that can both address the risks of leakage in electricity while also avoiding the "Manitoba effect," but if electricity is included in Canada's BCA the regime should be adapted to do the same.

Table 3. Vulnerable EITE products / product categories identified.

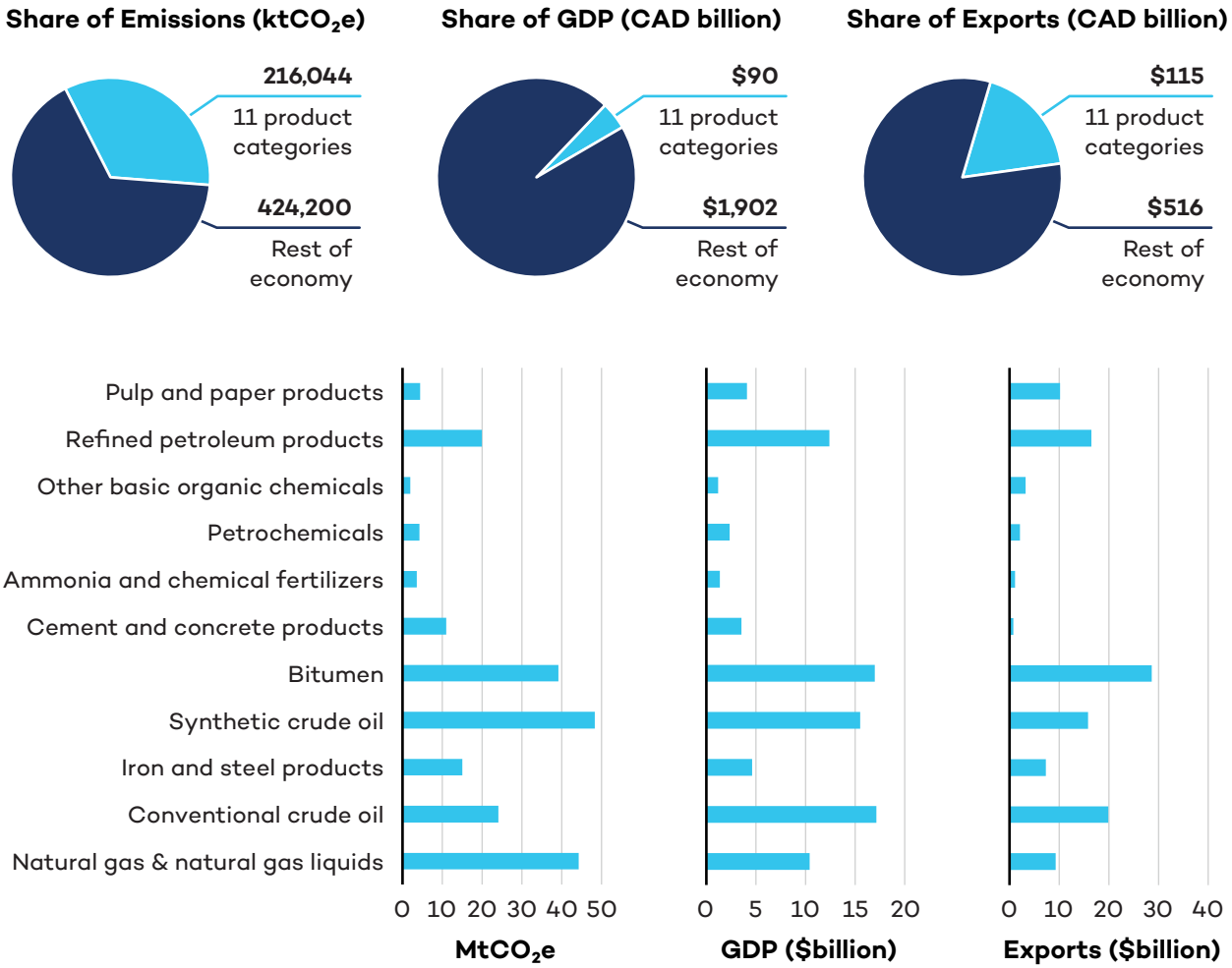
Industry	Product / product category	2017 Billion CAD GDP	Emission intensity ($kgCO_2e$/ CAD GDP)	Trade exposure (%)
Oil and gas extraction (conventional)	Natural gas and natural gas liquids	12.533	4.21	47%
	Conventional crude oil	17.146	1.40	55%
Iron and steel mills	Iron and steel and ferroalloy manufacturing	4.617	3.26	45%
Oil sands extraction (non-conventional)	Synthetic crude oil	15.509	3.11	56%
	Bitumen	16.982	2.31	96%
Cement and concrete product manufacturing[13]	Cement and concrete products	3.537	3.11	8%
Pesticide, fertilizer and other agricultural chemical manufacturing	Ammonia and chemical fertilizers	1.352	2.66	36%
Basic chemical manufacturing	Petrochemicals (e.G., High-value chemicals)	2.348	2.95	31%
	Other basic organic chemicals (e.G., Ethanol, methanol)	1.179	2.45	60%
Petroleum refineries	Refined petroleum (e.G., Gasoline, diesel, heavy oil)	12.692	1.72	36%
Pulp, paper and paperboard mills	Pulp and paper (e.G., Wood pulp, paperboard, newsprint)	3.531	1.10	74%

Source: Government of Canada, 2019.

[13] Cement and concrete products are included even though they are below the trade exposure threshold of 20%.

Figure 1 shows how those 11 vulnerable EITE products are situated in the Canadian economy, and as part of Canada's emissions profile. Though they make up only 4.5% of Canada's economy, they represent 18% of Canada's exports. As a percentage of Canada's GHG emissions, they are even more significant, at 34%. The bar charts at the bottom of Figure 1 give us more insight into how the various products contribute to those numbers. In all three metrics, the oil and gas sector features prominently.

Figure 1. The focus products in context.



The rest of the report focuses on these products and product categories, as they are likely the ones that would be most vulnerable to destination-based carbon pricing.

4.0 How Vulnerable is Canada to Foreign BCAs?

It turns out to be very difficult to answer the question: which sectors of the Canadian economy are vulnerable to foreign BCAs? The answer first depends on how a foreign BCA would be elaborated: what choices a country would make when facing the design questions explored in Section 2.

Beyond that, it would depend on the emissions intensity of Canadian production as compared to production in the implementing country (assuming that the BCA design in question somehow took account of that differential). Even sectors with very high emissions intensities are only vulnerable if their competitors in the implementing country are not so high by comparison.

As it turns out, however, that kind of comparison is more challenging than it might seem. The challenges involved can be better understood with concrete examples, such as previous attempts to compare relative carbon dioxide emission intensity between different countries.

In 2020, the Climate Leadership Council published a table comparing the carbon efficiency of the United States to other countries, including Canada, for broad sectors of the economy (Rorke & Bertelson, 2020). Their data suggested that the United States has a considerable carbon advantage over Canada with a relative economy-wide carbon advantage of 1 to 1.3, but varying for each sector, with most Canadian sectors underperforming.[14] Based on this data, the authors argue that a U.S. BCA would allow U.S. industries to leverage their carbon advantage, and increase their competitiveness vis-à-vis producers in other countries. Notably, many of the main industries and vulnerable products identified were those where Canada competes for export share, including mining and extraction of energy and non-energy products, wood products, chemicals, and electrical equipment. Based on that data, Canada would be exposed to adverse trade impacts were the United States to implement a BCA.

Below, we assemble a very similar set of emission-intensity indicators, using emission-intensity information from the OECD Stat database.[15] The economic sectors covered are identical to the Climate Leadership Council table, and include a number of sectors not traditionally thought of as emissions-intensive and trade-exposed.

[14] This ratio compares the economy-wide GHG intensity of the two countries (i.e., GHGs/GDP).

