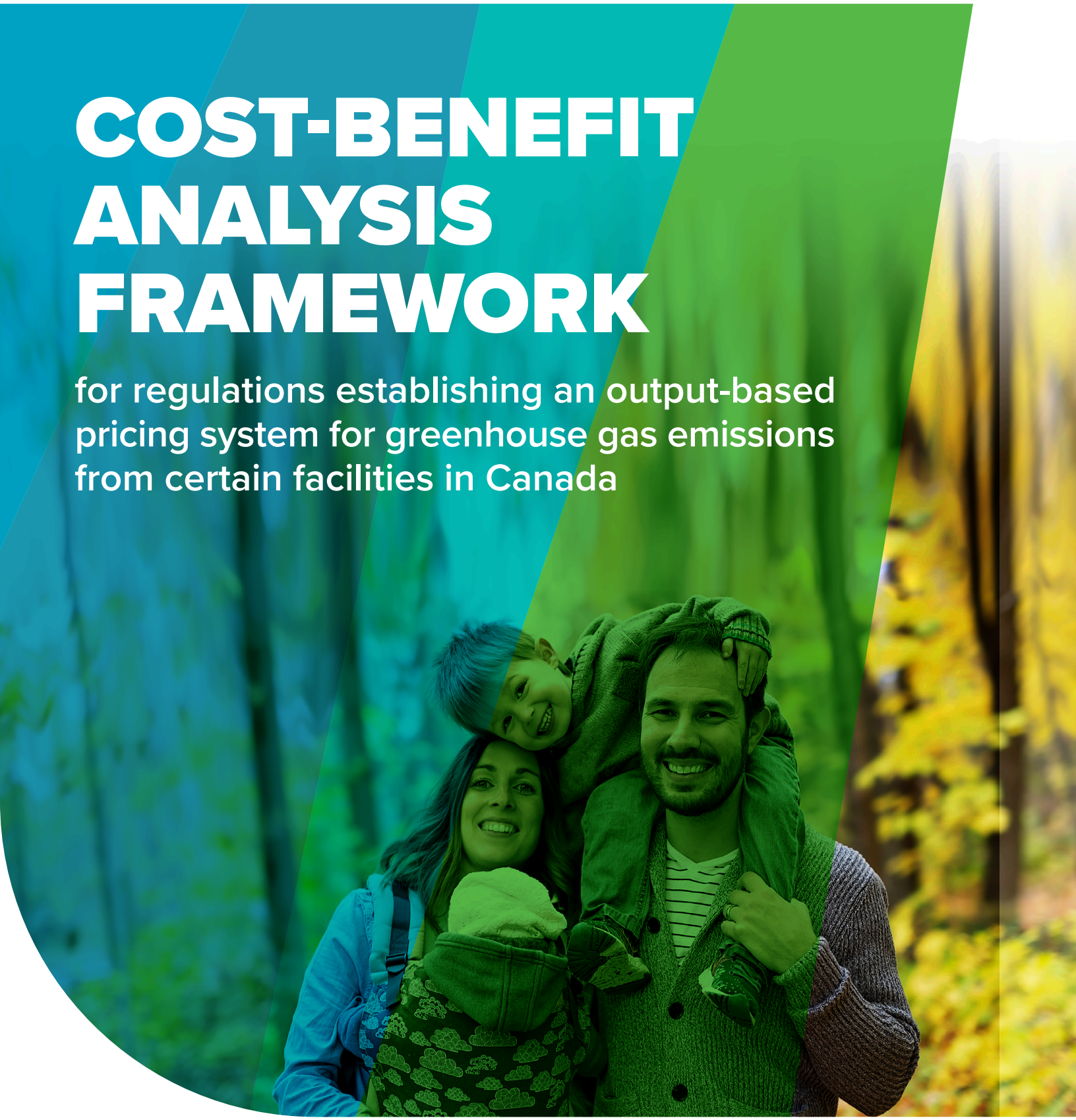
Environment and Climate Change Canada
Environnement et Changement climatique Canada

COST-BENEFIT ANALYSIS FRAMEWORK

for regulations establishing an output-based pricing system for greenhouse gas emissions from certain facilities in Canada



