

March 24, 2022



A DISTRIBUTIONAL ANALYSIS OF FEDERAL CARBON PRICING UNDER A HEALTHY ENVIRONMENT AND A HEALTHY ECONOMY



OFFICE OF THE PARLIAMENTARY BUDGET OFFICER
BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

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 distributional analysis of federal carbon pricing under the Government's A Healthy Environment and A Healthy Economy plan.

April 17, 2024: Estimates of the economic impacts presented in this report (Table 3-1) reflect the implementation of federal-equivalent carbon pricing at the national level. The counterfactual scenario used in the report reflects the broad removal of carbon pricing—that is, the removal of the federal-equivalent fuel charge and output-based pricing system (OBPS). Estimates of household net costs incorporating “fiscal and economic impacts” reflect the broad economic impact of federal-equivalent carbon pricing.

[April 17 2024 Additional Analysis](#)

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Summary

This report provides a distributional analysis of federal carbon pricing under the Government's *A Healthy Environment and A Healthy Economy* (HEHE) plan. Under the HEHE plan, the federal carbon levy is set to rise by \$15 per year from \$50 per tonne in 2022 until it reaches \$170 per tonne in 2030.

The report provides an update to previous PBO distributional analysis by incorporating the increase in federal carbon pricing under the HEHE plan. In addition, based on recent PBO work that assessed the economic impacts of carbon pricing under HEHE, the analysis incorporates the loss in economic efficiency from federal carbon pricing on household incomes. However, the scope of this report is limited to estimating the distributional impact of federal carbon pricing. The report does not attempt to account for the economic and environmental costs of climate change.

We provide estimates of the household carbon costs from energy and non-energy consumption net of rebates, across all households in Ontario, Manitoba, Saskatchewan and Alberta, by household income quintile.

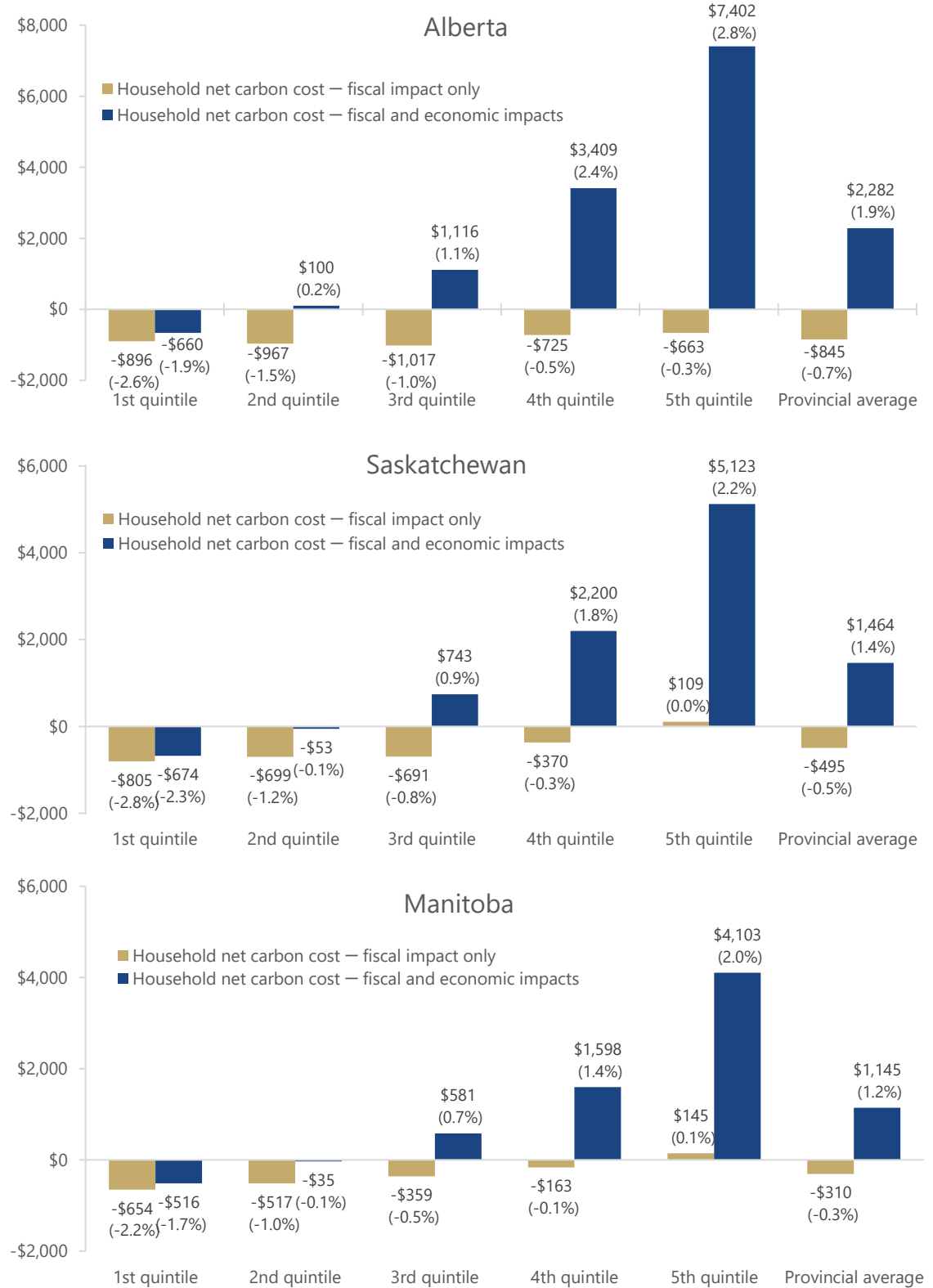
Our estimates reflect the direct "fiscal" (or, "use-side") impact of federal carbon pricing on household incomes that is, the carbon levy and related GST paid less the rebate received, as well as the "economic" (or, "source-side") impact. Estimates of the economic impact reflect the loss in real, or inflation-adjusted, employment and investment income due to carbon pricing under the HEHE climate plan.

Incorporating economic impacts into our distributional analysis helps to provide a more complete picture of the overall impact of the federal carbon pricing system on households under the backstop.