[15] These data include emissions from fuel consumption in production only. They do not include scope 2 or 3 emissions, or process emissions.

Table 4. Relative 2015 emission intensity of CO_2 emissions embodied in total gross exports of final products (tCO_2/USD million) where Canada = 1.

Industry	CAN	USA	EU28	G20
Agriculture, hunting, forestry, and fishing	1.00	0.60	0.54	0.66
Mining and extraction of energy producing products	1.00	0.87	1.13	0.85
Mining and quarrying of non-energy producing products	1.00	0.77	1.18	2.03
Services to mining and quarrying	1.00	0.82	0.79	1.23
Food products, beverages, and tobacco	1.00	0.91	0.66	0.92
Textiles, textile products, leather, and footwear	1.00	0.79	0.55	1.37
Wood and products of wood and cork	1.00	0.74	0.56	0.98
Paper products and printing	1.00	0.91	0.64	1.05
Coke and refined petroleum products	1.00	0.44	0.58	0.60
Chemicals and chemical products	1.00	0.63	0.38	0.88
Rubber and plastics products	1.00	0.65	0.46	1.53
Other non-metallic mineral products	1.00	0.87	0.87	1.92
Basic metals	1.00	1.16	1.16	2.66
Fabricated metal products	1.00	0.98	0.84	2.14
Computer, electronic, and optical equipment	1.00	0.45	0.82	1.98
Electrical machinery and apparatus, not elsewhere classified	1.00	0.82	0.79	2.10
Machinery and equipment, not elsewhere classified	1.00	0.96	0.82	1.84
Motor vehicles, trailers, and semi-trailers	1.00	1.05	0.66	1.27
Other transport equipment	1.00	1.00	0.83	1.74
Manufacturing not elsewhere classified; repair of machinery and equipment	1.00	0.73	0.43	1.88
Electricity, gas, water supply, sewerage, waste, and remedial services	1.00	2.02	0.70	1.79
Construction	1.00	0.81	0.74	1.13
Wholesale and retail trade; repair of motor vehicles	1.00	0.55	0.58	0.85

Industry	CAN	USA	EU28	G20
Transportation and storage	1.00	0.81	0.57	0.79
Accommodation and food services	1.00	0.80	0.61	1.01
Publishing, audiovisual, and broadcasting activities	1.00	0.35	0.47	0.60
Telecommunications	1.00	0.84	0.69	1.03
It and other information services	1.00	0.64	0.73	1.11
Financial and insurance activities	1.00	0.62	0.74	0.81
Real estate activities	1.00	1.01	0.72	1.24
Other business sector services	1.00	0.64	0.55	0.82
Public admin. And defence; compulsory social security	1.00	0.00	0.45	0.60
Education	1.00	0.68	0.51	0.78
Health and social work	1.00	1.12	0.75	1.42
Other community, social, and personal services	1.00	0.73	0.50	0.90
TOTAL	**1.00**	**0.64**	**0.56**	**1.14**

Note: Red means high emissions intensity relative to international peers. Green means low.
Source: OECD, 2020b.

The data in Table 4 are for emissions embodied in exported goods. The table shows that, for all of the broad industry sectors that include the vulnerable products identified in Table 3, the United States has a relative emission intensity that is significantly better than Canada's (from 0.44 for coke and refined petroleum products to 0.91 for paper products). Taken at face value, this suggests a significant competitiveness disadvantage for Canada, and an exposure to trade impacts from a U.S. BCA.

There are, however, a number of reasons why the relative emission intensities presented in Table 4 provide a poor basis for understanding of the relative carbon competitiveness of products between countries:

1. A global average emission intensity for a broad sector based on value tells us nothing about the many individual products produced by the sector. Every sector includes many different products with a large distribution of emission intensities. The distribution of emission intensity by product within an economic sector varies by many orders of magnitude. Producing ethylene in a steam cracker with natural gas is many orders of magnitude more emission intensive than producing a final product like plastic film from

its intermediate products, but both activities are included in the broader category of chemicals and chemical products.

2. The numbers in that table are based on GHG emissions per unit of gross value added for various products. But some of those products—like machinery and equipment for example—are made from input goods that may or may not have been produced in Canada, with unknown emission intensities. As such, assigning emission intensity values to goods that far down the value chain will probably be inaccurate, and will tell us nothing about Canadian vulnerability or advantage when facing foreign BCAs.
3. Differences in global average emission intensities in Table 3 may be driven simply by the fact that Canada has more primary emission-intensive production and less intermediate production within the listed sectors, compared to its trading partners. That is, the numbers may not reflect higher Canadian emissions intensity for the same products; rather, they may be reflecting different emission intensities for different products.
4. The global average emission intensities in Table 3 also do not consider the carbon policies in competing jurisdictions. For example, Canada has adopted carbon pricing and there is a significant marginal effective carbon price on the most emission-intensive products. A straight product-by-product comparison to another country with no effective carbon price doesn't tell us anything about vulnerability to a foreign BCA if the BCA is structured to account for carbon pricing in country of origin (which, arguably, it should be).

We undertook a more bottom-up Canada-European Union comparison of the products identified in Section 3, using publicly-specified benchmarks as the basis for correspondence. The full exercise is discussed in Appendix A. As explained in the Appendix, ultimately the comparison was stymied by the fundamental differences in regimes of governance and reporting. In fact, our assessment found only four products with readily comparable emissions intensities: clinker, ammonia, high value chemicals from steam cracking, and styrene.

In Table 5, we estimate average emission intensities of those four products with comparable product benchmarks for Canada and the European Union. The final column shows the cost that Canadian producers might have to pay under an EU BCA regime, assuming they were credited for the costs already paid in Canada under the carbon price, and assuming equivalence was calculated as described in Appendix A.

Table 5. Estimated average emission intensity and carbon costs for selected vulnerable products.

Product	Estimated average emission intensity (tCO_2e/tonne)		Estimated average carbon cost per unit (CAD)		EU BCA (CAD/ tonne)
	Canada	EU	Canada	EU	
Clinker	0.841	0.842	1.68	5.11	3.43
Ammonia	2.27	1.97	18.20	23.99	5.79
High-value chemicals from steam cracking (ethylene, propylene, butadiene)	0.815	0.856	6.52	10.40	3.88
Styrene	1.15	0.722	9.25	13.16	3.91

Source: authors' calculations, based on sources and methodology described in Appendix A.

The discounts applied as credit for Canadian carbon pricing are significant, running from 33% for clinker to 76% for ammonia. As explained in Table 6, this is assuming a CAD 40/tonne carbon price in Canada and a EUR 45/tonne (CAD 67.50) carbon price in the European Union.

Three of the four goods (all except clinker) would be charged an adjustment that is less than 2% of prevailing market prices for the products. Clinker is a significant outlier, with a charge of over 40% at prevailing market prices. On the basis of this limited analysis, and assuming crediting for Canada's OBPS, many covered goods will be subject to CBAM adjustments that are not particularly significant. For these products, emissions intensities are similar for Canada and the European Union, as is carbon pricing. There may, of course, be other outliers like clinker among the covered goods that we have not assessed here.

Assumptions that are used in estimating the average emission intensities and carbon costs for the vulnerable products are identified in Table 6. We started from the respective benchmarks and worked from there to estimate the averages. In Canada, we assumed that the benchmark represented 80% or 95% of the sector average, and assumed an even distribution of emissions intensities around that average. These results are at best directional, as there are significant data gaps in the methodology. Facility emission intensities change from year to year and are not likely to fit an even distribution as assumed in the analysis. EU carbon costs are also related to floating market prices that are constantly changing.

Table 6. Assumptions used to estimate average emission intensity and carbon costs for selected vulnerable products.