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COST-BENEFIT ANALYSIS FRAMEWORK FOR REGULATIONS ESTABLISHING AN OUTPUT-BASED PRICING SYSTEM FOR GREENHOUSE GAS EMISSIONS FROM CERTAIN FACILITIES IN CANADA

The goal of this cost-benefit analysis (CBA) framework is to establish a proposed analytical approach to assess the benefits and costs (impacts) of the regulations establishing an output-based pricing system for greenhouse gas (GHG) emissions from certain facilities in Canada (the Regulations). The analysis of these regulations would compare a scenario in which there are no new regulations to a scenario in which new regulations would implement an output-based pricing system (OBPS) for GHG emissions from facilities undertaking certain industrial activities in Canada. The impacts of the Regulations would be assessed in terms of incremental changes in compliance and administrative requirements, emissions and production, and the associated benefits and costs.

CONTEXT

The *Greenhouse Gas Pollution Pricing Act* (GGPPA or the Act) received Royal Assent on June 21, 2018, as part of the *Budget Implementation Act, 2018, No. 1*. For the purpose of ensuring that the pricing of GHG emissions is applied broadly in Canada, the GGPPA provides the legal framework and authorities for the federal carbon pollution pricing backstop system (the federal backstop system). This system includes a fuel charge regime under the Act, as well as an OBPS that would be implemented by means of regulations made under the authority of the Act.[1] The GGPPA provides the Governor in Council with authority to determine in which provinces, territories and areas (backstop jurisdictions) the GGPPA applies.

Part 1 of the GGPPA establishes a charge on fossil fuels – known as the fuel charge – that would generally be paid by fuel producers or distributors and would generally apply to fossil fuels produced, delivered or used in a backstop jurisdiction, brought into a backstop jurisdiction from another place in Canada, or imported into Canada at a location in a backstop jurisdiction. Part 2 of the Act provides the legal framework and authorities to establish a regulatory trading system for large industry – known as the OBPS. Facilities taking part in the OBPS are generally understood to face international competition for their output. In backstop jurisdictions, a facility participating in the OBPS would face a compensation obligation on the portion of its GHG emissions exceeding a regulated limit, instead of incurring the fuel charge on the fossil fuels that it purchases for use for prescribed activities.

[1] The fuel charge is expressed in dollars per unit of fuel (e.g., dollars per litre).

SCENARIO DEFINITIONS

This CBA is a regulatory impact analysis and its purpose would be to estimate the incremental impacts attributable to the Regulations. The impacts of the statute or legislation that provides regulatory-making authority (in this case, the impacts of the GGPPA) are thus technically out of the scope of the impacts attributable to the specific regulatory policy. As a result, the impacts of particular importance for this CBA are those resulting from the requirements of the Regulations.