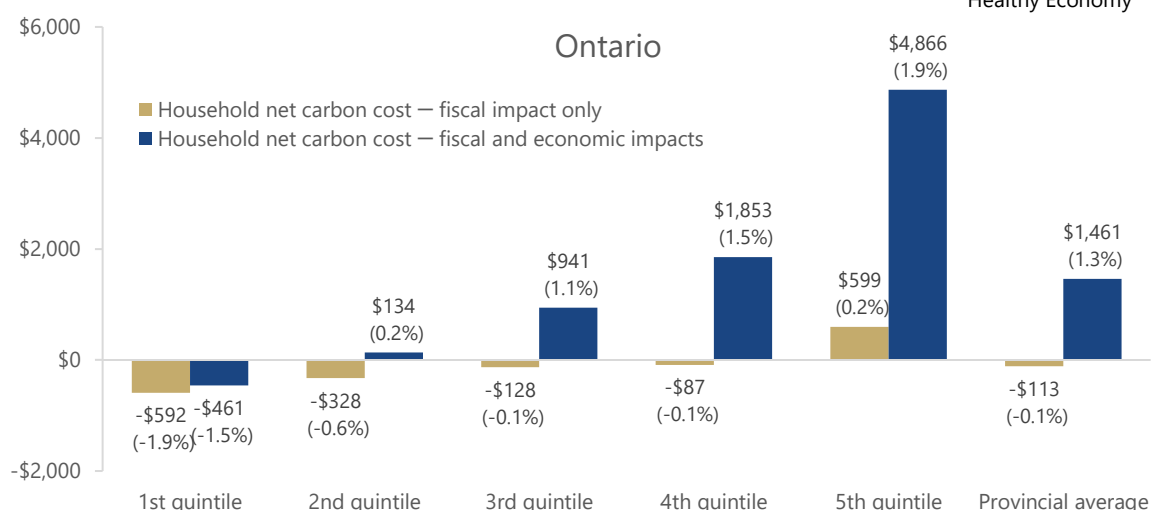
- When the economic impact is combined with the fiscal impact, the net carbon cost increases for all households, reflecting the overall negative economic impact of the federal carbon levy under the Government's HEHE plan (Summary Figure 1).
- Most households under the backstop will see a net loss resulting from federal carbon pricing under the HEHE plan in 2030-31.
 - Household carbon costs—which now include the federal levy and GST paid (fiscal impact) and lower income (economic impact)—exceed the rebate and the induced reduction in personal income taxes arising from the loss in income.
- The largest net loss is for households in the top income quintile in Alberta (2.8 per cent of disposable income) and the largest net gain is in the lowest income quintile in Saskatchewan (2.3 per cent of disposable income) in 2030-31.

Summary Figure 1

Household net carbon costs in 2030-31 under HEHE carbon pricing



A Distributional Analysis of Federal Carbon Pricing under A Healthy Environment and A Healthy Economy



Source: Office of the Parliamentary Budget Officer.

Notes: Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction. Net cost as a share of disposable income is calculated relative to disposable income without carbon pricing. Negative cost means rebates exceed the gross household carbon costs.

The 1st quintile represents the lowest household income quintile and the 5th quintile represents the highest household income quintile.

The variation in household net carbon costs across provinces reflects differences in the distribution of employment and investment incomes combined with the differential impacts on the returns to capital and wages resulting from federal carbon pricing under HEHE.

- Household net carbon costs in Alberta are higher, on average, compared to other provinces given that its economy is more emissions intensive.
- The finding that most households incur a net loss in 2030-31 from federal carbon pricing under HEHE contrasts with the results based on the fiscal impact only where, for the vast majority of households in the backstop provinces, their rebates exceed their carbon costs.
- That said, relative to disposable income, our estimates of household net carbon costs continue to show a progressive impact (that is, larger net costs for higher income households).

Following previous reports, we estimate the impact of carbon pricing on federal budgetary revenues and program spending. Our estimates now incorporate reductions in personal income taxes that arise from the economic ("source-side") impact of lower household employment and investment income in backstop provinces.

- Under its HEHE climate plan, we estimate that the Government will collect, net of personal income taxes lost, \$5.9 billion in budgetary revenues in 2021-22, rising to \$18.5 billion in 2030-31 (Summary Table

1). A large portion of this revenue will be generated by fuel charge proceeds from Alberta and Ontario.

Summary Table 1 Budgetary impacts of federal carbon pricing under HEHE

\$ millions	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Budgetary revenues										
Fuel charge proceeds	6,607	8,294	10,673	12,890	14,991	16,954	18,815	20,444	21,926	23,437
OBPS	216	83	93	112	136	159	164	166	177	190
Goods and Services Tax	239	296	382	461	536	606	673	731	784	837
Personal income tax	-1,144	-1,524	-2,059	-2,598	-3,186	-3,757	-4,323	-4,895	-5,455	-6,000
Total revenues	5,918	7,149	9,089	10,864	12,477	13,964	15,329	16,446	17,432	18,464
Program spending										
Fuel charge proceeds returned	6,607	8,294	10,673	12,890	14,991	16,954	18,815	20,444	21,926	23,437
OBPS returned	216	83	93	112	136	159	164	166	177	190
Total program spending	6,823	8,377	10,766	13,002	15,127	17,113	18,979	20,610	22,103	23,627
Budgetary balance	-905	-1,228	-1,677	-2,137	-2,649	-3,148	-3,650	-4,163	-4,671	-5,163

Source: Office of the Parliamentary Budget Officer.

Notes: Totals may not add due to rounding.

Budgetary impacts include only the revenues and spending in provinces under the federal backstop.

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 CO₂, 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.

The impact on personal income tax revenues is calculated using Statistics Canada's microsimulation model SPSP/M.

- We estimate that the Government will return \$6.6 billion in fuel charge proceeds in 2021-22, rising to \$23.4 billion in 2030-31. A large portion of this revenue will be returned to Alberta and Ontario.

Given the structure of the federal carbon pricing system, the overall budgetary impact of carbon pricing under HEHE will effectively be limited to the economic impact of lower income tax revenues. Our estimates, however, only account for the economic impact of carbon pricing on personal income tax revenues.

- We estimate that carbon pricing under HEHE will reduce the budgetary balance (that is, increase the budgetary deficit) by \$0.9 billion in 2021-22 and ultimately by \$5.2 billion in 2030-31.

1. Introduction

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*, which came into force on June 21, 2018.¹

The federal backstop is composed of two elements: a carbon levy and an output-based pricing system (OBPS). The system will apply only in provinces and territories that do not have climate pricing plans of their own that meet federal standards. As of September 2021, Alberta, Manitoba, Ontario, Prince Edward Island, Saskatchewan, Nunavut and Yukon were subject to elements of the federal backstop.^{2,3}

On December 11, 2020, the federal government announced its *A Healthy Environment and a Healthy Economy* (HEHE) climate plan. Under this plan, the federal carbon levy is set to rise by \$15 per year from \$50 per tonne in 2022 until it reaches \$170 per tonne in 2030. Large emitters are covered under an OBPS with a 2 per cent tightening in stringency every year after 2022.⁴

The federal government has committed to return the revenue from the carbon levy directly to individuals and families, through Climate Action Incentive payments (“rebates”). It will also return a portion of proceeds to particularly affected sectors in other jurisdictions that do not meet the federal standard for reducing emissions (that is, Ontario, Manitoba, Saskatchewan and Alberta).⁵

Revenue generated from the OBPS in Ontario, Manitoba and Saskatchewan will also be returned to the province of origin to support industrial projects to cut emissions and use new cleaner technologies and processes.^{6,7}

Prior to the introduction of the Government’s HEHE plan, PBO analysis estimated the distributional impacts on households of the federal carbon pricing system with the carbon levy rising to \$50 per tonne in 2022 and remaining at this rate thereafter.⁸

This report provides an updated analysis, incorporating the increase in federal carbon pricing under the Government’s HEHE plan. In addition, based on recent PBO work that assessed the economic impacts of carbon pricing under HEHE⁹, the analysis incorporates the loss in economic efficiency¹⁰ from federal carbon pricing on household incomes. However, the scope of this report is limited to estimating the distributional impact of federal carbon pricing. The report does not attempt to account for the economic and environmental costs of climate change.