	Product emission-intensity assumptions		Carbon price	
Product	**Canada**	**EU**	**Canada**	**EU**
Clinker	Benchmark represents 95% of average production, even distribution of facility production (+/- 10%)	Benchmark represents average of 10% best-performing facilities, even distribution of facility production (+/- 10%)	CAD 40/tonne marginal carbon price no reduction in marginal carbon price due to banking or trading of credits, and flexibility mechanisms such as offsets	EUR 45 (CAD 67.50) /tonne EU ETS auction price no reduction in marginal carbon price due to banking or trading of credits, and flexibility mechanisms such as offsets
Ammonia	Benchmark represents 80% of average production, even distribution of facility production (+/- 25%)	Benchmark represents average of 10% best-performing facilities, even distribution of facility production (+/- 25%)		
High-value chemicals from steam cracking (ethylene, propylene, butadiene)	Benchmark represents 80% of average production, even distribution of facility production (+/- 25%)	Benchmark represents average of 10% best-performing facilities, even distribution of facility production (+/- 25%)		
Styrene	Benchmark represents 80% of average production, even distribution of facility production (+/- 20%)	Benchmark represents average of 10% best-performing facilities, even distribution of facility production (+/- 30%)		

The analysis in this section gives rise to a few conclusions:

- If Canada considers implementing a BCA, it should do so from a position of informed understanding about how BCA plus carbon pricing would change the relative competitiveness of Canadian producers in EITE sectors.

- A number of factors make that sort of comparative assessment difficult, including: lack of data for many countries; where data exists, different reporting protocols and metrics; variations in the emissions profiles of different foreign producers; and the need to account for the effective carbon price paid in other countries, and in Canada.
- If schemes such as the EU CBAM do take account of foreign carbon pricing, and do allow for individual producers to challenge default emissions-intensity assumptions, there will be many covered exports from Canada that are not significantly affected. Our carbon pricing regime is ambitious, and our emissions intensity for most covered goods is relatively low by global standards (with at least one notable exception: crude oil). There may also be some outlier goods that suffer major impacts.

5.0 BCAs in the United States

The United States and Canada are each other's largest export markets. The United States is the destination for almost three quarters of Canada's merchandise exports, and the source of almost half of its merchandise imports. As such, both countries have a significant interest in policies that the other might adopt to prevent carbon leakage and protect the competitiveness of domestic firms as it pursues its climate ambition.

The Biden administration in the United States has given repeated indications that it will complement its ambitious climate policy with instruments that deal with leakage and threats to U.S. competitiveness. The Biden election platform promised that:

> "As the U.S. takes steps to make domestic polluters bear the full cost of their carbon pollution, the Biden Administration will impose carbon adjustment fees or quotas on carbon-intensive goods from countries that are failing to meet their climate and environmental obligations." (Biden, 2020a)

The U.S. Trade Representative's 2021 Trade Policy Agenda and Annual Report pledged that:

> "The Biden Administration will work with allies and partners that are committed to fighting climate change. … As appropriate, and consistent with domestic approaches to reduce U.S. greenhouse gas emissions, this includes consideration of carbon border adjustments." (USTR, 2021).

The roadmap for cooperation that came out of President Biden's first summit with Prime Minister Trudeau contained:

> "The President also restated his commitment to holding polluters accountable for their actions. Both the President and the Prime Minister agreed to work together to protect businesses, workers and communities in both countries from unfair trade by countries failing to take strong climate action." (Government of Canada, 2021a)

Recall, however, the basic structure of a BCA: it is an accompaniment to ambitious climate action, designed to ensure that foreign producers are subject to the same sorts of climate-related costs as their domestic competitors. It can be combined either with a tax or a regulation. To explore what the Biden administration might have in mind, we have to start by looking at the climate action that has been implemented and might be implemented during the Biden presidency.

First things first: since the United States does not have a carbon tax of any sort, and until such time as it does, there could clearly be no tax-based BCA. A number of credible bi-partisan pundits are pushing to have the United States adopt a carbon tax, and with it a tax-based BCA (Climate Leadership Council, 2019; Flannery et al., 2020). And no less than eight carbon tax bills were introduced to Congress in 2019. Those laudable efforts may eventually bear fruit, making the prospects for BCA in the United States much more straightforward. But for the

politically foreseeable future (i.e., at least until the November 2022 midterm elections) the Biden administration appears to be more focused on a regulatory and industrial policy-style approach to addressing climate change (Lavelle & Fahys, 2021). As such, this report will focus on what actions the United States might take in the absence of a carbon tax.

This leaves the United States in the realm of regulation-based BCA. The key questions then, are:

- What regulatory policies would the United States seek to base its BCA on?
- How would it translate those policies into obligations for foreign producers?
- How could Canada coordinate its policies with those of the United States?

5.1 U.S. Climate Policy

By surveying possible U.S. climate policy we can filter through the larger whole to focus on those elements that might affect U.S. EITE sectors. Where a policy might impose costs on such sectors, the United States would presumably want to impose some sort of levelling charges.

A comprehensive survey of the Biden administration's regulatory initiatives in its first 100 days can be found in Appendix B. It surveys the flurry of executive orders that came shortly after the presidential inauguration, some of Biden's key campaign commitments, and the first piece of climate-related legislation to come to Congress since the 2021 presidential inauguration: the CLEAN Future Act (H.R. 1512). The latter includes a national clean electricity standard. While that body of initiatives, orders, standards, and plans is comprehensive, it does not—with a few exceptions—impose costs on domestic producers, either in the form of a carbon price or in the form of regulatory requirements.

Biden's American Jobs Plan, the administration's keystone proposal to promote a broad range of objectives including climate action, illustrates this well (Biden, 2021c). Its climate-related proposals include:

- Investing USD 174 billion in the electric vehicle market, including purchase incentives, support to manufacturing, incentives and grants to build massive charging infrastructure, and government procurement of electric vehicles.
- Incentives and support to build out 20 gigawatts of high-voltage capacity power lines, tax credits for generation and storage of clean energy, government procurement of clean energy, and an Energy Efficiency and Clean Electricity Standard—a utility-focused mandate to create a clean grid by 2035.
- Demonstration plants for carbon capture and storage, and tax credits to increase the practice.
- Incentives and funding for energy efficiency retrofits to 2 million houses and buildings.
- USD 35 billion in support to innovation in the climate change solutions space, including creating and funding an Advanced Research Projects Agency for climate (ARPA-C),

modelled after the Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E).

- Using government procurement to "jumpstart" clean energy manufacturing.

The closest any of these proposals come to imposing regulatory costs is the clean energy standard. But even that may not significantly increase costs of production, given the low levelized costs of solar and wind energy and the proposed investments in new transmission infrastructure and storage.

5.2 What Does U.S. Climate Policy Imply for Policies to Protect Against Leakage and Competitiveness Impacts?

The body of effort surveyed above and in Appendix B is not the final shape of Biden's climate policies. But it nonetheless gives an indication of the type of climate policies we are likely to see in the foreseeable future. The survey finds only a few policy proposals that could conceivably raise the cost of doing business for EITE firms. For the most part, the thrust seems more toward industrial policy-type support for the investment and innovation needed to achieve ambitious targets, rather than toward measures that impose costs on EITEs. This is not a criticism of the approach; rather it is an argument that U.S. producers will not be at high risk of leakage.

5.2.1 Regulation-based BCAs in the United States

There are three possible policy exceptions from the list of measures surveyed above and in Appendix B that might actually impose costs on the sectors of interest:

- Any restrictions on the production of oil and gas that raise the price of those goods as an input. Natural gas in particular is widely used as a feedstock (for chemicals) and a fuel for industrial heat (in steelmaking, chemicals, cement, and pulp and paper, for example). This includes siting restrictions and tightened methane regulations.
- Siting restrictions and stronger emissions and health standards for the petrochemical sector.
- Any effort to decarbonize the electricity grid that raises the price of electricity, which is used by all industrial sectors, but particularly intensively by sectors like primary aluminum, and steel produced via electric arc furnace. Such cost increases might come from mandates such as the Clean Electricity Standard, though generous support is proposed for decarbonizing investments and infrastructure. One analysis argues that up to 90% decarbonization of the US electricity sector could be achieved at no cost increase to consumers (Goldman School of Public Policy, 2020).

