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Fiscal and Distributional Analysis of the Federal Carbon Pricing System

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The Parliamentary Budget Officer (PBO) supports Parliament by providing economic and financial analysis for the purposes of raising the quality of parliamentary debate and promoting greater budget transparency and accountability.

This report provides a fiscal and distributional analysis of implementing a federal carbon pricing system.

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Executive Summary

On October 23, 2018, the Government of Canada announced details of a carbon pricing system for Canada, including where and when it would apply.

The federal carbon pollution pricing "backstop" system is based on the *Greenhouse Gas Pollution Pricing Act*, adopted on June 21, 2018. It has two components:

- A charge on fossil fuels, or "fuel charge", which will be administered by the Canada Revenue Agency, and which will apply starting in April 2019; and
- A regulatory system for large industry, known as the "output-based pricing system" (OBPS), which will apply to industrial facilities that emit more than 50,000 tonnes of carbon dioxide equivalent per year.[1]

The backstop will apply in provinces and territories that do not have adequate climate pricing plans of their own that meet federal standards. They are Saskatchewan, Manitoba, Ontario and New Brunswick, starting in April 2019, and Yukon and Nunavut, as of July 2019. The federal output-based pricing system will be implemented in Prince Edward Island.[2,3]

This report provides an independent estimate of the revenues that will be generated under the federal pollution pricing system. It also estimates the net fiscal impact on households in different income groups in Ontario, New Brunswick, Manitoba and Saskatchewan.[4]

PBO estimates that the federal government will generate $2.63 billion in carbon pricing revenues in 2019-20. The vast majority of revenues ($2.43 billion) will be generated through the fuel charge; the balance, roughly $197 million, will be generated by output-based pricing.

In addition, PBO estimates that by 2023-24, carbon pricing revenues will increase to $6.20 billion, with fuel charge proceed accounting for $5.77 billion and OBPS accounting for the rest[5] (Summary Table 1).

Summary Table 1 Estimated revenue of carbon pricing

$ millions	2019-20	2020-21	2021-22	2022-23	2023-24
Total Fuel charge proceeds	2,433	3,606	4,748	5,798	5,769
Total OBPS	197	279	361	437	430
Total all revenue	2,630	3,885	5,108	6,235	6,199
Carbon cost rate ($/tonne)	20	30	40	50	50

Source: PBO calculations.

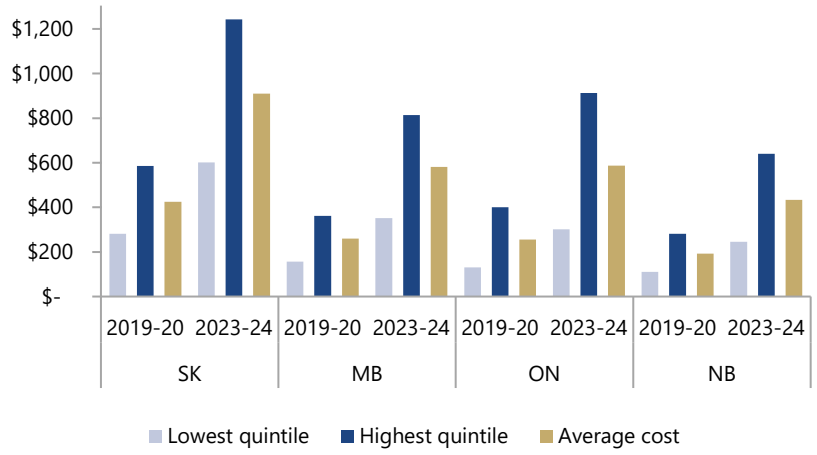
Notes: Totals may not add due to rounding.

Households will largely bear the cost of the pricing system through their consumption of energy used for residential and transport purposes, and carbon charges embodied in non-energy products. Regions currently using carbon-intensive energy will have higher costs per household.

PBO estimates that Saskatchewan households will incur the highest average annual cost, starting at $425 in 2019-20 and reaching $910 in 2023-24. By comparison, these amounts are roughly twice the average household cost in New Brunswick, where it will be $191 in 2019-20 and $430 by 2023-24 (Summary Figure 1).

PBO estimates that households in the top income quintile, or top one-fifth, will pay between two and three times the gross fuel charge amounts paid by lower income households. This latter group typically has fewer members and consume less (Summary Figure 1).

Summary Figure 1 Household Costs of Carbon pricing before rebate



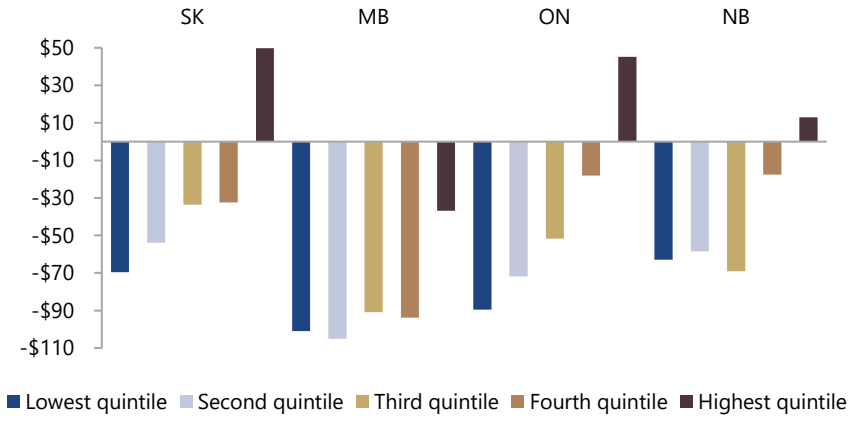
Source: PBO calculations.