The report provides estimates of the household carbon costs from energy and non-energy consumption net of rebates, across all households in Ontario, Manitoba, Saskatchewan and Alberta, by household income quintile. The focus of the analysis is cast on household net carbon costs in 2030, the year in which the federal carbon levy reaches \$170 per tonne under the Government's HEHE plan. Detailed year-by-year results over 2021-22 to 2030-31 are provided in appendices.

For comparability with our previous analysis, we first provide estimates of households' net carbon costs under HEHE without accounting for the loss in economic efficiency. These estimates reflect the direct "fiscal" (or "use-side"¹¹) impact of federal carbon pricing on household incomes that is, the carbon levy and related GST paid less the rebate received. Our estimates are based on the assumption of full pass-through of the federal carbon levy to the final prices of good and services.

Next, estimates of household net carbon costs are adjusted to incorporate the loss in economic efficiency arising from carbon pricing under HEHE, which represents the "economic" (or "source-side") impact. Estimates of the economic impact reflect the loss in real, or inflation-adjusted, employment and investment income due to carbon pricing under the HEHE climate plan.

Incorporating economic impacts into our distributional analysis helps to provide a more complete picture of the overall impact of the federal carbon pricing system on households under the backstop.

Lastly, we provide estimates of the budgetary impacts on federal government revenues and spending in Ontario, Manitoba, Saskatchewan and Alberta.

2. Household net carbon costs – fiscal impact

Previous PBO reports provided a distributional analysis of household net carbon costs (that is, the federal carbon levy and related GST paid less the rebate received) under the federal carbon pricing system.

PBO developed a multi-step model that simulates carbon costs to households under the federal carbon pricing backstop. The specific cost estimates to these households include the cost calculated on the final purchase of energy by household, such as electricity, natural gas, and refined petroleum products and the non-energy products.

Our previous analysis showed that changes in relative prices of products due to federal carbon pricing affect households differently, depending on the composition of their spending on goods and services. For example, high-income households, which have relatively high carbon-intensive consumption, bear a larger cost burden compared to lower income households, whose spending is less carbon intensive.

As noted above, for comparability with our previous analysis, we first provide estimates of households' net carbon costs under HEHE without accounting for the loss in economic efficiency. These estimates reflect the direct "fiscal" (or "use-side") impact of federal carbon pricing on household incomes, consistent with the approach and assumptions used in our 2020 report.

2.1. Distribution of household net carbon costs (fiscal impact only)

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), as well as the consumption of non-energy products. The remaining revenue will be generated by exports.

The Government has committed to return the proceeds from the fuel charge directly to individuals and families, through Climate Action Incentive payments, as well as to particularly affected sectors in Alberta, Saskatchewan, Manitoba, and Ontario.

Households receive 90 per cent of the revenues raised from carbon pricing (except those from large final emitters under the OBPS). Based on guidance from Finance Canada and the Government's initial estimates of Climate Action Incentive payments, we assume that the remaining amount is returned to particularly affected sectors.¹²

Table 2-1 presents our estimates of the distribution of carbon pricing costs across household income quintiles, net of rebates, for all family groups in Alberta, Saskatchewan, Manitoba, and Ontario.

Table 2-1 Quintile distribution of household net carbon costs in
2030-31 (fiscal impact only)

		1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Average
Alberta	Net cost	-\$896	-\$967	-\$1,017	-\$725	-\$663	-\$845
	Net cost as a share of disposable income	-2.6%	-1.5%	-1.0%	-0.5%	-0.3%	-0.7%
Saskatchewan	Net cost	-\$805	-\$699	-\$691	-\$370	\$109	-\$495
	Net cost as a share of disposable income	-2.8%	-1.2%	-0.8%	-0.3%	0.0%	-0.5%
Manitoba	Net cost	-\$654	-\$517	-\$359	-\$163	\$145	-\$310
	Net cost as a share of disposable income	-2.2%	-1.0%	-0.5%	-0.1%	0.1%	-0.3%
Ontario	Net cost	-\$592	-\$328	-\$128	-\$87	\$599	-\$113
	Net cost as a share of disposable income	-1.9%	-0.6%	-0.1%	-0.1%	0.2%	-0.1%

Source: Office of the Parliamentary Budget Officer.

Notes: Net cost is calculated as the federal levy paid and GST (that is, the gross carbon cost) less rebates received. Net cost as a share of disposable income is calculated relative to disposable income without carbon pricing.

The 1st quintile represents the lowest household income quintile and the 5th quintile represents the highest household income quintile.

Taking into account only the fiscal, or “use-side” impacts, we project most households will see a net gain, receiving more in rebates from federal carbon pricing under the Government’s HEHE than the total amount they pay in federal fuel charges (directly and indirectly).¹³

As a share of disposable income—and considering that the federal carbon levy is at its maximum of \$170 per tonne in 2030-31—the effects appear relatively small, approximately less than 1 per cent for three-fifths of households in each province, but progressive (larger net gains for lower income households).

For example, the largest net gain for households is in the lowest quintile in Saskatchewan, at 2.8 per cent of disposable income; the largest net cost is in the top quintile in Ontario, at 0.2 per cent of disposable income under the HEHE plan in 2030-31.

3. Household net carbon costs – fiscal and economic impacts

To better reflect the tax burden on households by accounting for the loss in economic efficiency, we incorporate estimates of the economic or “source-side” impact from federal carbon pricing under HEHE into our estimates of household net carbon costs.

As was the case with the fiscal impact, we expect that the change in relative factor prices in response to the carbon levy will affect households differently depending on their income composition. For example, if the carbon levy results in lower returns to capital relative to wages, then households with a greater share of their income from investments will bear a greater burden.¹⁴

3.1. Economic impacts of the \$170 federal carbon levy

The impacts of the federal carbon levy on labour and capital income are estimated using the same model (ENVISAGE) that was used in PBO’s 2021 report that analyzed the economic impacts of reducing Canada’s GHG emissions, with the federal carbon levy rising to \$170 per tonne in 2030 under HEHE.¹⁵

Table 3-1 presents the economic impacts of implementing a carbon price that matches the federal carbon levy under the HEHE plan.¹⁶ However, the results from ENVISAGE shown below are based on the assumption that the carbon price (rising to \$170 per tonne in 2030) is applied at the national level, for all provinces and territories.