In theory, it would be possible to link the costs from these three policies to a BCA. This would require calculating the cost per unit equivalent of new regulations for petrochemical facilities, and doing the same for oil and gas operations, using the results to calculate the cost per unit as passed

through to those that use gas as an input to other industrial activities. And it would be possible in turn to make importers of petrochemicals, downstream plastics, pulp and paper, and cement products to pay costs at the border equivalent to those calculated costs. But such a strategy faces two main challenges: methodological complexity and WTO legality.

Methodologically, while it is possible to calculate those costs in theory, the practice would be closer to art than science, and would offer myriad opportunities to unfairly promote U.S. businesses through a mechanism that was not meant for that purpose. Moreover, any such policy should also credit other countries for regulatory measures with similar requirements. If Canada, for example, had methane regulations *more* stringent than the new U.S. regulations, not granting credit would make no sense from an environmental or fairness perspective, and would probably be found arbitrary in a GATT Article XX defence. But trying to do such crediting would boost the methodological difficulties by orders of magnitude; it would have to be done bilaterally for each trading partner, would have to be regularly updated, and would involve trying to somehow equate complex regulatory regimes that would most often be fundamentally different.

From a WTO legal perspective, it was noted in Section 2 that only some regulations can be legally applied to imports at the border. The regulation must be an internal measure, rather than one triggered by the fact of import. It must affect "the internal sale, offering for sale, purchase, transportation, distribution or use of products."[16] And the BCA in question must be simply an extension of the regulation to also cover imported goods, treating them in effect like domestic goods. A low-carbon standard for steel, for example, would qualify if it applied equally to domestic goods and imports, setting the conditions for sale in the domestic market. The European Union's ETS would likely qualify, since it can be construed as a condition of sale imposed on domestic goods, and since its application at the border would amount to an inclusion of imports in the scheme, by making them purchase allowances (Holzer, 2014). As discussed in Section 2, Canada's OBPS might similarly qualify if it were constructed so as to treat imports as if they were part of the domestic regime. It's not clear that the same could be said for a tax at the border that tried to make up for the cost of regulatory requirements in the United States. The border measure would not in fact apply the substance of the regulation to the imports—siting restrictions and methane emissions restrictions for gas wells, for example. In fact, the regulations in question do not even apply directly to the goods that would be taxed at the border. So while a clean electricity standard could be applied at the border on imported electricity, it could likely not be applied as a tax on imported goods that used electricity in their manufacture. Ultimately, it is very unlikely that these sorts of adjustments would be found to be an extension of an internal regulation covered by GATT Article III:4; instead they would likely be found to be illegal quantitative restrictions under GATT Article XI.

What does this leave in the way of options for the United States? The first thing to note is that any solution should be tailored to the problem at hand. If we see very few climate-related regulations actually increasing costs for U.S. EITEs, and instead an approach based almost entirely on

[16] GATT Article III:1, as referenced by GATT ad Article III.

government support for a low-carbon transition, then there is arguably not much need for protection from leakage and competitiveness impacts.

Nonetheless, there are at least three options that the United States might consider in the fulfilment of the pledges noted at the beginning of this section, to put in place some trade-related instrument:

- Low-carbon standards
- A BCA based on the social cost of carbon
- Section 232 tariffs

5.2.2 Alternatives: A low-carbon standard

A low-carbon standard is a mandate that specifies the carbon intensity of a good. A strict standard would allow no goods into commerce that did not meet the standard. A more flexible approach is exemplified by Canada's Clean Fuel Standard; it allows sellers who are not able to meet the requirements to achieve compliance through other means, such as by purchasing credits, contributing to the Emissions Reduction Fund, or carrying forward a portion of their obligation to the following year.

Such a regulation could likely be legally applied at the border, though there is some uncertainty about whether it is acceptable under the WTO's Technical Barriers to Trade Agreement for a regulation to cover how a good is produced, as opposed to specifying its characteristics as a good (Gerres et al., 2019). It would protect domestic producers against low-cost, high-emissions competitors, thereby preventing leakage. And it could form the basis of a coordinated United States-Canada approach if the two countries harmonized the standards, the timetables for rolling them out, and possibly even the support mechanisms to aid the sector in transitioning to low-carbon processes.

Low-carbon standards as an option suffer from two weaknesses. The first is that they do not protect against leakage and competitiveness impacts in global markets. That is, they may hold importers to the same standard as domestic producers, but they do nothing to level the playing field for domestic producers in foreign markets; they are a purely domestic instrument (unless the standard is internationally harmonized). The second weakness is that if such standards apply only to the upstream parts of some value chains (e.g., to steel but not to steel pipes), then there may be leakage further down the value chain, and the instrument will just have pushed the risk elsewhere in the domestic economy.

5.2.3 Alternatives: The social cost of carbon

In looking for something in the U.S. regulatory regime that resembles an adjustable tax, we might land on the social cost of carbon. In his Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, President Biden creates and

mandates an Interagency Working Group on the Social Cost of Greenhouse Gases to revise the social cost of carbon (Biden, 2021a). This is a price used in the U.S. regulatory process to assess the costs and benefits of regulations. A policy that saved 1 Mt of carbon, for example, would have achieved benefits equal to a million times the social cost of carbon. Is it possible to imagine the United States elaborating a BCA that imposed the social cost of carbon on the embodied emissions of all imports?

Probably not. There's a difference between assigning a social cost of carbon and imposing a carbon tax. The social cost of carbon is used as a tool in the process of making regulations, and so it does ultimately influence the costs that those regulations impose. But it's a very indirect influence. The U.S. regulatory impact assessment process considers not only the social cost of carbon, but also all other costs and benefits associated with a proposed policy. So if the idea was to find a price that equaled the costs of U.S. regulations, and adjust that price at the border, the social cost of carbon would only be a fraction of that price.

There is another way in which the social cost of carbon and a carbon price are not directly linked. The social cost of carbon's use in the regulatory impact assessment procedure is two-fold: to prioritize among alternate policy options, and to endorse (or not) specific policy measures. In either case, *even if the social cost of carbon were the only cost or benefit considered*, the stringency of the resulting measure wouldn't necessarily correspond directly to the social cost of carbon. In the former case, the measure chosen would be the one with the highest net benefit (or lowest net cost). In the latter case, the measure's net benefit might well be significantly positive. That is, there's no equilibrating force that drives the stringency to exactly correspond to the social cost of carbon—it could be greater or less.

5.2.4 Alternatives: Section 232 tariffs

Section 232 of the U.S. Trade Expansion Act of 1962 allows the president to set tariffs independently of Congress under certain circumstances, specifically to protect national security, and following a process of investigation by the Commerce Department. Section 232 tariffs were extensively used by the Trump administration in a highly controversial manner that defined economic vitality as a matter of national security. The result was, for example, steel and aluminum tariffs of 25% and 10%, respectively, imposed on key trading partners like the European Union and Canada.

While such use was unprecedented and controversial, the United States argued that it was allowed under WTO rules. The traditional interpretation of GATT's Article XXI provisions for national security involved no judgment from the dispute settlement mechanism as to the legitimacy of each country's determination of what constitutes national security (but also involved an informal agreement not to abuse that latitude) (SCCE, 2019). That interpretation was eroded by a panel decision on a case between Ukraine and Russia in 2019, in which the panel ruled that it did in fact have jurisdiction to review national security actions, and found that Article XXI was not

"totally self-judging."[17] While it found Russia's measures to be necessary for national security in that particular case, the panel remarked in passing that WTO members invoking Article XXI have normally "endeavoured to separate military and serious security-related conflicts from economic and trade disputes."[18] It is not yet clear how this will affect the nine ongoing cases filed against the U.S. aluminum and steel tariffs.[19] Decisions are expected in many of those cases by late 2021, but if the United States appeals the decisions they will be stuck in limbo, there being for now no functioning Appellate Body to hear the appeal.