The federal government has stated that the carbon pricing system will be revenue neutral; any revenues generated under the system will be returned to the province or territory in which they are generated.[6,7] Households will receive 90 per cent of the revenues raised from fuel charges.[8]

Based on this assumption, a typical household will receive higher transfers than the average amounts it pays in fuel charges. In this case, revenues derived from exports exceed transfers to particularly affected sectors.

The net benefits are broadly progressive by income group. That is, lower income households will receive larger net transfers than higher income households. (Summary Figure 2).

Summary Figure 2 Quintile distribution of household carbon cost net of amounts paid in 2019-20



Source: PBO calculations.

Notes: Negative cost means rebates exceed the gross household carbon costs.

1. Introduction

In December 2016, the Government of Canada, along with most provinces and territories, agreed to the Pan-Canadian Framework on Clean Growth and Climate Change. Under the framework, carbon pricing was to become the central mechanism to reduce greenhouse gas (GHG) emissions.[9]

On October 23, 2018, the Government of Canada announced details of a carbon pricing system for Canada, including where and when it would apply.

The federal carbon pollution pricing "backstop" system is based on the *Greenhouse Gas Pollution Pricing Act*, adopted on June 21, 2018.

The system will apply only in provinces that do not have adequate climate pricing plans of their own that meet federal standards. They are Ontario, New Brunswick, Manitoba and Saskatchewan.

This federal option is composed of two elements: a carbon levy and an output-based pricing system.[10]

Carbon levy: A direct pricing mechanism

The carbon levy is a direct pricing mechanism applied at downstream levels and included in the final price of products, such as liquid fuels (for example, gasoline, diesel fuel and aviation fuel); gaseous fuels, such as natural gas; and solid fuels, such as coal and coke.

The carbon levy is generally payable by fuel producers or distributors, with rates that will be set for each fuel. The rates are equivalent to $20 per tonne of carbon dioxide equivalent (CO_2e) in 2019-20; this will rise by $10 per year to $50 per tonne of CO_2e in 2022-23. Thereafter, the carbon price remains at $50 per tonne in nominal terms.

PBO assumes that the carbon levy directly affects consumer sale prices through energy consumption. We also assume that higher fuel prices are passed through to the final prices of non-energy commodities that use fuel as input.

Output-based pricing system

The output-based pricing system (OBPS) will be applied at the upstream level of the production of goods and services of industrial facilities with emissions above a certain threshold. These facilities will be able to purchase charge-free fuel from the time the charge starts to apply.

However, they will be subject to the carbon price on the portion of their emissions that exceeds an annual output-based emissions limit.

Smaller industrial facilities that emit fewer than 50,000 tonnes of CO_2e, but which compete against facilities exceeding the limit, will also be given the option of participating in the OBPS.[11]

Numerous industrial and commercial companies whose emissions are above their limits are required to pay a charge to the Government of Canada to continue supplying their goods and services. This charge will be set at the same level as the fuel charge, that is, $20 per tonne of CO_2e in 2019-22, increasing by $10 per tonne each year to $50 per tonne in 2022-23.

Hence, the unit production cost for these companies will likely increase. Companies that emit less than their annual limit can also trade surplus credits to companies that exceed their annual limit.

In both cases, PBO assumes that the cost of the GHG emission is "passed through" to the final consumer of the product through an increase in the sale price of the energy or non-energy products.

The cost of the residential and private transport energy consumption could be considered as the direct household carbon cost. The carbon cost embodied in non-energy goods and services is the indirect household emission cost.

Carbon pricing revenue neutral

The federal government has stated that the carbon pricing system will be revenue neutral, with any revenues generated under the system staying in the province or territory where they are generated.

The Government of Canada will return the revenue from the carbon levy, directly to individuals and families, through proposed Climate Action Incentive payments. It will also return proceeds to particularly affected sectors in other jurisdictions that do not meet the Canada-wide federal standard for reducing carbon pollution (that is, Ontario, New Brunswick, Manitoba and Saskatchewan).

Revenue generated from the OBPS in Ontario, New Brunswick, Manitoba and Saskatchewan will also be returned to the province of origin. Given that these proceeds would only be realized in 2020, the Government will decide in due course how best to return the proceeds in these provinces.

This report uses the federal carbon policy parameters to estimate household carbon costs. Also, PBO estimates the distribution of carbon costs net of rebates across all families in Ontario, New Brunswick, Manitoba and Saskatchewan, and reports results by household income quintile.

This report takes into account the behavioural impact of consumers in response to carbon pricing.

2. Results

PBO prepared a multi-step model that simulates carbon costs to households of the federal backstop system between 2019 and 2024 for five income quintiles in Saskatchewan, Manitoba, Ontario and New Brunswick.[12] (A quintile divides the population into five income groups each representing 20 per cent, or one-fifth, of the population.)

The model estimates three main components of the federal carbon pricing system:

1. The carbon revenue collected by the federal government.
2. The distribution of the gross carbon costs from energy and non-energy purchases.
3. The distribution of net costs under the federal rebate system to households.

Each component is discussed below.