To allocate the impacts on factor incomes to the specific provinces subject to the federal carbon levy, we use Statistics Canada’s microsimulation model SPSP/M.¹⁷ The assumptions and calculations underlying the SPSP/M simulation results were prepared by OPBO analysts; the responsibility for the use and interpretation of these data is entirely that of OPBO analysts.

Our results show a larger decline in inflation-adjusted investment (capital) income relative to labour income, mainly because capital-intensive industries are also carbon intensive.¹⁸ However, over time this discrepancy narrows as technological change reduces the negative impact of carbon pricing on capital productivity.

In addition, we estimate that the decline in labour income is somewhat larger for workers without a high school diploma (“unskilled”) than it is for workers with a high school diploma or higher level of education (“skilled”) because emissions-intensive sectors rely more on unskilled labour than other sectors.¹⁹

Table 3-1 Economic impacts of carbon pricing (national results)

% (unless otherwise indicated)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Carbon levy (\$ per tonne)	40	50	65	80	95	110	125	140	155	170
Real GDP at market prices	-0.3	-0.4	-0.5	-0.6	-0.7	-0.8	-1.0	-1.1	-1.2	-1.3
Labour income – unskilled labour	-0.6	-0.7	-1.0	-1.2	-1.4	-1.6	-1.9	-2.1	-2.3	-2.6
Labour income – skilled labour	-0.2	-0.4	-0.5	-0.8	-1.0	-1.2	-1.4	-1.7	-1.9	-2.1
Total labour income	-0.4	-0.5	-0.7	-0.9	-1.2	-1.4	-1.6	-1.8	-2.1	-2.3
Investment income	-2.3	-2.6	-2.8	-3.0	-3.2	-3.3	-3.4	-3.5	-3.5	-3.6

Source: Office of the Parliamentary Budget Officer.

Notes: Economic impacts are expressed in real (inflation-adjusted) terms relative to a scenario without the federal carbon levy and OBPS.

3.2. Distribution of household net carbon costs (fiscal and economic impacts)

When the economic (“source-side”) impact is combined with the fiscal (“use-side”) impact, the net carbon cost increases for all households, reflecting the overall negative economic impact of the federal carbon levy under the Government’s HEHE plan.

Indeed, most households will see a net loss resulting from federal carbon pricing under the HEHE plan in 2030-31 (Table 3-2). That is, their overall costs—which now include the federal levy and GST paid (fiscal impact) and lower employment and investment income (economic impact)—exceed the rebate and the induced reduction in personal income taxes arising from the loss in income.

The largest net loss is for households in the top income quintile in Alberta (2.8 per cent of disposable income) and the largest net gain is in the lowest income quintile in Saskatchewan (2.3 per cent of disposable income) in 2030-31.

Detailed annual results over 2021-22 to 2030-31 are provided in Appendix A. The results show similar distributional impacts over time, with the magnitude of net costs increasing, reflecting increases in the federal carbon levy and household consumption.

Table 3-2 **Quintile distribution of household net carbon costs in
2030-31 (fiscal and economic impacts)**

		1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Average
Alberta	Net cost	-\$660	\$100	\$1,116	\$3,409	\$7,402	\$2,282
	Net cost as a share of disposable income	-1.9%	0.2%	1.1%	2.4%	2.8%	1.9%
Saskatchewan	Net cost	-\$674	-\$53	\$743	\$2,200	\$5,123	\$1,464
	Net cost as a share of disposable income	-2.3%	-0.1%	0.9%	1.8%	2.2%	1.4%
Manitoba	Net cost	-\$516	-\$35	\$581	\$1,598	\$4,103	\$1,145
	Net cost as a share of disposable income	-1.7%	-0.1%	0.7%	1.4%	2.0%	1.2%
Ontario	Net cost	-\$461	\$134	\$941	\$1,853	\$4,866	\$1,461
	Net cost as a share of disposable income	-1.5%	0.2%	1.1%	1.5%	1.9%	1.3%

Source: Office of the Parliamentary Budget Officer.

Notes: Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction. Net cost as a share of disposable income is calculated relative to disposable income without carbon pricing.

The 1st quintile represents the lowest household income quintile and the 5th quintile represents the highest household income quintile.

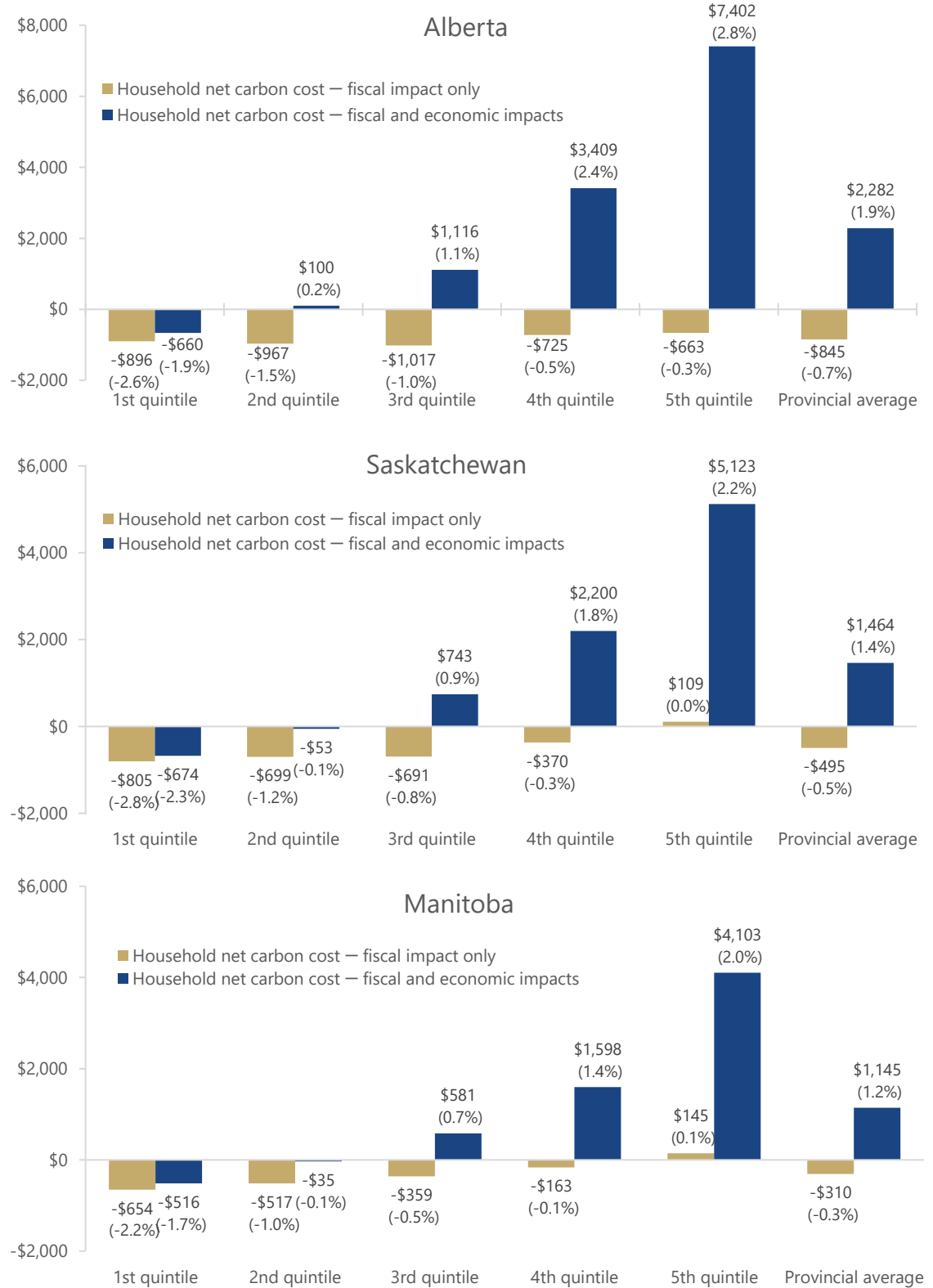
The variation in household net carbon costs across provinces reflects differences in the distribution of employment and investment incomes combined with the differential impacts on the returns to capital and wages resulting from federal carbon pricing under HEHE. Household net carbon costs in Alberta are higher, on average, compared to other provinces given that its economy is more emissions intensive.