President Biden could emulate his predecessor's administration and direct an investigation into whether imports of high-carbon goods threaten national security (Holzman, 2020; Meyer & Tucker, 2020). Climate change is widely acknowledged to be a national security issue, including by independent U.S. military experts (CCS, 2018), and by the Pentagon in response to the president's Executive Order on Tackling the Climate Crisis at Home and Abroad, the first section of which is titled "Putting the Climate Crisis at the Center of United States Foreign Policy and National Security" (Biden, 2021b; Mehta, 2021). In response to the positive findings of such an investigation, Biden could, without approval from Congress, implement tariffs designed to protect national security.

Such an approach faces a few challenges. First, it's unclear how the president would determine which goods from which countries should be subject to investigation. To some extent this would involve a unilateral determination of *prima facie* harm from inadequate climate ambition. Such a determination would be a bombshell in the context of multilateral climate cooperation. Second, it's unclear how to determine the appropriate levels for such tariffs. The Commerce Department in the Trump-era Section 232 rulings was already hard-pressed to recommend tariff levels based on economic interest; determining the dollar value of harm done to the climate by individual goods from selected countries would be messy at best. Presumably the social cost of carbon could be used as the cost per tonne of embedded carbon (a challenging enough assumption), but how to calculate the per-unit carbon emissions caused by a lack of strong climate action in the country of export? Finally, any such move would be seen by trading partners and allies as an attack on multilateralism that ratcheted up, rather than de-escalated, the previous administration's controversial approach.

5.3 The Way Forward

The prospects for a shared approach between Canada and the United States depend fundamentally on how the United States proceeds. If the United States eventually adopts carbon pricing and accompanies that with a tax-based BCA, it is conceivable that the two countries could fashion a coordinated approach to which sectors should be covered, the scope of coverage, and

[17] WTO. *Russia – Measures Concerning Traffic in Transit.* Panel Report WT/DS512/R, April 5, 2019. Para. 7.103.

[18] *Ibid.* Para. 7.81.

[19] The nine cases are DS544; DS547; DS548; DS550; DS551; DS552; DS554; DS556; and DS564.

appropriate crediting arrangements for each others' regimes. This would be no small feat, but it would be feasible.

Absent U.S. carbon pricing, the best prospects for cooperation going forward may be in the area of low-carbon standards. The two countries could cooperate on designating sectors and goods to which such standards should apply, and on setting a timetable of benchmarks. Perhaps they could even cooperate on research, development, and deployment of low-carbon technologies in those sectors. Such standards might be complemented by other measures designed to ensure a market for low-carbon goods, coordinated between the two countries, such as government procurement. And they might be underpinned by joint research and development in low-carbon technologies and processes.

It is hard to envision a cooperative agenda if the United States decides to pursue a regulations-based BCA as described above, or a strategy of Section 232 tariffs. In the case of the former, it would be orders of magnitude more difficult to credit for underlying regulations than it would be for carbon pricing regimes, as noted above. Section 232 tariffs would arguably involve a deliberate decision by the United States to act unilaterally.

Given the many challenges outlined above—not to mention the political challenges of a divided federal government—it seems possible that the United States may not ultimately implement any sort of BCA. If that happens, would it still be feasible for Canada to do so unilaterally, given our special economic and political relationship?

While acting without our largest trading partner would be challenging, not acting comes with its own problems. It is hard to imagine Canada continuing to increase its climate ambition without effective policies to address leakage and competitiveness concerns, particularly in the event that the U.S. policies surveyed above do not impose much in the way of carbon costs on U.S. producers. In a go-it-alone scenario, Canada would need to find ways to engage our American counterparts so as to reduce strain on the overall economic relationship.

6.0 The EU CBAM

This section will survey the ongoing developments in the European Union with respect to its proposed CBAM, and will consider what they mean for Canada, and for the prospects of a shared agenda going forward.

6.1 Current Developments

The European Union's interest in a border carbon adjustment mechanism—called a Carbon Border Adjustment Mechanism or CBAM in the current EU discussions—dates back well over a decade (for some member states), but the current push has roots in the European Union's strengthened climate ambition, as elaborated in the EU Green Deal (European Commission, 2019a). That plan sees the European Union reducing its GHG emissions by at least 55% below 1990 levels by 2030, and the achievement of net-zero emissions by 2050. It is a distinctly more ambitious trajectory than has been enunciated previously in the European Union, and one of the most ambitious plans globally.

The EU Green Deal is an overarching plan for transformation, comprised of many elements. A non-exhaustive list includes:

- Climate action, including the 2050 and 2030 targets and a climate law in which they are enshrined.
- Clean energy, including decarbonization of the electricity grid, smart infrastructure, and addressing energy poverty.
- Sustainable industry, including industrial policy efforts aimed at furthering a circular economy and growth in green sectors of the future.
- Building and renovation, including strengthened standards for building energy efficiency, incentives, and regulatory facilitation for widespread retrofitting.
- Sustainable mobility, including a push on multi-modal transport, reform of fossil fuel subsidies, promotion of clean fuels, and strengthened CO_2 standards for automobiles.
- Sustainable agriculture, including a "Farm to Fork" program of initiatives to increase standards on animal welfare, and for increased environmental stewardship including a push for lower-input farming models.
- Ecosystems and biodiversity, including a new biodiversity strategy and a forest strategy, and a focus on blue economy.
- Eliminating pollution, including regulatory revisions to strengthen monitoring, reporting, prevention, and remediation of pollution from air, water, soil, and consumer products.

- Green finance, including creating new institutions to help finance various elements of the Green Deal, support for a "just transition", and efforts to mobilize private sector finance in support of the Green Deal.
- Research and innovation, including a push under the Horizon Europe program for innovation to underlie the Green Deal's transformation objectives, and stimulate economic growth.

Climate action is a central part of the Green Deal, with links to almost all the other elements. And a central part of that climate action is a proposal to address the potential for leakage, in the context of uneven global climate ambition. From the EU Green Deal proposal:

> "Should differences in levels of ambition worldwide persist, as the EU increases its climate ambition, the Commission will propose a carbon border adjustment mechanism, for selected sectors, to reduce the risk of carbon leakage. This would ensure that the price of imports reflect more accurately their carbon content. This measure will be designed to comply with World Trade Organization rules and other international obligations of the EU. It would be an alternative to the measures that address the risk of carbon leakage in the EU's Emissions Trading System."

The current carbon pricing regime in the European Union is its emissions trading system (ETS), a cap-and-trade scheme in existence since 2005 and now entering its fourth phase. At present, that scheme addresses the risk of leakage by freely allocating emissions allowances to covered firms, benchmarked at the sectoral 90th percentile of best practice in emissions intensity. Those firms producing at the benchmark intensity for their sectors will have just enough free allocation to cover operations, the top 10% will have excess emission allowances to sell, and those not meeting the benchmark will need to buy. The result, as with the Canadian OBPS, is that there are still incentives for decarbonization, but firms are less vulnerable to the international competition that might give rise to leakage.

That system of protection has worked fine in previous phases, but is widely seen as inadequate in the context of ramped-up climate ambition. At a practical level, as the overall cap under the ETS is reduced, other things being equal, some projections see the number of free allocations actually exceeding the cap by the mid 2030s (Marcu, Vangenechten, et al., 2020).[20] For another thing, the path to net-zero will demand costly investments in new technology rather than marginal improvements, and a carbon price muted by free allocation is seen as unable to impel those kinds of investments. Thus the interest in pursuing a CBAM, which aims to allow the full carbon price to be transmitted to domestic producers and consumers, while minimizing leakage risk.