2.1. Revenue of carbon pricing

PBO estimates that the federal government will generate $2.63 billion in carbon pricing revenues in 2019-20. The vast majority of the revenues ($2.43 billion) will be generated through the fuel charge; the remaining amount, roughly $197 million, will be generated by output-based pricing. PBO estimates that carbon pricing revenues will increase to $6.21 billion by 2023-24. Proceeds from the fuel charge will account for $5.77 billion and OBPS the rest (Table 2-1).

Table 2-1 Estimated revenue of carbon pricing

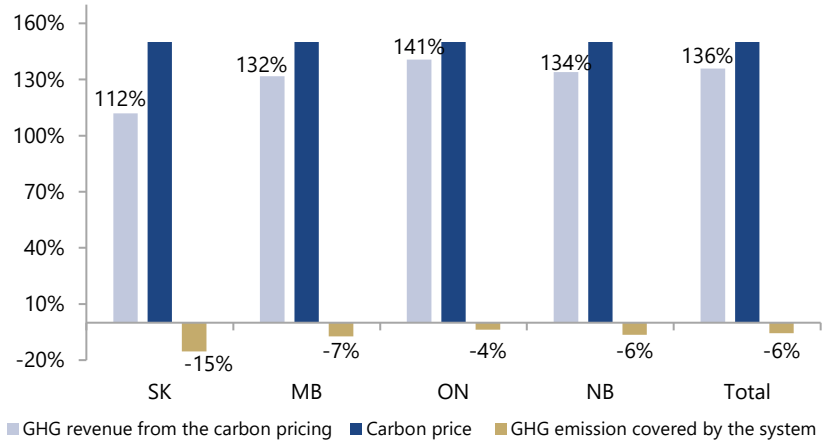
$ millions	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
Total Fuel charge proceeds	2,433	3,606	4,748	5,798	5,769
Total OBPS	197	279	361	437	430
Total all revenue	2,630	3,885	5,108	6,235	6,199
Carbon cost rate ($/tonne)	20	30	40	50	50

Source: PBO calculations.

Notes: Totals may not add due to rounding. OBPS revenue could be generated either by the federal government or by the firms themselves. Small industrial facilities that emit fewer than 50,000 tonnes of CO_2e, but which compete against facilities exceeding the limit, will also be given the option of participating in the OBPS and trading emission credits with big emitters.

We project that between 2019 and 2024, carbon revenue will increase by 136 per cent. This will be somewhat less than the rate of growth of 150 per cent in the carbon price in the same period. This divergence is mainly explained by reductions in GHG emissions. For example, in our projections, Saskatchewan's GHG emissions decline 15 per cent between 2019 and 2024 (Figure 2-1).

Figure 2-1 Variation of revenues, carbon price, and GHG emission between 2019 and 2024



Source: PBO calculations.

There are three principal reasons behind the reduction in GHGs:

- Cleaner electricity generation. The National Energy Board (NEB) projects that a greater share of electricity production will come from renewable energy sources such as wind, hydro and solar power.[13] This transition toward cleaner energy will reduce intensities of provincial electricity generation emissions.[14]
- Declining oil and gas emission. Environment Canada projects a 16 per cent decline in oil and gas GHG emissions from 2019 to 2024 in the four provinces because of declining supply of both conventional natural gas and conventional oil production.[15]
- Decreasing use of diesel and motor gasoline for transportation. The NEB estimates that energy efficiency improvements will reduce GHG emissions in the transport sector, combined with increased use of biofuels and electricity for transportation.[16] The NEB estimates that between 2019 and 2024, the vehicle energy use of electricity and biofuels will rise by 4 per cent, while the energy use of diesel and motor gasoline will decrease by 4 per cent for all four provinces.

Ontario, the most populous province under the carbon pricing regime, will generate just over $1.9 billion in fuel charges in 2019-20, roughly 75 per cent of the overall total for the four provinces (Table 2-2).

At the same time, Manitoba's fuel charges of $201 million will account for virtually all (98 per cent) of the revenue collected in the province, the highest share, due to the small number of industrial facilities that emit large quantities of GHG.

In all four provinces, total OBPS revenue will amount to about $197 million in 2019-20, 7.5 per cent of total revenue. In Saskatchewan, OBPS will account for 30 per cent of total revenue in the province, the highest share (Table 2-2).

Table 2-2 Estimated revenue of carbon pricing

	$ millions	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
SK	Fuel charge proceeds	239	335	436	529	519
	OBPS	109	147	188	224	217
	All revenue	347	482	624	753	736
MB	Fuel charge proceeds	201	299	392	472	465
	OBPS	3	5	6	7	7
	All revenue	204	304	398	479	473
ON	Fuel charge proceeds	1,909	2,847	3,753	4,594	4,585
	OBPS	69	104	137	170	170
	All revenue	1,978	2,951	3,890	4,764	4,755
NB	Fuel charge proceeds	84	125	167	203	200
	OBPS	16	23	30	36	36
	All revenue	100	149	196	239	236
Total	Total fuel charge proceeds	2,433	3,606	4,748	5,798	5,769
	Total OBPS	197	279	361	437	430
	Total all revenue	2,630	3,885	5,108	6,235	6,199

Source: PBO calculations.

Notes: Totals may not add due to rounding.

2.2. Household cost of the carbon pricing

Federal carbon pricing revenues will come largely from households through the consumption of energy used in residential activities (such as heating fuel and electricity) and in private transport (such as motor gasoline, diesel and lubricants).