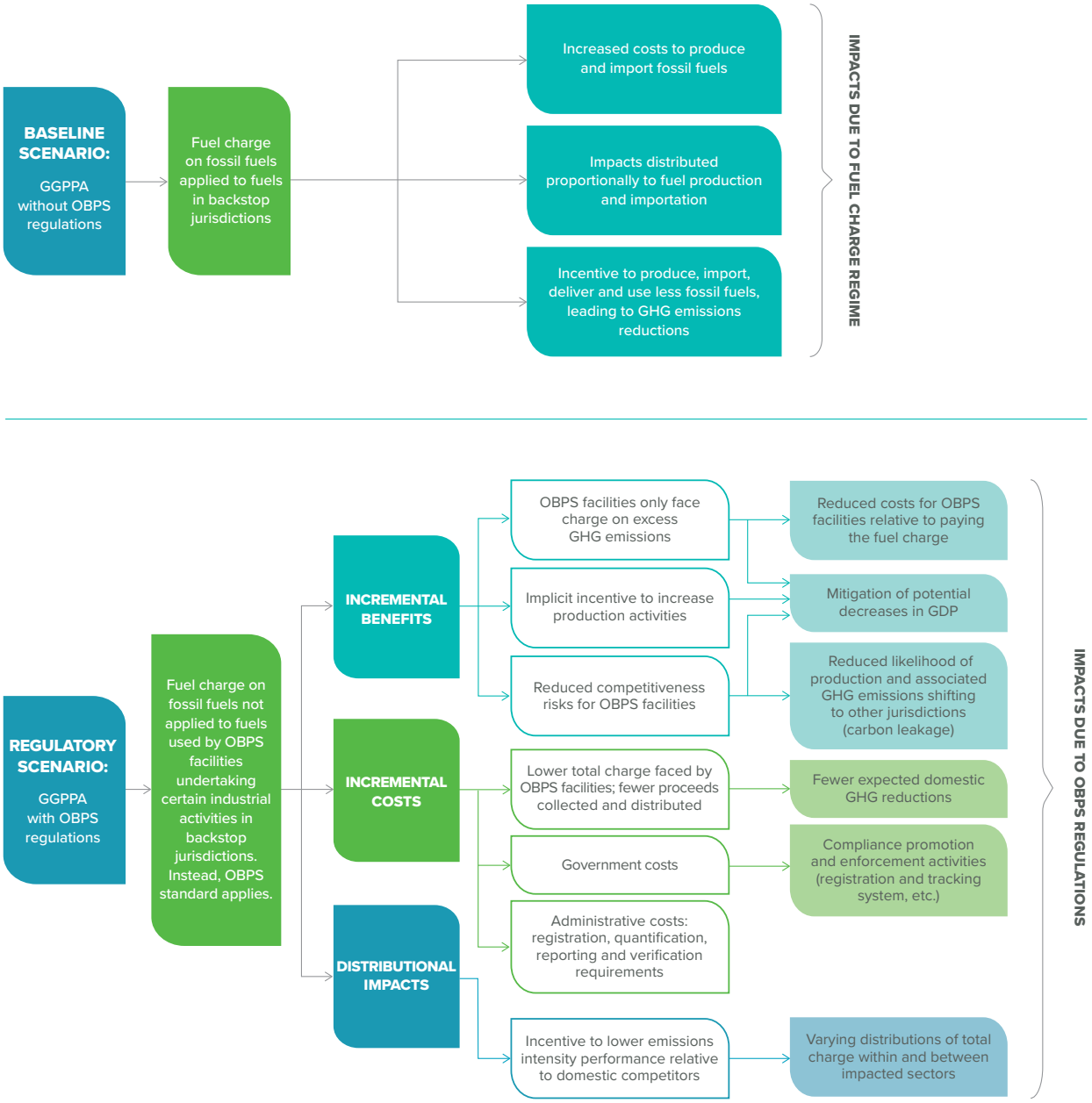
Given this analytical scope, the scenario without OBPS regulations (the baseline scenario) for this regulatory impact analysis is defined as a state in which the GGPPA is enacted; however, regulations are not developed under Part 2 of the Act to implement an OBPS for GHG emissions from facilities undertaking certain industrial activities in backstop jurisdictions. In this scenario, the fuel charge under Part 1 of the Act would generally apply to fossil fuels produced, delivered or used in a backstop jurisdiction, brought into a backstop jurisdiction from another place in Canada, or imported into Canada at a location in a backstop jurisdiction. In the baseline scenario, the fuel charge would generally apply to fossil fuels used by facilities in backstop jurisdictions.

The scenario with OBPS regulations (the regulatory scenario) is defined as a state in which the GGPPA is enacted and regulations are developed under Part 2 of the Act to implement an OBPS for GHG emissions from facilities undertaking certain industrial activities in backstop jurisdictions. Under the regulatory scenario, the fuel charge regime would not apply to fossil fuels used at facilities participating in the OBPS. Instead, facilities undertaking certain industrial activities would be subject to annual facility emissions limits based on GHG emissions intensity standards (output-based standards) for prescribed production activities.

It is important to note that while Part 2 of the GGPPA establishes the legal framework and authorities for the OBPS, this system cannot be implemented in the absence of enabling regulations. In the baseline scenario, Part 1 of the Act (the fuel charge regime) would apply to all fossil fuels used in backstop jurisdictions by default. This is a “hypothetical” or counterfactual scenario because it reflects how the GGPPA is structured; it does not reflect the Government of Canada’s policy approach. In theory, the fuel charge regime could function with Part 1 of the Act in effect, without regulations under Part 2 of the Act in place to implement the OBPS. Nevertheless, the federal government’s policy intent is to have the OBPS start shortly before the fuel charge regime, in order to provide relief from the fuel charge to facilities undertaking certain industrial activities in backstop jurisdictions. The OBPS is designed to ensure there is a price incentive for these facilities to reduce their GHG emissions and spur innovation, while maintaining competitiveness and protecting against carbon leakage.