The European Commission has mandated itself to produce a proposal on CBAM by June 2021, together with a raft of other proposals on initiatives related to the 2030 target—a package known

[20] In fact under current rules, exceeding the cap is impossible; a cross-sectoral correction factor kicks in as the cap declines, to also lower the supply of allowances across the various sectors when it exceeds a maximum percentage of the cap.

as "Fit for 55." To feed into the CBAM proposal it convened two sets of public consultations and is conducting internal impact assessments. Also important in the timeline: in May 2020 the European Commission included revenue from the CBAM (at EUR 5 billion to EUR 14 billion per year) as part of its next multiannual financial framework (running until 2027), designating it as a source of funds for the EU Recovery Plan ("Next Generation EU"). This budget was confirmed in special European Council meetings in July 2020. As well, rather than waiting for the Commission's proposal, the European Parliament in March 2021 approved its own vision of what an EU CBAM should look like (European Parliament, 2021).

When the Commission's proposal is released, the next legislative step will be approval by the European Parliament and the European Council. There will be a process of negotiation and accommodation before any such approval is effected. The target date for implementation of a CBAM in the European Union is 2023.

At this point, we know little about the shape of the Commission's proposal. A widely circulated draft, leaked a month before the proposal was due, had it covering five sectors—cement, electricity, fertilizers, iron and steel, and aluminum—and constituted in a two-year pilot phase, with full implementation starting in 2026. As described in the leak, it would credit for foreign price-based policies and would exempt only those countries with emissions trading systems linked to the ETS. It asks importers for actual data on emissions, and where that data is not forthcoming would assign a (relatively punitive) default emission intensity equal to the 10th percentile worst performers in the EU. Per the leaked draft, revenues will be retained by the Commission as "own resources," to be used to finance post-COVID recovery. Free allocation seems likely to be retained at least in the pilot phase, with the CBAM covering only that portion of carbon costs that free allocation doesn't cover. While these details are indicative, they aren't a reliable predictor of the details of the proposal, and they certainly can't predict the final agreement that the European Council, Commission, and Parliament will reach. The Commission has been intensely lobbied by EITE industry representatives on a few key issues, including:

- They argue that free allocation should not simply be removed when a CBAM is introduced. For one thing, they are concerned that the CBAM will be found WTO-illegal, and they will be left with no protection. For another, they note that export coverage by a CBAM would be WTO-illegal, the ETS being a regulatory instrument, and so they need some protection from leakage in global markets. The leaked draft kicks this can down the road, referring to the forthcoming proposals for reform of the ETS, but seems to guarantee that free allocation will be maintained.
- They argue that the CBAM would be unsuitable to sectors with high indirect costs, such as non-ferrous metals (chiefly aluminum), unless it covers scope 2 emissions. The draft proposal covers scope 2 emissions.
- They argue that sectors with long and complex downstream value chains are at risk of leakage not just at the upstream, where the major emissions occur, but also downstream, where the costs are passed through. An effective CBAM must, in their view, cover

downstream sectors and allow coverage of scope 3 emissions from embodied carbon in inputs. The draft proposal does cover scope 3 emissions.

6.2 The Way Forward

From Canada's perspective there are three sets of issues going forward. The first is ensuring that any CBAM is fairly elaborated, in ways that do not unduly penalize foreign producers. This would involve consultation after the Commission's proposal is tabled in June 2021, and should be informed by meaningful private-sector consultations within Canada, though the timelines will be tight. The main issues would include:

- Securing fair crediting for foreign climate policies such as Canada's OBPS.
- Avoiding the double protection that might come from the co-existence of free allocation and a CBAM.
- Ensuring that, if a default emissions intensity is assumed, there are fair and effective facilities for challenging the benchmark.

The second set of issues centres on a cooperative agenda going forward. Canada and the European Union share climate ambition, share a price-based regulatory approach, and share an interest in ensuring that this approach is not undermined by leakage. It should be possible to cooperate in ways that benefit both jurisdictions, making the efforts in this space more international and less unilateral, for example by:

- Agreeing on best practices in technical and substantive areas, such as calculating embodied emissions, setting benchmarks, crediting practice, use of revenue, etc.
- Agreeing on interpretations of trade law under the Comprehensive Economic and Trade Agreement (CETA)[21] that govern the elaboration and implementation of BCA. Such interpretations would not alter the WTO-based rights and obligations of non-CETA parties, but they would help facilitate the process of bringing the necessary discussions into the WTO.
- Reviewing the experience of BCA/CBAM mechanisms in practice, should they be implemented, for example in the CETA's Committee on Sustainable Development, which has a mandate to discuss, among other things, "trade-related aspects of the current and future international climate change regime, as well as domestic climate policies and programmes relating to mitigation and adaptation, including issues relating to carbon markets, ways to address adverse effects of trade on climate …"[22]

The third set of issues involves helping, where possible, to prepare Canada's domestic firms for the application of the European Union's CBAM, through information sharing,

[21] The CETA is a free trade agreement between Canada and the European Union. It entered into force provisionally in 2017.

[22] Listed as an area on which the Parties commit to cooperate (CETA Article 24.12).

technical assistance, and capacity building. It is impossible to predict what sort of assistance will be appropriate in ignorance of the CBAM's final shape, but setting up the channels of communication during internal consultations will help prime the Canadian government to play a valuable role in this space when the time comes.

7.0 Recommendations

1. Coordinate with key trading partners: The European Union seems certain to implement a CBAM, perhaps by 2023. The United States seems likely to implement some similar instrument, though at this point we don't know what that might look like. Given the relatively small size of the Canadian economy and our reliance on trade with these economies—especially the United States—Canada should work in close coordination with both of them.

With respect to the European Union's CBAM, we should be pushing for crediting for foreign carbon pricing, mechanisms for Canadian producers to challenge any default emissions-intensity assumptions, and assurances that EU firms will not be double protected by CBAM and free allowances.

With respect to the United States, we should argue against the use of Section 232 tariffs, and seek a collaborative approach to the extent that we can in the absence of U.S. carbon pricing (e.g. harmonized low-carbon standards).

If Canada implements a BCA, we should aim to minimize design differences with the systems being developed by our peers, to the extent possible given our different underlying climate policies. At a minimum, we should aim to agree on best practices in areas like measuring embodied carbon in traded goods, crediting for foreign pricing, and setting default values for embodied carbon. Ideally such agreements would serve as a basis for broader international agreement; as international climate ambition ramps up, Canada, the United States, and the European Union will not be the only jurisdictions considering BCA.

2. Consult broadly: A Canadian BCA would have significant impacts on the Canadian economy, and would affect different sectors quite differently. It is thus essential that the federal government closely consult with industry and other stakeholder groups as it designs its policy. But the government should also go further, consulting closely with provincial governments as well as all major federal political parties. Encouragingly, the NDP, the Green Party, and the Conservative Party have all spoken positively about the prospect for a border carbon adjustment. Engaging these parties—as well as the Bloc Québecois and provincial governments—could help build political consensus on BCAs, ensuring they are politically durable. Meaningful consultation garners buy-in, and minimizes the risks that a BCA could be dismantled following a change in government. Of course, consultation does not mean consensus, and the federal government will need to balance the need for generating buy-in with the need to act efficiently.

3. Simplify where possible: Designing a BCA involves many complicated considerations. The need to satisfy a wide array of stakeholders will also create the temptation to design bespoke rules for each industry, or even each trading partner. While the final design of any BCA will inevitably be quite complex, Canada policymakers should attempt, as much as possible, to make design choices that offer clarity and relative simplicity. Among other benefits, this will be easier to administer and reduce the costs imposed on businesses who are required to comply. A good

example involves the benchmark approach to evaluating embodied emissions. While this system risks letting higher emitters off too easily, the simplicity of this approach is a major advantage relative to a product-based approach.