Cost pass-through

The pass-through degree is the magnitude of the response of the output prices to the input prices variations. The pass-through is complete when the change in cost is fully transmitted to the final product price, and it is incomplete when it partially affects the consumer price.

In addition, the federal carbon system will generate revenue from household consumption of non-energy products. If, as we expect, the carbon levy is charged on the industrial use of the combustible fuels, we assume that these industries will pass the cost of the levy through to the price of any downstream good and service.[17]

We estimate that household consumption of energy and non-energy products will generate three-quarters of carbon pricing revenue. The remaining revenue will be generated by exports.

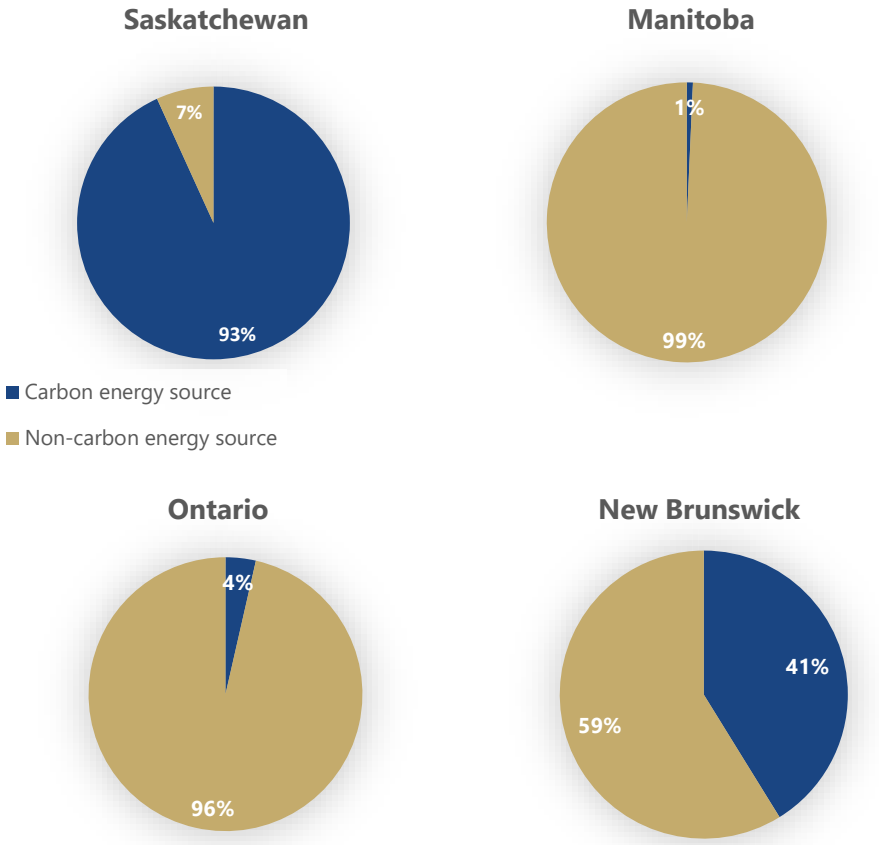
Among the four provinces, Saskatchewan households will have the highest average annual gross carbon costs in 2019-20 at $425. By 2023-24, these average annual costs will more than double to $910.

In contrast, New Brunswick households will have the lowest average cost in 2019-20 at $191; by 2023-24, this will more than double to $430. Thus, a typical household in Saskatchewan will pay roughly twice as much as a typical household in New Brunswick (Table 2-3).

The heterogeneous distribution of carbon costs across provinces demonstrates differences in the sectoral emission intensities. Provinces with higher costs generally rely on power sources that have higher intensities of GHG emissions.

For example, NEB estimates show that electrical power generation in Saskatchewan is much more carbon intensive than in Manitoba, Ontario or New Brunswick[18] (Figure 2-2).

Figure 2-2 Energy shares of carbon-intensive fuel used to generate electricity in 2019



Source: PBO calculations from the energy accounts provided by the National Energy Board.

Notes: Carbon energy sources include coal, coke and coke oven gas, oil and natural gas. Non-carbon sources are from hydro, solar, nuclear and wind energy.

PBO also examined the distribution of gross carbon costs across household income groups. We found that costs will vary based on household characteristics. As a rule of thumb, larger and richer households consume more, and as a result will bear higher costs (Table 2-3).

Table 2-3 Quintile distribution of household gross carbon cost

	$ CAN	2019-20	2020-21	2021-22	2022-23	2023-24
SK	Lowest quintile	282	396	511	616	601
	Second quintile	324	455	589	710	693
	Third quintile	401	560	723	870	848
	Fourth quintile	453	637	824	994	970
	Highest quintile	585	819	1058	1274	1242
	Average cost	**425**	**598**	**773**	**932**	**910**
MB	Lowest quintile	157	231	300	359	351
	Second quintile	180	265	345	413	405
	Third quintile	222	326	425	510	500
	Fourth quintile	258	379	493	593	581
	Highest quintile	362	531	691	830	813
	Average cost	**260**	**381**	**496**	**593**	**580**
ON	Lowest quintile	131	193	252	306	303
	Second quintile	180	264	344	419	414
	Third quintile	245	360	469	570	563
	Fourth quintile	306	448	584	710	701
	Highest quintile	402	589	766	927	915
	Average cost	**256**	**376**	**490**	**596**	**588**
NB	Lowest quintile	108	158	203	246	241
	Second quintile	137	199	256	311	305
	Third quintile	157	229	295	358	351
	Fourth quintile	228	333	432	525	515
	Highest quintile	280	410	533	648	635
	Average cost	**191**	**279**	**361**	**438**	**430**

Source: PBO calculations from the national and provincial accounts provided by Statistics Canada, energy accounts provided by the National Energy Board, and physical flow accounts provided by the Environment Canada.