The finding that most households incur a net loss in 2030-31 from federal carbon pricing under HEHE contrasts with the results based on the fiscal impact only where, for the vast majority of households in the backstop provinces, their rebates exceed their carbon costs (that is, a net gain). Figures 3-1 provides a comparison of household net carbon costs across income quintiles and provinces.

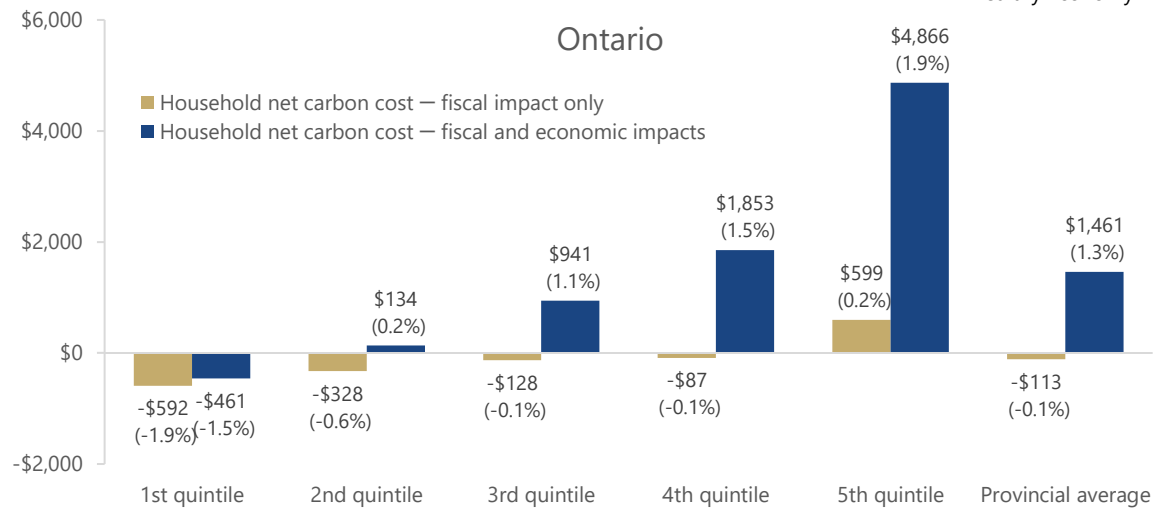
That said, relative to disposable income, our estimates of household net carbon costs continue to show a progressive impact (that is, larger net costs for higher income households). This reflects, in part, the larger decline in investment income relative to labour income. Given that investment income makes up a larger share of total income for higher income households, the carbon cost of federal carbon pricing under HEHE is therefore proportionately larger.

Figure 3-1

Household net carbon costs in 2030-31 under HEHE carbon pricing



A Distributional Analysis of Federal Carbon Pricing under A Healthy Environment and A Healthy Economy



Source: Office of the Parliamentary Budget Officer.

Note: Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction. Net cost as a share of disposable income is calculated relative to disposable income without carbon pricing.

4. Budgetary impacts of HEHE carbon pricing

We also assess the impact of carbon pricing on federal budgetary revenues and program spending. Our estimates now incorporate reductions in personal income taxes that arise from the economic (“source-side”) impact of lower household employment and investment income in backstop provinces.

However, these estimates are partial in nature, in that they do not capture the full budgetary impact of the reduction in economic efficiency. For example, households with lower incomes would likely reduce their spending on goods and services further, resulting in lower GST revenues; and lower corporate profits would lead to a reduction in corporate income tax revenues.

That said, incorporating the impact on personal income taxes enables an enhanced analysis of the budgetary impact of federal carbon pricing in backstop provinces.

Table 4-1 presents the aggregate budgetary impacts of federal carbon pricing under HEHE. These impacts represent the aggregation of results in provinces under the federal backstop. Appendix B provides the detailed budgetary impacts by individual province.

Under its HEHE climate plan, we estimate that the Government will collect, \$5.9 billion in budgetary revenues in 2021-22, rising to \$18.5 billion in 2030-31 (after taking into account the lower personal income tax revenues). A large portion of this revenue will be generated by fuel charge proceeds from Alberta and Ontario. Beyond 2021-22, OBPS revenue will only be generated in Saskatchewan and Manitoba, as all other provinces will have their own large emitters pricing programs.

The Government will also collect revenue from GST on its carbon levy. We estimate that \$239 million in GST revenue from carbon pricing will be collected in 2021-22, increasing to \$837 million in 2030-31 under HEHE carbon pricing.

When the economic (“source-side”) impact is incorporated into our analysis, we observe a decrease in employment and investment income, which leads to a reduction in federal personal income tax (PIT) revenues in the backstop provinces. In 2021-22, we estimate that federal carbon pricing will reduce PIT revenues by \$1.1 billion, dampening the impact of fuel charge proceeds on budgetary revenues. The impact on PIT revenues is projected to reach \$6.0 billion in 2030-31. Approximately half of the reduction in federal PIT revenue annually will come from Ontario.