The expected impacts of the Regulations are illustrated in Figure 1. Requiring facilities in backstop jurisdictions to comply with output-based standards, instead of facing a fuel charge on the fossil fuels that they use in their activities, is expected to reduce the costs of complying with the GGPPA, while maintaining a price incentive to reduce GHG emissions. The relatively lower costs of GHG pollution pricing in the regulatory scenario would lower the risks of domestic production decreasing, or of production activities shifting to jurisdictions outside of Canada with less stringent or no GHG pollution pricing policies (“carbon leakage”), while leading to lower expected domestic emissions than would result from application of the full fuel charge.

FIGURE 1: EXPECTED BENEFITS AND COSTS



BENEFITS OF THE REGULATORY SCENARIO

Figure 1 characterizes the expected benefits due to the exemption of fossil fuels used by OBPS participants from the fuel charge and the application of an OBPS standard. In general, the system is anticipated to reduce the costs of GHG pollution pricing for facilities subject to the OBPS, relative to the costs of the fuel charge regime under Part 1 of the GGPPA. This fuel charge cost relief would be provided as follows:

- The GGPPA requires facilities undertaking certain industrial activities in backstop jurisdictions to register in order to obtain covered facility certificates from the Minister of the Environment (the Minister).
- A covered facility certificate would allow an OBPS participant to register as an emitter with the Canada Revenue Agency (CRA) and obtain an exemption certificate under Part 1 of the Act.
- From the time the fuel charge starts to apply, and upon production of the exemption certificate, an OBPS participant would be exempt from paying the fuel charge (i.e., a participant would be able to purchase charge-free fuel), in accordance with the rules set out under Part 1 of the Act.
- Instead of incurring the fuel charge, an OBPS participant would be required to compensate for the GHG emissions that exceed the annual facility emissions limit.[2]

Overall, it is expected that the OBPS would generate fuel charge cost relief for the facilities required to participate in the system. However, it is possible that the OBPS could result in increased costs for some facilities with relatively high levels of emissions that are not due to combustion activity, but are nonetheless associated with production processes (i.e., process emissions), relative to the baseline scenario in which the fuel charge generally applies to fossil fuels that result in GHG emissions by means of combustion (i.e., combustion emissions). However, such cases are expected to be rare given the design and flexibilities of the OBPS.

The OBPS retains a price on GHG pollution and thus an incentive to reduce GHG emissions. Nevertheless, the requirement to compensate for excess emissions within this system would decrease the competitiveness risks posed by the pricing of GHG pollution that facilities undertaking certain industrial activities could face under the fuel charge regime. Given that the risks to competitiveness are expected to be lower in the regulatory scenario than in the baseline scenario, the implementation of the OBPS would mitigate carbon leakage and decreases in domestic production resulting from GHG pollution pricing.

The output-based standards established in the Regulations would also offer an incentive for participants in the system to increase their production activities, while decreasing their GHG emissions intensity levels. The OBPS provides an implicit output incentive that encourages participants in the system to increase their production levels at a rate that is greater than the rate at which their GHG emission levels change in response to the increased production activity. From a macroeconomic perspective, this implicit output incentive is anticipated to help mitigate potential decreases in gross domestic product (GDP) that may result from pricing GHG emissions.

[2] The compensation can be provided by remitting compliance units, paying the excess emissions charge or a combination of both. The excess emissions charge is expressed in dollars per tonne of carbon dioxide equivalent (CO_2e).

COSTS OF THE REGULATORY SCENARIO

Figure 1 characterizes the expected costs due to the exemption of fossil fuels used by OBPS participants from the fuel charge and the application of an OBPS standard. These costs can be categorized as societal costs due to fewer GHG emissions reductions occurring domestically in the regulatory scenario relative to the baseline scenario; administrative costs for mandatory OBPS participants; and federal government costs.