Note: These costs do not include the GST and PST portion of the carbon price impact on households.

PBO estimates that households in the top income quintile, or top one-fifth of the income spectrum, will pay between two and three times the gross carbon charge amounts of lower income households, which typically have fewer members and consume less. For example, the lowest quintile households in

Ontario will be subject to a gross cost of $131 in 2019-20, compared to $402 for those in the highest income (Table 2-3).

It should be noted that this analysis is based on gross amounts, that is, prior to any transfers back to households. They represent only one side of the federal carbon pricing regime. The federal government has stated that the carbon pricing system will be revenue neutral; any revenues generated under the system will stay in the province or territory where they are generated.

In the following section, we estimate the distribution of costs from carbon pricing net of rebates across all family groups in Saskatchewan, Manitoba, Ontario and New Brunswick. We report results by household income quintile.

2.3. Distribution of net costs under the federal rebate system to households

The Government of Canada has stated that it will return the proceeds from the fuel charge directly to individuals and families, through proposed Climate Action Incentive payments, as well as to particularly affected sectors in Saskatchewan, Manitoba, Ontario and New Brunswick. The federal government, however, has not yet announced the way in which it will return OBPS revenue in these provinces[19] (Table 2-4).

Table 2-4 Projected federal proceeds returned to households and sectors

$ millions	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
Projected payment for households	2,189	3,245	4,273	5,218	5,192
Support for particularly affected sectors	243	361	475	580	577
Projected total federal proceeds return	2,433	3,606	4,748	5,798	5,769

Source: PBO calculations based on guidance from Finance Canada and the Government's initial estimates of total Climate Action Incentive payments.

In the PBO's baseline scenario, households receive 90 per cent of the revenues raised from carbon levy. PBO's assumption is based on guidance from Finance Canada and the Government's initial estimates of total Climate Action Incentive payments for the four provinces.[20]

Thus, in this scenario, the projected payment for households would amount to $2.19 billion in 2019-20, 90 per cent of projected total federal revenue of $2.43 billion.

Estimates of total transfers to households are sensitive to assumptions on revenues raised on exported products and the relative share of revenues transferred to households.

The remaining amounts ($243 million) will be provided to support particularly affected sectors, including small and medium-sized enterprises (SMEs) and municipalities, universities, colleges, schools and hospitals, non-profit organizations, and Indigenous communities.

Based on these assumptions, a typical household will receive higher transfers than average amounts it pays in fuel charges. In this case, revenues derived from exports exceed transfers to particularly affected sectors.

However, the carbon levy raised on exports part of revenue could be volatile since international trade is affected by monetary, policy and economic changes in foreign markets. Thus, PBO developed an alternative scenario in which only the total household costs will be returned, and we exclude the export portion from the incentive payment to relate only to the local market.

The alternative scenario demonstrates that the relative distribution of net benefits under the carbon pricing system is not materially affected by whether total transfers to households are larger or smaller than total amounts paid. These results are presented in Appendix B.

Table 2-5 shows that most households will receive higher transfers than amounts paid in fuel charges. They will therefore be better off on a net basis because the rebate exceeds the average household carbon cost in the baseline scenario.

The annual rebates from the federal government will more than compensate for the carbon levy in the first, second, third, and fourth quintiles. For households, with higher incomes, the annual rebates will be less than what they pay.

In Saskatchewan, for example, households in the highest quintile will pay a net of $50 in carbon costs after rebate in 2019-20, while those in the lowest quintile will get a net refund of $70 from the government.

Table 2-5 Quintile distribution of household net carbon cost

	$ CAN	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
SK	Lowest quintile	-70	-93	-117	-139	-131
	Second quintile	-54	-70	-91	-109	-102
	Third quintile	-34	-29	-62	-69	-64
	Fourth quintile	-32	-32	-54	-66	-62
	Highest quintile	50	74	95	112	113
MB	Lowest quintile	-101	-148	-190	-221	-214
	Second quintile	-105	-155	-201	-237	-229
	Third quintile	-91	-123	-174	-200	-192
	Fourth quintile	-94	-132	-181	-208	-202
	Highest quintile	-37	-55	-70	-75	-71
ON	Lowest quintile	-89	-130	-167	-199	-195
	Second quintile	-72	-106	-135	-159	-156
	Third quintile	-52	-71	-101	-119	-117
	Fourth quintile	-18	-21	-35	-38	-36
	Highest quintile	45	65	84	102	99
NB	Lowest quintile	-63	-94	-125	-148	-143
	Second quintile	-59	-92	-133	-159	-156
	Third quintile	-69	-104	-149	-179	-174
	Fourth quintile	-18	-25	-48	-56	-54
	Highest quintile	13	15	10	14	14

Source: PBO calculations.

Notes: Negative cost means rebates exceed the gross household carbon costs.

The household's structure influences this cost distribution since the federal rebates are based on family composition. The federal incentive payment is designed so the amount for the first adult of a household will be double the amount for the second adult, and four times the amount a child.[21]

Thus, a household composed of only adults will receive higher payments per person than one with children. This adjustment reflects the fact while the consumption needs of a household increase as the household gets larger, it is not a one-for-one relationship.