Table 4-1 Budgetary impacts of federal carbon pricing under HEHE²⁰

\$ millions	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Budgetary revenues										
Fuel charge proceeds	6,607	8,294	10,673	12,890	14,991	16,954	18,815	20,444	21,926	23,437
OBPS	216	83	93	112	136	159	164	166	177	190
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Total revenues	5,918	7,149	9,089	10,864	12,477	13,964	15,329	16,446	17,432	18,464
Program spending										
Fuel charge proceeds returned	6,607	8,294	10,673	12,890	14,991	16,954	18,815	20,444	21,926	23,437
OBPS returned	216	83	93	112	136	159	164	166	177	190
Total program spending	6,823	8,377	10,766	13,002	15,127	17,113	18,979	20,610	22,103	23,627
Budgetary balance	-905	-1,228	-1,677	-2,137	-2,649	-3,148	-3,650	-4,163	-4,671	-5,163

Source: Office of the Parliamentary Budget Officer.

Notes: Totals may not add due to rounding.

Budgetary impacts include only the revenues and spending in provinces under the federal backstop.

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 CO₂, 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.

The impact on personal income tax revenues is calculated using Statistics Canada's microsimulation model SPSPD/M.

We estimate that the Government will return \$6.6 billion in fuel charge proceeds in 2021-22, rising to \$23.4 billion in 2030-31. A large portion of this revenue will be returned to Alberta and Ontario.

Given the structure of the federal carbon pricing system, the overall budgetary impact of carbon pricing under HEHE will effectively be limited to the economic impact of lower income tax revenues. We estimate that carbon pricing under HEHE will reduce the budgetary balance (that is, increase the budgetary deficit) by \$0.9 billion in 2021-22 and ultimately by \$5.2 billion in 2030-31.

Our estimates, however, only account for the economic impact of carbon pricing on personal income tax revenues. Future work may expand the analytical scope to include additional budgetary impacts.

Appendix A –

Household rebates, gross costs, and net carbon costs

Table A-1 Alberta: household rebates, gross costs and net carbon costs, 2021-22 to 2030-31 (fiscal and economic impacts)

	\$ CAN	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Rebate	1 st quintile	-\$801	-\$976	-\$1,201	-\$1,416	-\$1,609	-\$1,774	-\$1,935	-\$2,071	-\$2,204	-\$2,316
	2 nd quintile	-\$982	-\$1,190	-\$1,484	-\$1,740	-\$1,978	-\$2,181	-\$2,378	-\$2,546	-\$2,710	-\$2,847
	3 rd quintile	-\$1,082	-\$1,339	-\$1,670	-\$1,966	-\$2,234	-\$2,463	-\$2,686	-\$2,875	-\$3,061	-\$3,215
	4 th quintile	-\$1,238	-\$1,553	-\$1,935	-\$2,279	-\$2,590	-\$2,855	-\$3,114	-\$3,333	-\$3,548	-\$3,727
	5 th quintile	-\$1,296	-\$1,606	-\$2,002	-\$2,366	-\$2,690	-\$2,965	-\$3,234	-\$3,461	-\$3,684	-\$3,871
	Average	-\$1,078	-\$1,333	-\$1,665	-\$1,948	-\$2,215	-\$2,441	-\$2,662	-\$2,849	-\$3,033	-\$3,187
Total gross cost	1 st quintile	\$555	\$687	\$856	\$1,002	\$1,133	\$1,254	\$1,372	\$1,473	\$1,572	\$1,656
	2 nd quintile	\$896	\$1,126	\$1,411	\$1,664	\$1,904	\$2,138	\$2,365	\$2,571	\$2,770	\$2,947
	3 rd quintile	\$1,262	\$1,592	\$1,995	\$2,361	\$2,705	\$3,062	\$3,413	\$3,737	\$4,048	\$4,331
	4 th quintile	\$1,993	\$2,531	\$3,191	\$3,784	\$4,374	\$4,986	\$5,585	\$6,138	\$6,661	\$7,136
	5 th quintile	\$3,221	\$4,084	\$5,107	\$6,022	\$6,926	\$7,894	\$8,827	\$9,700	\$10,515	\$11,273
	Average	\$1,585	\$2,004	\$2,512	\$2,967	\$3,408	\$3,867	\$4,312	\$4,724	\$5,113	\$5,469
Total net cost	1 st quintile	-\$246	-\$289	-\$345	-\$413	-\$476	-\$520	-\$563	-\$597	-\$633	-\$660
	2 nd quintile	-\$86	-\$64	-\$73	-\$76	-\$74	-\$43	-\$13	\$26	\$60	\$100
	3 rd quintile	\$180	\$254	\$325	\$395	\$470	\$599	\$727	\$862	\$988	\$1,116
	4 th quintile	\$755	\$978	\$1,256	\$1,506	\$1,783	\$2,130	\$2,471	\$2,805	\$3,114	\$3,409
	5 th quintile	\$1,925	\$2,477	\$3,105	\$3,655	\$4,236	\$4,928	\$5,593	\$6,239	\$6,831	\$7,402
	Average	\$507	\$671	\$847	\$1,018	\$1,194	\$1,425	\$1,650	\$1,874	\$2,080	\$2,282

Source: Office of the Parliamentary Budget Officer.

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

Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction.

Table A-2 Saskatchewan: household rebates, gross costs and net carbon costs, 2021-22 to 2030-31 (fiscal and economic impacts)

	<u>\$ CAN</u>	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Rebate	1 st quintile	-\$704	-\$878	-\$1,107	-\$1,308	-\$1,485	-\$1,645	-\$1,769	-\$1,783	-\$1,859	-\$1,966
	2 nd quintile	-\$863	-\$1,030	-\$1,298	-\$1,536	-\$1,744	-\$1,933	-\$2,078	-\$2,094	-\$2,184	-\$2,310
	3 rd quintile	-\$929	-\$1,170	-\$1,470	-\$1,740	-\$1,976	-\$2,189	-\$2,353	-\$2,372	-\$2,473	-\$2,616
	4 th quintile	-\$1,090	-\$1,314	-\$1,651	-\$1,960	-\$2,226	-\$2,466	-\$2,651	-\$2,672	-\$2,786	-\$2,948
	5 th quintile	-\$1,149	-\$1,454	-\$1,824	-\$2,159	-\$2,451	-\$2,716	-\$2,920	-\$2,943	-\$3,068	-\$3,246
	Average	-\$946	-\$1,172	-\$1,472	-\$1,743	-\$1,979	-\$2,193	-\$2,357	-\$2,376	-\$2,477	-\$2,620
Total gross cost	1 st quintile	\$464	\$564	\$704	\$833	\$953	\$1,061	\$1,143	\$1,171	\$1,230	\$1,292
	2 nd quintile	\$756	\$929	\$1,175	\$1,370	\$1,566	\$1,761	\$1,919	\$2,004	\$2,130	\$2,257
	3 rd quintile	\$1,007	\$1,253	\$1,585	\$1,928	\$2,216	\$2,510	\$2,765	\$2,937	\$3,149	\$3,359
	4 th quintile	\$1,481	\$1,857	\$2,370	\$2,848	\$3,294	\$3,756	\$4,163	\$4,419	\$4,807	\$5,148
	5 th quintile	\$2,566	\$3,204	\$4,027	\$4,770	\$5,472	\$6,192	\$6,817	\$7,296	\$7,837	\$8,368
	Average	\$1,255	\$1,561	\$1,972	\$2,350	\$2,700	\$3,056	\$3,362	\$3,565	\$3,831	\$4,085
Total net cost	1 st quintile	-\$239	-\$314	-\$403	-\$474	-\$532	-\$585	-\$625	-\$612	-\$628	-\$674
	2 nd quintile	-\$107	-\$100	-\$122	-\$166	-\$178	-\$172	-\$159	-\$90	-\$54	-\$53
	3 rd quintile	\$78	\$83	\$115	\$188	\$240	\$321	\$412	\$565	\$676	\$743
	4 th quintile	\$391	\$544	\$719	\$888	\$1,068	\$1,290	\$1,512	\$1,746	\$2,020	\$2,200
	5 th quintile	\$1,417	\$1,750	\$2,204	\$2,611	\$3,021	\$3,476	\$3,898	\$4,353	\$4,769	\$5,123
	Average	\$309	\$390	\$500	\$607	\$721	\$863	\$1,004	\$1,189	\$1,353	\$1,464