The implementation of the OBPS means that facilities undertaking certain industrial activities in backstop jurisdictions would face a price on GHG pollution. Under the OBPS, these facilities would face a lower total compensation obligation than they would under the baseline scenario as they would only face costs related to emissions that exceed their annual limit. Although these facilities will face a financial incentive for continuous emissions reductions, the OBPS is expected to result in fewer domestic emission reductions than would occur under the baseline scenario. Foregone domestic GHG emissions reductions represent a cost to society and would be monetized using the social cost of carbon.[3]

The foregone domestic GHG emission reductions will be offset to some extent by avoided carbon leakage, because reducing the costs of compliance is expected to reduce the risk that production, and associated GHG emissions, would shift to other jurisdictions where the carbon intensity and regulatory controls are uncertain. It will not be possible in the cost-benefit analysis to be conducted for these regulations to quantify the amount of increased foreign emissions the OBPS will help avoid, but these impacts will be analyzed and accounted for qualitatively.

In terms of administrative costs, persons responsible for facilities required to participate in the system would incur one-time, upfront costs under the regulatory scenario, as they would be required to apply to the Minister and the CRA to register in the system. There would also be ongoing administrative costs for mandatory participants associated with the monitoring and gathering of information, including data related to facilities' levels of production and GHG emissions, and the use of charge-free fuel. The Regulations would also contain requirements concerning the quantification, reporting and verification of the collected information that would result in further annual administrative costs.[4]

In addition, the federal government would incur costs associated with the OBPS. The federal government would face upfront costs to conduct compliance promotion activities and develop a secure electronic system for the tracking of surplus credits issued, purchased, sold, remitted (used) and retired, eligible offset credits, and payments of the excess emissions charge. Environment and Climate Change Canada (ECCC) would also face ongoing costs for enforcement activities undertaken to support the OBPS, and to administer the compliance tracking system.

[3] More information on the social cost of carbon can be found at the following link: http://ec.gc.ca/cc/default.asp?lang=En&n=BE705779-1

[4] The costs incurred by facilities in backstop jurisdictions that voluntarily participate in the OBPS would not represent compulsory costs due to the Regulations, as the persons responsible for these facilities would have the discretion to choose between the fuel charge regime and participation in the OBPS.

DISTRIBUTIONAL IMPACTS

Under the baseline scenario, facilities undertaking certain industrial activities in backstop jurisdictions would be incentivized to decrease their use of fossil fuels that result in combustion emissions, irrespective of the emissions intensities of competing facilities. In contrast, under the regulatory scenario, participants in the OBPS would have the incentive to lower their emissions intensities relative to the applicable output-based standard, which has been derived from the historical emissions intensity performance of facilities across Canada in the same industrial sector or output grouping.

In general, the establishment of output-based standards would lead to a distribution of costs resulting from the GGPPA that is based on the distribution of the emissions intensities of OBPS facilities undertaking a covered production activity, in relation to the applicable standard. This means that, in the regulatory scenario, the costs would not be charged in direct proportion to a facility's use of fossil fuels. This distribution of costs attributable to the Act in the regulatory scenario contrasts with the distribution of costs in the baseline scenario, where these costs would be distributed in direct proportion to a facility's use of fossil fuels.

For a given compliance period, a facility participating in the OBPS with an emissions intensity lower than the applicable output-based standard would receive an amount of surplus credits from ECCC equal to the difference between its annual facility emissions limit and annual reported emissions. This facility would not be required to compensate for any GHG emissions since it emits GHGs within its annual limit. On the other hand, a facility with an emissions intensity greater than the applicable output-based standard would have a compensation obligation equal to the difference between its annual reported emissions and annual facility emissions limit. The OBPS would credit or charge facilities participating in the system to varying degrees, depending on their respective production levels, and on their respective emissions intensity performance relative to the output-based standard for the given production activity.

ADJUSTMENTS DUE TO HIGH COMPETITIVENESS RISKS

In a regulatory framework released in January 2018, ECCC proposed that output-based standards be set at 70% of an industrial sector's average GHG emissions intensity as a starting point, with the possibility of adjustments to that starting point based on an assessment of the potential risks from GHG pollution pricing to the competitiveness of the sector and to carbon leakage. The extent to which the competitiveness of industrial sectors or specific facilities within a sector may be impacted by GHG pollution pricing is largely determined by two factors:

1. the carbon emissions intensity associated with the production of the products of the sector or facility (the GHG emissions per unit of net output is representative of the cost exposure of the sector or facility to GHG pollution pricing); and
2. the extent to which facilities in the sector are able to pass on the costs of GHG pollution ricing without significant loss of market share, an indicator of its degree of trade exposure.