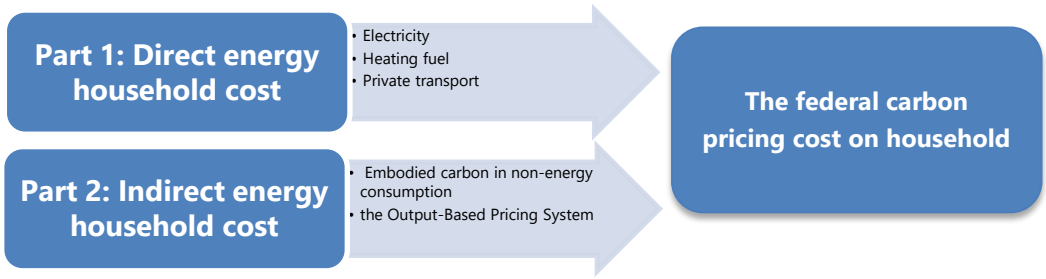
Appendix A: Costing Methodology

The model provides an estimate of the net cost of implementing a federal carbon pricing program to the household by province. These cost estimates are based on the *Greenhouse Gas Pollution Pricing Act*, adopted on June 21, 2018. The federal carbon pollution pricing system has two parts:

- a regulatory charge on fuel (fuel charge).
- a trading system for large industry, known as the output-based pricing system (OBPS).

PBO adopts a multi-step approach to construct a model that simulates the carbon costs to households between 2019 and 2024 for five household quintiles in Saskatchewan, Manitoba, Ontario and New Brunswick. The specific cost estimates to the Canadian households will include:

- The direct cost calculated on the final purchase of energy by household, such as electricity, natural gas, and refined petroleum products (RPP).
- The indirect cost calculated during the production process based on the complete cost pass-through assumption. In this case, the cost of the carbon price is "passed through" to the final consumer of the product through an increase in the sale price of the products or of the goods and services.



In addition to aggregate costs and projections, the model provides estimates of the income distributional impact of carbon pricing. These estimates are based on the direct and indirect energy consumption included in the household spending by income quintile.

There are three big groups of databases used for estimates:

- National and provincial accounts provided by Statistics Canada, such as physical flows by final demand category, supply and use tables (that is, input-output tables) and household energy consumption.
- Energy accounts provided by the National Energy Board (NEB).

- GHG emission databases provided by Environment Canada, such as national inventory reports, facility-reported greenhouse gas data and projected GHG emissions by sector.

A.1 Direct household carbon costs

The first part of the model aims to forecast the potential direct cost of implementing a federal carbon pricing program to households by province. The direct effect includes the cost related to residential energy consumption as electricity, heating fuel and motor fuels used in private transport (Figure A-1).

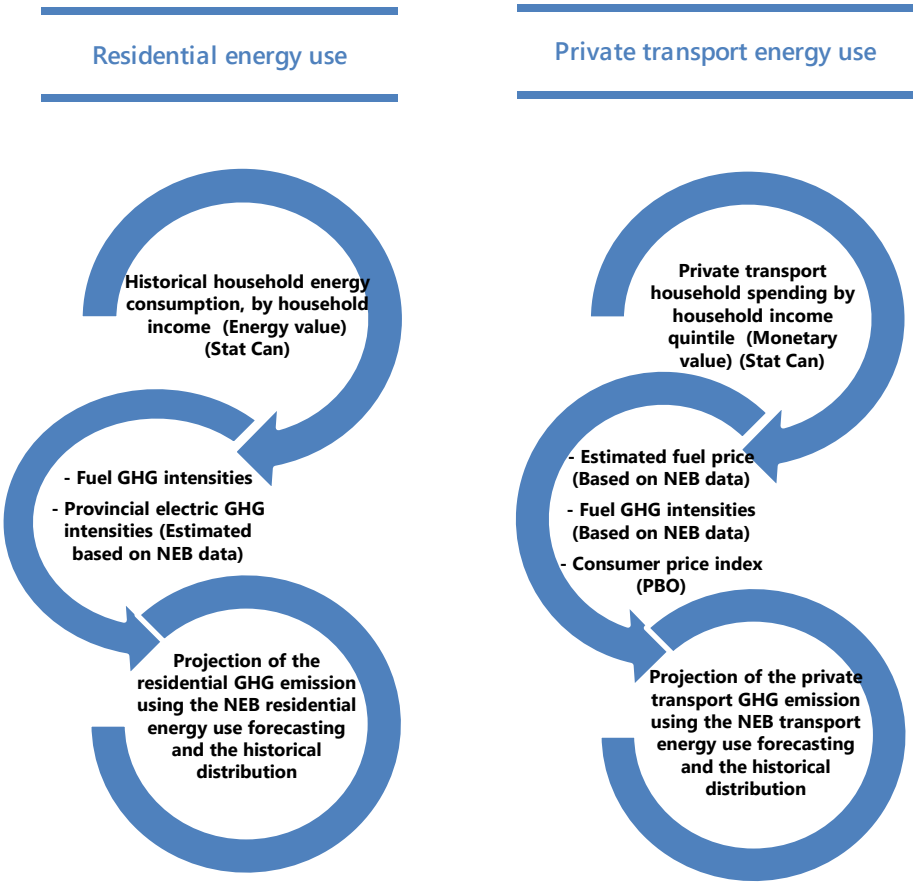
To estimate the carbon cost related to heating and electricity for a typical household, we use the NEB data for forecasting residential energy use. The federal backstop carbon price is binding in the NEB projection. It assumes that Canadian energy prices are affected by the carbon price and benchmark crude oil and natural gas price trends. Increased carbon pricing puts upward pressure on prices, based on the relative carbon intensity of fuels.[22]

To break down the energy consumption by household income quintile, we use Statistics Canada data on provincial household energy consumption, by household income.[23,24] We project this historical distribution on the NEB residential energy use forecasting to get an approximation of the building emission by household groups.