Source: Office of the Parliamentary Budget Officer.

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

Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction.

Table A-3

Manitoba: household rebates, gross costs and net carbon
costs, 2021-22 to 2030-31 (fiscal and economic impacts)

	\$ CAN	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Rebate	1 st quintile	-\$429	-\$542	-\$698	-\$841	-\$973	-\$1,098	-\$1,215	-\$1,315	-\$1,395	-\$1,509
	2 nd quintile	-\$491	-\$610	-\$786	-\$946	-\$1,094	-\$1,235	-\$1,366	-\$1,479	-\$1,569	-\$1,697
	3 rd quintile	-\$555	-\$708	-\$913	-\$1,096	-\$1,268	-\$1,431	-\$1,584	-\$1,714	-\$1,818	-\$1,967
	4 th quintile	-\$607	-\$757	-\$976	-\$1,179	-\$1,363	-\$1,540	-\$1,703	-\$1,843	-\$1,956	-\$2,115
	5 th quintile	-\$671	-\$866	-\$1,112	-\$1,341	-\$1,551	-\$1,751	-\$1,937	-\$2,097	-\$2,225	-\$2,406
	Average	-\$552	-\$698	-\$896	-\$1,081	-\$1,250	-\$1,412	-\$1,562	-\$1,690	-\$1,793	-\$1,939
Total gross cost	1 st quintile	\$274	\$347	\$449	\$544	\$630	\$715	\$796	\$868	\$929	\$993
	2 nd quintile	\$423	\$541	\$711	\$867	\$1,011	\$1,156	\$1,296	\$1,426	\$1,543	\$1,662
	3 rd quintile	\$620	\$801	\$1,051	\$1,281	\$1,505	\$1,732	\$1,954	\$2,162	\$2,354	\$2,547
	4 th quintile	\$903	\$1,163	\$1,524	\$1,863	\$2,185	\$2,516	\$2,839	\$3,145	\$3,430	\$3,713
	5 th quintile	\$1,667	\$2,132	\$2,756	\$3,313	\$3,868	\$4,441	\$4,989	\$5,520	\$6,018	\$6,509
	Average	\$777	\$997	\$1,298	\$1,574	\$1,840	\$2,112	\$2,375	\$2,624	\$2,855	\$3,085
Total net cost	1 st quintile	-\$156	-\$195	-\$248	-\$297	-\$343	-\$383	-\$419	-\$447	-\$466	-\$516
	2 nd quintile	-\$68	-\$69	-\$75	-\$79	-\$83	-\$79	-\$71	-\$53	-\$25	-\$35
	3 rd quintile	\$65	\$93	\$137	\$185	\$237	\$301	\$370	\$448	\$536	\$581
	4 th quintile	\$296	\$407	\$547	\$685	\$821	\$977	\$1,135	\$1,301	\$1,475	\$1,598
	5 th quintile	\$996	\$1,266	\$1,644	\$1,972	\$2,317	\$2,690	\$3,052	\$3,423	\$3,794	\$4,103
	Average	\$225	\$299	\$402	\$493	\$590	\$701	\$813	\$934	\$1,062	\$1,145

Source: Office of the Parliamentary Budget Officer.

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

Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction.

Table A-4

Ontario: household rebates, gross costs and net carbon
costs, 2021-22 to 2030-31 (fiscal and economic impacts)

	\$ CAN	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Rebate	1 st quintile	-\$418	-\$511	-\$652	-\$780	-\$903	-\$1,017	-\$1,121	-\$1,215	-\$1,288	-\$1,366
	2 nd quintile	-\$480	-\$603	-\$763	-\$909	-\$1,052	-\$1,185	-\$1,307	-\$1,416	-\$1,501	-\$1,591
	3 rd quintile	-\$556	-\$678	-\$866	-\$1,037	-\$1,200	-\$1,351	-\$1,490	-\$1,614	-\$1,711	-\$1,814
	4 th quintile	-\$630	-\$780	-\$990	-\$1,185	-\$1,371	-\$1,544	-\$1,702	-\$1,845	-\$1,956	-\$2,073
	5 th quintile	-\$662	-\$833	-\$1,063	-\$1,274	-\$1,474	-\$1,661	-\$1,831	-\$1,983	-\$2,103	-\$2,229
	Average	-\$549	-\$679	-\$866	-\$1,037	-\$1,200	-\$1,351	-\$1,490	-\$1,614	-\$1,711	-\$1,814
Total gross cost	1 st quintile	\$268	\$328	\$421	\$505	\$583	\$659	\$730	\$795	\$849	\$905
	2 nd quintile	\$471	\$586	\$757	\$918	\$1,067	\$1,216	\$1,358	\$1,490	\$1,607	\$1,725
	3 rd quintile	\$679	\$860	\$1,132	\$1,381	\$1,626	\$1,872	\$2,110	\$2,338	\$2,547	\$2,756
	4 th quintile	\$909	\$1,161	\$1,536	\$1,905	\$2,255	\$2,613	\$2,961	\$3,299	\$3,612	\$3,926
	5 th quintile	\$1,799	\$2,274	\$2,951	\$3,574	\$4,202	\$4,831	\$5,429	\$6,015	\$6,552	\$7,095
	Average	\$825	\$1,039	\$1,356	\$1,653	\$1,942	\$2,234	\$2,512	\$2,782	\$3,027	\$3,275
Total net cost	1 st quintile	-\$150	-\$182	-\$231	-\$276	-\$320	-\$358	-\$391	-\$420	-\$439	-\$461
	2 nd quintile	-\$9	-\$17	-\$6	\$9	\$15	\$31	\$51	\$74	\$106	\$134
	3 rd quintile	\$124	\$182	\$265	\$345	\$426	\$521	\$621	\$724	\$836	\$941
	4 th quintile	\$279	\$381	\$546	\$721	\$884	\$1,069	\$1,259	\$1,454	\$1,656	\$1,853
	5 th quintile	\$1,137	\$1,441	\$1,888	\$2,300	\$2,728	\$3,170	\$3,598	\$4,031	\$4,449	\$4,866
	Average	\$276	\$360	\$490	\$616	\$743	\$882	\$1,023	\$1,168	\$1,316	\$1,461

Source: Office of the Parliamentary Budget Officer.