Sectors or facilities that export a large portion of their production or compete with imported products are more likely to face competitive pressures if GHG pollution prices are applied asymmetrically between jurisdictions. However, where there are other pre-existing barriers that limit trade, such as transportation costs, tariffs, or regulatory barriers, sectors or facilities charged a GHG pollution price are usually more insulated from interjurisdictional competition and thus face less competitive pressure. In addition, sectors or facilities that have a relatively inelastic demand for their product due to market power, product differentiation or a lack of affordable substitutes resulting from other factors will also face less competitive pressure from asymmetric GHG pollution pricing policies between competing jurisdictions.

ECCC is undertaking a three-phased approach that takes into account the relative degree of emissions intensity and trade exposure of each industrial sector, as well as other factors that may lead industry to be at risk to competitiveness due to GHG pollution pricing. This analysis will help inform the level at which the output-based standards are set for a given sector.

Phase 1 consists of a "static" test that looks at historical data at the national level to calculate sector-level estimates of emissions intensity and trade exposure. These metrics are then combined to provide an indication of competitiveness risk due to GHG pollution pricing, an approach similar to the quantitative tests used in a number of other jurisdictions with GHG pollution pricing, including California, Alberta and Quebec. Phase 2 is a "dynamic" test employing economic modelling that uses projected emissions and economic data to evaluate the same emissions intensity and trade exposure metrics as assessed in Phase 1, for the year 2022.

Based on the Phase 1 and 2 analyses, combined with the input received to date, ECCC adjusted the starting point for all sectors from 70% to 80% of the sector's average GHG emissions intensity.

In Phase 3, ECCC has invited industry stakeholders to submit additional supporting information and analyses on aspects of competitiveness to supplement the results of Phases 1 and 2. This information could have included, for example, evidence of significant facility-level impacts, domestic or international market considerations, and consideration of indirect costs on sectors associated with GHG pollution pricing. As a result of Phase 1, 2, and 3 analyses, the level of the output-based standards for some sectors have been adjusted. Further engagement with stakeholders through the regulatory process will inform the final level of the output-based standards for all sectors.

PROPOSED METHODOLOGY TO ESTIMATE IMPACTS

It is proposed that ECCC's multi-region, multi-sector, computable general equilibrium model of the Canadian economy (EC-PRO) be used as the model for estimating the impacts discussed in this CBA framework. EC-PRO captures important differences between provinces and territories and it could be applied to forecast the domestic impacts of the federal backstop system.[5] In particular, the baseline and regulatory scenarios could be modelled with EC-PRO to assess the variables of interest, including GHG emissions and GDP.

EC-PRO simulates the response of the main economic sectors in each jurisdiction, and their interactions with each other, including interprovincial trade. It captures characteristics of provincial production and consumption patterns through a detailed input-output table and links provinces and territories by means of bilateral trade. Each province and territory is explicitly represented as a region. The rest of the world is represented as import and export flows to Canadian provinces and territories, which are assumed to be price-takers in international markets. To accommodate analysis of energy and climate policies, the model incorporates information on energy use and combustion emissions. It also tracks process emissions.

A key input into the EC-PRO modelling would be ECCC's 2018 GHG Reference Case (the 2018 Reference Case). It includes the future impact of policies and measures taken, or announced in detail, by the federal, provincial and territorial governments as of the fall of 2018, including the GHG pollution pricing systems in British Columbia, Alberta and Quebec. In the 2018 Reference Case, key macroeconomic variables such as GDP, the exchange rate and inflation are aligned to Finance Canada's projections. Population growth projections are obtained from Statistics Canada and updated in consultation with provinces and territories. Forecasts of oil and natural gas prices and production are taken from the National Energy Board's most recent *Canada's Energy Future* publication.[6]

In order to model the baseline and regulatory scenarios for the OBPS analysis, EC-PRO will modify the 2018 Reference Case. The EC-PRO modified 2018 Reference Case would serve as the foundation for estimating with EC-PRO the impacts associated with the baseline scenario in which the fuel charge under Part 1 of the GGPPA would generally apply to fossil fuels used in backstop jurisdictions for combustion purposes. Similarly, the EC-PRO modified 2018 Reference Case would serve as the foundation for estimating the impacts associated with the regulatory scenario in which both the fuel charge regime and the OBPS are implemented in backstop jurisdictions.