With regard to emissions related to private transport, we estimate the series of historical shares of the energy value of gas and other fuels used in private transport in relation to energy use in the whole transport sector. Following Sawyer (2018), the estimation of the energy use in private transport is based on the monetary value of Statistics Canada's data on household transport fuel expenditures.

We convert the monetary value to energy value by using the NEB's data on historical fuel prices. The next step is to project private transport fuel consumption by applying the historical share to the NEB projected energy use in the transport sector.[25]

Figure A-1 Model to estimate the direct carbon cost



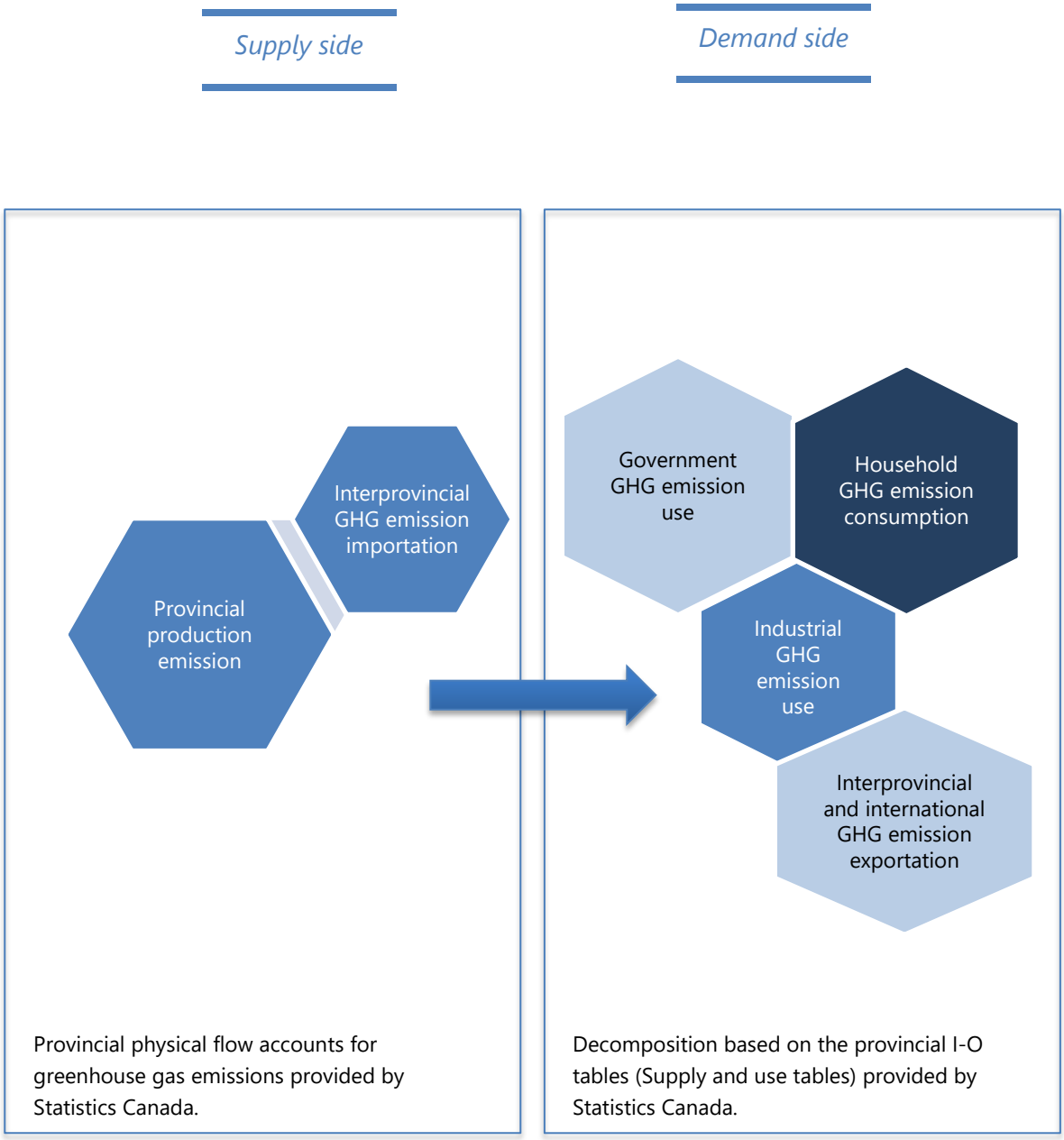
A.2 Indirect household carbon costs

The second part of the model sets out to estimate the indirect emissions from the production of the goods and services that households consume. The model uses the basic assumptions regarding of the partition of GHG emissions between household consumption, industrial use and international and interprovincial trade.

Since the total emission represents the polluting output on the supply side, it can also be considered as the polluting component of Canadian industry that goes with regular goods and services in the demand side. This component is divided among industrial use, household consumption, public service use, and interprovincial and international exports (Figure A-2).