4. Future-proof the design: The BCA system should be designed to accommodate potential changes in the domestic carbon pricing system. In particular, the system should be designed to work both with the output-based pricing system that exists today as well as the likely future scenario in which industrial emitters face the full carbon price in combination with a BCA. Beyond full carbon pricing, there are other policy design changes that might occur, such as the sectors that fall under the BCA, the benchmark stringency applied to individual sectors, as well as other details that might be changed by the provinces and territories that administer most of the industrial pricing systems in operation around the country.

5. Start now: Designing a BCA would take several years, and the carbon pricing regime that BCA would support is already moving ahead on its own ambitious timetable. Furthermore, the European Union is aiming to have its BCA in place by 2023, with international consultations starting in mid-2021. There is little time to waste. If Canada wants to have a BCA to help it avoid leakage, and accelerate the transition to a low-carbon economy, it should start developing that regime now.

8.0 Conclusions

Canada's climate ambition, with a net-zero target for 2050 and a roadmap to a significant carbon price, means that sooner or later we will have to grapple with how best to reduce emissions while avoiding leakage and maintaining competitiveness. BCA is one obvious choice for trying to meet these objectives.

A BCA is a powerful tool but it is no silver bullet. This report aims to help policymakers understand the complex policy decisions that lie ahead in designing a BCA, and the importance of clarifying and balancing potentially competing objectives. Even the best-designed BCA should be seen as one tool in a suite of policies and measures that aim to prevent leakage and protect competitiveness. Depending on the policy objective, a BCA will need to be complemented by other policies to support competitiveness, such as government procurement, financial support, and investments in research, development, and deployment of low-carbon technologies and processes.

If Canada acts wisely, and coordinates with its international peers, it can help to accelerate the arrival of a day when enough major economies have established domestic carbon pricing, or its equivalent, to make concerns about leakage and competitiveness insignificant. But in the meantime, Canada needs to both explore its own options for enabling high climate ambition, and be prepared for others to do the same.

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Appendix A: Comparing Canadian and EU Carbon Intensities

Should Canada and the European Union resolve to cooperate in some manner, and work toward harmonizing their respective regimes for prevention of leakage and competitiveness impacts, they will face some challenges. While BCA is often compared to a value-added tax, which can be relatively easily coordinated among many different countries, that kind of coordination for BCA would be daunting. This appendix explores some of the practical difficulties involved.

As described above, the European Union and Canada have both adopted output-based product emission-intensity benchmarks for emission-intensive trade-exposed sectors. The benchmarks provide a basis for applying a carbon cost to domestic producers that exceed the benchmark, and they provide a price incentive for industrial emitters to reduce their emissions. However, the regulatory systems are very different. Canada's federal Output Based Pricing System (OBPS) uses a rising carbon price, and benchmarks that are based on a specified fraction of average historic production levels, whereas the EU Emission Trading System (ETS) is a cap-and-trade system with a floating market carbon price based on a declining cap of permits issued, and product benchmarks set at the average emission level of the most efficient 10% of installations.

In Table 7, Canadian OBPS benchmarks for the different vulnerable product categories identified in Table 3 are compared to available EU ETS benchmarks. Benchmarks from Alberta's Technology Innovation and Emissions Reduction (TIER) system are used for oil and gas extraction, as federal benchmarks are not available. The EU ETS benchmarks are draft phase 4 values and are the 2021-2030 starting point benchmarks identified in the Official Journal of the European Union.

The last column of Table 7 contains an assessment of product equivalency. This assessment is based on whether the benchmarks can be directly compared. There are five main reasons why a valid comparison is, in many cases, not possible:

1. **No EU ETS benchmark is available for the Canadian product category that is under consideration.** Benchmarks need to exist in both jurisdictions in order to establish a comparable reference point. The EU ETS has identified 52 different benchmarks for a wide variety of products but, for example, none of these product benchmarks cover upstream natural gas processing or crude oil production. This is in part because the European Union's import dependency for crude oil and natural gas is above 90% with limited domestic production (Eurostat, 2020), and because alternative regulatory approaches are used in different producer countries and these products are not included in the EU ETS. There are also products such as ethanol and polyethylene that have product benchmarks in Canada, but in the European Union are covered under fall-back benchmarks for heat consumption or fuel use consumption that are not directly comparable.

2. **EU ETS benchmarks and Canadian benchmarks do not cover the same industrial processes that are associated with the product.** Benchmarks are designed to cover different facilities and processes. In many cases there are equivalent products covered by both the Canadian OBPS benchmarks and the EU ETS benchmarks, but the benchmarks don't cover the same emissions and processes. A good example is the benchmarks related to iron and steel production. There are multiple benchmarks in Canada for the production of steel using coking coal in a blast furnace. Benchmarks cover different portions of iron and steel making, including production of metallurgical coke in coke ovens, production of iron ore pellets, production of iron from smelted iron ore, and finally production of steel in a basic oxygen furnace. These individual process benchmarks cannot be directly aligned to EU ETS benchmarks that cover multiple different processes.
3. **Product benchmarks may have different units of measurement based on methodologies that are not directly comparable.** The Canadian and EU benchmarks for refinery products cover the same products but use different units of measurement. The Canadian benchmark is based on tonnes of CO_2e per weighted complexity barrel while the EU benchmark is based on tonnes of CO_2e per CO_2 weighted tonne. They are similar in that they both weight the emissions for different subunits of production (e.g., subunits of propane, diesel, gasoline, heavy oil), but they are methodologically different and so are not directly comparable. The Canadian metric is associated with a barrel of crude oil input, while the EU metric is associated with a tonne of carbon input.
4. **Product benchmarks represent a specific sub-product that does not have an equivalent.** For pulp and paper, Canada has three benchmarks: a benchmark for processes that include a recovery boiler, lime kiln or pulping digester, a benchmark for all other processes, and a calculated benchmark for specialty products. In the EU ETS system there are four different product benchmarks for pulp manufacturing, some of which don't directly overlap with Canada's benchmarks, and others which are a subset of Canada's benchmark for pulp and paper made by all other processes.
5. **Boundary and methodological differences may also be an issue in comparison.** There are many different sources of emissions that may or may not be included in product benchmarks. It is clear that EU and Canadian federal OBPS product benchmarks include all direct stationary combustion and industrial process emissions that occur at a facility; however there are groups of emissions where it is less clear whether they are always included or excluded. For example, emissions from waste treatment, emissions from on-site or off-site transportation fuel use, emissions related to product use, and upstream emissions related to product inputs for processes that may or may not occur onsite. Indirect emissions from imported electricity and heat are always excluded from the EU ETS and federal OBPS; however, they have a different treatment under provincial systems such as Alberta's TIER system. Fugitive emissions are almost always included in the EU ETS and Canada's federal OBPS; however, for upstream oil and gas, fugitive methane emissions are not included in Canada's OBPS. A careful review of methodologies would need to be conducted to ensure that the benchmarks have equivalent coverage of different GHGs and sources.

Table 7. Comparison of Canadian and EU benchmarks.