In the baseline scenario, the EC-PRO modified 2018 Reference Case would assume that non-backstop jurisdictions operate their own GHG pollution pricing systems that remain aligned with the benchmark elements of the Pan-Canadian Approach to Pricing Carbon Pollution (the Benchmark) that all GHG pollution pricing systems must meet. For the other Canadian jurisdictions, which are part of the backstop system, the baseline scenario would assume that only the fuel charge regime is implemented. In the regulatory scenario, both the fuel charge regime and the OBPS will be applied to jurisdictions in the backstop.

[5] ECCC's international, computable general equilibrium model, EC-MSMR, considers domestic and international energy and environmental policies. However, EC-MSMR aggregates Canadian jurisdictions into one region and cannot capture differences between the provinces and territories.

[6] "Canada's Energy Future". National Energy Board: www.neb-one.gc.ca/nrg/ntgrtd/ftr/index-eng.html

For industrial sectors in backstop jurisdictions, a modified charge regime would serve as a proxy measure for the output-based standards in the regulatory scenario. Specifically, this modified charge regime would be modelled by applying an output-based "rebate" according to the rate at which the given output-based standard would assign free allocations. For example, if an output-based standard is established at 80% of a sector's average GHG emissions intensity for a production activity, the modified charge regime would first consist of imposing the excess emissions charge (GHG pollution price) on all GHG emissions covered by the OBPS (i.e., on all covered emissions, including both process and combustion emissions). Simultaneously, the proceeds generated from the imposition of the GHG pollution price would be returned to the facilities in backstop jurisdictions within the given sector, at a rate equivalent to the applicable output-based standard. This modified charge regime would be scaled by sector to align with the portion of GHG emissions from facilities in backstop jurisdictions within the given sector that are required to participate in the OBPS. In particular, the modified charge regime would be scaled based on comparisons of sectoral GHG emissions from the Greenhouse Gas Reporting (GHGRP) and the National Inventory Report.[7]

The fuel charge and the excess emissions charge both increase annually up to 2022. In the modelling of impacts under the two scenarios, it would be assumed that these charges remain at their respective nominal 2022 levels for all future years. It is also important to note that the cost impacts due to the fuel charge and the excess emissions charge originate from the GGPPA. These charges are thus considered to be costs attributable to the Act, as opposed to regulatory cost impacts. Under the two scenarios, the costs resulting from the GGPPA would be estimated using EC-PRO. It is anticipated that the costs in the baseline scenario would be greater than the costs in the regulatory scenario. Both cost estimates would be projected with EC-PRO, and the difference between them would approximate the cost relief provided by the addition of the OBPS to the federal backstop system.

The impacts of the Regulations would be assessed in this CBA in accordance with the Government of Canada's Cabinet Directive on Regulation and *Canadian Cost-Benefit Analysis Guide*. This guidance indicates that the net present value and the present value of benefits and costs should be based on a minimum forecast of ten years. The analysis of the Regulations would begin in 2018, as registration for OBPS participants began in 2018. It is proposed that the present value base year be 2018 and that the analysis end in 2030. To the extent possible, benefits and costs would be quantified and monetized. In accordance with guidance regarding environmental and health regulatory analyses, monetized impacts would be analyzed in present value terms, applying a 3% discount rate for future years. Other identified impacts would be considered qualitatively.

[7] Starting with the 2017 reporting year, the GHGRP applies to all facilities in Canada that emit at least 10 kilotonnes (kt) of CO_2e per year. Prior to the 2017 reporting year, the GHGRP applied to all facilities in Canada that emitted at least 50 kt of CO_2e per year. The National Inventory Report contains Canada's annual estimates of GHG emissions covering anthropogenic emissions by sources and removals by sinks.