After estimating the GHG emission shares between households and other economic agents, we project the household share on the projected GHG emissions provided by the Environment Canada.[26]

Figure A-2 Model to estimate the indirect carbon cost



In relation to the output-based pricing system, we use Greenhouse Gas Reporting Program (GHGRP) data to identify the big emitters in each province.[27] Mostly, the big emitter sectors are oil and gas extraction, pipeline transportation, coal, metal ore and non-metallic mineral mining, electricity, pulp and paper, chemicals, nitrogen-fertilizers, lime, and cement.

We set the output-based standards at range of 80 per cent to 90 per cent of the average GHG emission intensities of the big emitters based on the

Environment Canada assumption.[28] Then, we estimate a full pass-through of the carbon cost in the remaining 10 per cent to 20 per cent of the GHG emissions of the big emitters.

Appendix B: Distribution of net costs under the alternative scenario

In relation to the alternative scenario, a typical household in each province will receive less money on average than a comparable one in the baseline scenario. Thus, all households are expected to see increasing net costs (Table B-1).

Even then, we see that there will be more households categorized as worse off on net because the rebate will be less than what they pay as carbon cost under the alternative scenario. Furthermore, in Ontario and New Brunswick, only the households in the first, second and third quintiles will receive rebates higher than what they pay.

The cost distribution in Saskatchewan does not change. Only, for households in the highest income quintile, the annual rebates will be less than what they pay. However, these households will be subject to a net cost range increase from $50-$113 in the baseline scenario to $73-$142 in the alternative scenario.

Table B-1 Quintile distribution of household net carbon cost (2nd scenario)

	$ CAN	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
SK	Lowest quintile	-55	-77	-98	-118	-115
	Second quintile	-38	-53	-70	-87	-84
	Third quintile	-15	-9	-38	-44	-43
	Fourth quintile	-12	-10	-27	-37	-39
	Highest quintile	73	97	123	146	142
MB	Lowest quintile	-51	-74	-95	-113	-110
	Second quintile	-50	-73	-96	-116	-113
	Third quintile	-30	-35	-59	-68	-65
	Fourth quintile	-25	-33	-51	-59	-58
	Highest quintile	41	59	77	93	91
ON	Lowest quintile	-64	-92	-119	-143	-141
	Second quintile	-43	-63	-81	-96	-94
	Third quintile	-17	-21	-36	-43	-43
	Fourth quintile	19	33	35	44	44
	Highest quintile	87	126	162	192	188
NB	Lowest quintile	-39	-56	-71	-84	-82
	Second quintile	-31	-48	-68	-83	-82
	Third quintile	-38	-54	-76	-92	-89
	Fourth quintile	17	28	31	38	37
	Highest quintile	50	73	97	117	114

Source: PBO calculations.

Notes: Negative cost means rebates above the gross household carbon costs.

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3. Department of Finance Canada (2019). Department of Finance Canada Proposes Refinements to the Federal Carbon Pollution Pricing System. Retrieved from https://www.fin.gc.ca/n19/19-023-eng.asp
4. We exclude Yukon and Nunavut from our analysis because of a lack of data. Since the federal government will only apply the output-based pricing system in Prince Edward Island and the provincial government will conduct the big part of the carbon pricing, we do not consider the fiscal and distributional analysis in this province.
5. OBPS revenue could be generated either by the federal government or by the firms themselves. Small industrial facilities that emit fewer than 50,000 tonnes of CO2e, but which compete against facilities exceeding the limit, will also be given the option of participating in the OBPS and trading emission credits with big emitters.
6. The Government of Canada will return the proceeds from the fuel charge directly to individuals and families, through proposed Climate Action Incentive payments, as well as to particularly affected sectors in Saskatchewan, Manitoba, Ontario, and New Brunswick. The federal government does not yet decide the way to return the OBPS revenue in these provinces.
7. Department of Finance Canada (2018). Backgrounder: Ensuring Transparency. Retrieved from https://www.fin.gc.ca/n18/data/18-097_2-eng.asp
8. The remaining amounts will be provided to support particularly affected sectors including small and medium-sized enterprises (SMEs) and the municipalities, universities, colleges, schools and hospitals, non-profit organizations, and Indigenous communities.
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14. In Saskatchewan, NRB projects a decline in polluting energy uses in electricity generation by 11 per cent but a rise in the renewable and nuclear energy uses by 36 per cent.
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17. Alexeeva-Talebi (2011) measures the pass-through of the carbon allowance costs on unleaded petrol retail prices during the trial phase of the EU ETS from 2005 to 2007. Their estimates are consistent with the complete pass-through potential. Fabra and Reguant (2014) use data from the Spanish wholesale electricity market covering the period in which the European cap-and-trade program for carbon emissions was introduced. They found that emission costs are almost fully passed through to electricity prices. Miller et al. (2017) study the effect of the market-based CO_2 regulation on Portland cement industry. The latter accounts for roughly 5 per cent of global anthropogenic CO_2 emissions. They found that the fuel cost changes, because of the regulations, are more than completely passed through to cement prices.
18. The Statistics Canada physical flow account for greenhouse gas emissions shows that the electricity sector in Canada covered 12 per cent of the total GHG emission in 2015.
19. Ibid. note 7.
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23. Sawyer (2018) uses a similar logical order of analysis to estimate a probability distribution of the building energy demand for each household.
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