Industry	Product / product category	Product (Canadian standard)	Canadian benchmark	Product (EU Standard)	EU draft benchmark	Product equivalency assessment
Oil and gas extraction (conventional)	Natural gas and natural gas liquids	Processing and production of natural gas	10.6 tCO_2e/100,000 m^3 of pipeline transmission	NA	NA	NA
		Natural gas liquids	0.0301 tCO_2e/m^3	NA	NA	NA
	Conventional crude oil	Light crude oil	0.0159 tCO_2e/barrel	NA	NA	NA
Iron and steel mills	Iron and steel and ferroalloy manufacturing	Production of metallurgical coke in a coke oven battery	0.597 tCO_2e/tonne	Coke (not necessarily related to steel making)	0.286 tCO_2e/ tonne	Benchmarks incomparable and different products
		Production of iron ore pellets	0.056–0.990 tCO_2e/ tonne	Sintered ore	0.171 tCO_2e/ tonne	
		Production of iron from smelted iron ore	0.146 tCO_2e/tonne	Hot metal (liquid iron) product of blast furnace	1.328 tCO_2e/ tonne	
		Production of steel in a basic oxygen furnace	0.164 tCO_2e/tonne			
		Production of steel in an electric arc furnace	Variable by facility depending on net thermal energy allowance (95% of covered emissions)	EAF high alloy steel	0.352 tCO_2e/ tonne	Benchmarks incomparable and different products
				EAF carbon steel	0.283 tCO_2e/ tonne	

Industry	Product / product category	Product (Canadian standard)	Canadian benchmark	Product (EU Standard)	EU draft benchmark	Product equivalency assessment
Oil sands extraction (non-conventional)	Synthetic crude oil	Synthetic crude oil	0.0408 tCO_2e/barrel	NA	NA	NA
	Bitumen	Bitumen and heavy crude oil[23]	0.0544 tCO_2e/barrel	NA	NA	NA
Cement and concrete product manufacturing	Cement and concrete products	Clinker	0.799 tCO_2e/tonne	Grey cement clinker	0.766 tCO_2e/ tonne	Close product equivalency
Pesticide, fertilizer, and other agricultural chemical manufacturing	Ammonia and chemical fertilizers	Ammonia	1.82 tCO_2e/tonne	Ammonia	1.619 tCO_2e/ tonne	Product equivalency
Basic chemical manufacturing	Petrochemicals (e.G., High-value chemicals)	High-value chemicals from steam cracking (ethylene, propylene, butadiene)	0.652 tCO_2e/tonne	High-value chemicals from steam cracking (ethylene, propylene, butadiene, benzene, hydrogen)	0.702 tCO_2e/ tonne	Product equivalency
	Other basic organic chemicals (e.G., Ethanol)	Styrene	0.925 tCO_2e/tonne	Styrene	0.527 tCO_2e/ tonne	Product equivalency
		Polyethylene	0.164 tCO_2e/tonne	NA	NA	NA
		Ethanol	0.321 tCO_2e/tonne	NA	NA	NA

[23] Alberta's TIER system differentiates between in-situ and mining bitumen production.

Industry	Product / product category	Product (Canadian standard)	Canadian benchmark	Product (EU Standard)	EU draft benchmark	Product equivalency assessment
Petroleum refineries	Refined petroleum (e.G., Gasoline, diesel, heavy oil)	Refining of crude oil	0.0042 tCO_2e/ complexity weighted barrel	Refinery products	0.0295 tCO_2e/CO_2 weighted tonne	Different products
Pulp, paper, and paperboard mills	Pulp and paper (e.G., Wood pulp, paperboard, newsprint)	Pulp—recovery boiler, lime kiln or pulping digester	0.203 tCO_2e/tonne	Short fibre kraft pulp	0.12 tCO_2e/ tonne	Benchmarks incomparable and different products
				Long fibre kraft pulp	0.06 tCO_2e/ tonne	
		Pulp other	0.184 tCO_2e/tonne	Sulphite pulp, thermomechanical and mechanical pulp	0.02 tCO_2e/ tonne	
				Recovered paper pulp	0.039 tCO_2e/ tonne	

Source: Government of Canada, 2019; European Commission, 2019b.

Appendix B: Biden Climate Policies

The Biden administration gave a sense of its priorities shortly after the presidential inauguration, in a series of climate-related executive orders (Biden, 2021a, 2021b). These set in motion processes to:

- Develop a national emissions target.
- Achieve a carbon-free electricity sector by 2035.
- Increase fuel economy and emissions standards.
- Boost procurement of electric vehicles for government and USPS fleets.
- Tighten up methane emissions standards for oil and gas operations.[24]
- Strengthen building efficiency standards.
- Revise and strengthen the social cost of carbon used in regulatory decision making.
- Increase siting of renewable energy generation on public lands and in offshore waters.
- Pause new oil and gas leases on public lands, pending a review of permitting and leasing practices.
- End federal fossil fuel subsidies (those that the administration can end—not tax incentives, which would require congressional approval).
- Create a civilian climate corps focused on nature-based solutions and environmental remediation.
- Support carbon sequestration by tribes, farmers, ranchers, forest owners, and others.
- Support economic and social recovery of coal, oil, gas, and power plant-dependent communities.
- Elaborate a suite of initiatives aimed at environmental justice.

Biden also committed, in his election platform, to a USD 2 trillion push to support climate-related innovation and technology development, promising an Advanced Research Projects Agency for climate (ARPA-C) that mimics the successful Advanced Research Projects Agency-Energy (ARPA-E) funding model supporting innovation in energy (Biden, 2020a).

Of course, the final shape of this presidency's climate ambition will also be embodied in legislative efforts. To get a feel for what those might look like, it's instructive to assess the first piece of climate-related legislation to come to Congress since the 2021 presidential inauguration: the CLEAN Future Act (H.R. 1512), introduced by the leadership of the House Energy and Commerce Committee (the House of Representatives committee with primary jurisdiction over climate change). This act has many of the features found in the clean energy plan that Biden

[24] Methane regulations will probably also be the subject of a Congressional Review Act reinstatement of Obama-era regulations.

proposed during his candidacy for president (Biden, 2020b). While this bill will not pass both houses of Congress in its current form, it is very likely that some or many elements of it will be passed in 2021, given its provenance and the work that has already been done in bringing it to the House (it is an updated version of a draft circulated and widely discussed in 2020 hearings) (Lashof et al., 2021).

The bill includes provision for:

- A national target of 50% emissions reduction from 2005 levels by 2030.
- Federal protection of marginalized communities from disproportionate impacts of environmental damages, and of climate policy.
- Support for a transition for fossil fuel-dependent workers and communities, and for communities dependent on manufacture of internal combustion engine automobiles.
- USD 100 billion over 10 years to support the electrification of transport, including measures to support electric vehicle charging infrastructure and retooling for automobile manufacturers.
- Increased energy efficiency and decarbonized heating and appliances in new and existing buildings, including stronger building codes and USD 40 billion in support over 10 years.

Provisions that might affect the cost of fossil fuel inputs and electricity for EITEs include those aimed at:

- Reducing methane emissions from oil and gas operations, compared to 2012 levels, by 65% in 2025 and 90% in 2030, including through tougher standards and support for technology development.
- A pause on permitting for petrochemicals plants, and tighter emissions and health standards for existing plants.
- A Clean Electricity Standard requiring utilities to decarbonize, with zero-emission sources in the mix at 80% by 2030 and 100% by 2035. The proposed regime would grant tradable credits to those that exceed the targets, and offer the possibility of compliance payments for those that miss them. It includes provisions for the Federal Energy Regulatory Commission to institute a carbon pricing regime under the Federal Power Act. It would also feature a carbon mitigation fund to support investments in decarbonization, and various other funding programs, including for the modernization of the electric grid, the creation of microgrids, and the creation of solar capacity in or serving marginalized populations.

Title V on industry is worth noting, because it directly affects, among others, EITEs. It includes provisions for:

- A buy-clean procurement program, with targets for low-carbon steel, cement and other materials in any federally funded projects.

- A major Department of Energy role in improving industrial efficiency, including by means of a loan guarantee program.
- A technology commercialization program for carbon capture and utilization.
- Reauthorizing the Combined Heat and Power (CHP) Technical Assistance Partnership Program to facilitate the deployment of energy efficient CHP systems.
- Directing the Secretary of Energy to develop a national strategy for developing and deploying smart manufacturing technologies.
- Providing rebates to facilities that purchase or install more efficient electric motor systems.


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