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

Net cost is calculated as the federal levy and GST paid plus income loss (that is, the gross carbon cost) less rebates received and income tax reduction.

Appendix B – Budgetary impacts of HEHE carbon pricing by province

Table B-1 Provincial breakdown of the budgetary impacts of federal carbon pricing under HEHE

	\$ millions	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
AB	Budgetary revenues										
	Fuel charge proceeds	2,046	2,554	3,244	3,885	4,488	5,028	5,568	6,051	6,533	6,950
	OBPS	-	-	-	-	-	-	-	-	-	-
	Goods and Services Tax	66	83	105	126	145	162	179	195	210	222
	Personal income tax	-478	-620	-808	-991	-1,195	-1,393	-1,588	-1,775	-1,950	-2,117
	Total revenues	1,635	2,017	2,541	3,020	3,438	3,797	4,160	4,470	4,793	5,056
	Program spending										
	Fuel charge proceeds returned	2,046	2,554	3,244	3,885	4,488	5,028	5,568	6,051	6,533	6,950
	Budgetary balance	-411	-537	-702	-865	-1,050	-1,231	-1,408	-1,581	-1,740	-1,894
SK	Budgetary revenues										
	Fuel charge proceeds	521	650	830	994	1,140	1,275	1,383	1,408	1,484	1,567
	OBPS	68	67	72	84	101	116	114	108	110	113
	Goods and Services Tax	19	23	29	35	40	45	48	50	53	56
	Personal income tax	-65	-85	-111	-138	-168	-196	-224	-252	-278	-305
	Total revenues	543	656	820	974	1,113	1,240	1,322	1,314	1,368	1,432
	Program spending										
	Fuel charge proceeds returned	521	650	830	994	1,140	1,275	1,383	1,408	1,484	1,567
	OBPS returned	68	67	72	84	101	116	114	108	110	113
	Budgetary balance	-46	-62	-82	-103	-128	-151	-175	-201	-225	-248
MB	Budgetary revenues										
	Fuel charge proceeds	351	446	582	708	825	940	1,050	1,147	1,231	1,345
	OBPS	12	15	21	28	35	42	50	58	67	77
	Goods and Services Tax	12	15	20	24	28	32	36	39	42	46
	Personal income tax	-48	-64	-87	-110	-135	-158	-183	-207	-232	-255
	Total revenues	327	412	536	649	754	856	953	1,038	1,109	1,213
	Program spending										
	Fuel charge proceeds returned	351	446	582	708	825	940	1,050	1,147	1,231	1,345
	OBPS returned	12	15	21	28	35	42	50	58	67	77
	Budgetary balance	-36	-49	-67	-86	-106	-126	-146	-167	-189	-209

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ON	Budgetary revenues										
	Fuel charge proceeds	3,689	4,644	6,017	7,304	8,538	9,711	10,814	11,837	12,678	13,574
	OBPS	135	-	-	-	-	-	-	-	-	-
	Goods and Services Tax	142	175	228	276	323	367	409	447	479	512
	Personal income tax	-553	-754	-1,052	-1,359	-1,688	-2,007	-2,329	-2,661	-2,995	-3,323
	Total revenues	3,413	4,065	5,192	6,221	7,173	8,071	8,894	9,623	10,162	10,763
	Program spending										
	Fuel charge proceeds returned	3,689	4,644	6,017	7,304	8,538	9,711	10,814	11,837	12,678	13,574
	OBPS returned	135	-	-	-	-	-	-	-	-	-
	Budgetary balance	-411	-579	-825	-1,083	-1,365	-1,640	-1,920	-2,214	-2,517	-2,811
Total	Budgetary revenues										
	Fuel charge proceeds	6,607	8,294	10,673	12,890	14,991	16,954	18,815	20,444	21,926	23,437
	OBPS	216	83	93	112	136	159	164	166	177	190
	Goods and Services Tax	239	296	382	461	536	606	673	731	784	837
	Personal income tax	-1,144	-1,524	-2,059	-2,598	-3,186	-3,755	-4,323	-4,895	-5,455	-6,000
	Total revenues	5,918	7,149	9,089	10,864	12,477	13,964	15,329	16,446	17,432	18,464
	Program spending										
	Fuel charge proceeds returned	6,607	8,294	10,673	12,890	14,991	16,954	18,815	20,444	21,926	23,437
	OBPS returned	216	83	93	112	136	159	164	166	177	190
	Budgetary balance	-905	-1,228	-1,677	-2,137	-2,649	-3,148	-3,650	-4,163	-4,671	-5,163

Source: Office of the Parliamentary Budget Officer.

Notes: Totals may not add due to rounding.

Budgetary impacts include only the revenues and spending in provinces under the federal backstop.

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 CO₂, 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.

The impact on personal income tax revenues is calculated using Statistics Canada's microsimulation model SPSPD/M.

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2. Environment and Climate Change Canada. (2021). *Output-Based Pricing System*. Retrieved from <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system.html>.
3. We exclude Yukon and Nunavut from our analysis because of a lack of data. In the case of Prince Edward Island, since the federal government will only apply the output-based pricing system, we do not consider it in our distributional analysis.
4. Environment and Climate Change Canada. (2021). *A Healthy Environment and a Healthy Economy*. Retrieved from <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html>.
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7. In March 2021, Environment and Climate Change Canada announced its intent to remove the application of the federal OBPS from Ontario facilities effective January 2022. The Ontario Emission Performance Standards (EPS) program will be the alternative to the OBPS.

The federal government recognized that Saskatchewan was on track to partially meet the federal benchmark stringency requirements for big emitters. In Saskatchewan, the federal OBPS applies to electricity generation and natural gas transmission lines.
8. Available at: <https://www.pbo-dpb.gc.ca/en/blog/news/RP-1920-024-S-reviewing-fiscal-distributional-analysis-federal-carbon-pricing-system--examen-analyse-financiere-distributive-systeme-federal-tarification-du-carbone>.
9. Available at: <https://www.pbo-dpb.gc.ca/en/blog/news/RP-2122-009-S-beyond-paris-reducing-canada-ghg-emissions-2030--dela-paris-reduire-emissions-gaz-effet-serre-canada-ici-2030> and https://www.pbo-dpb.gc.ca/en/blog/news/Federal_carbon_pricing.

10. For example, Auerbach and Hines (2001) note that “[t]ax induced reductions in economic efficiency are known as *deadweight losses* or the *excess burdens* of taxation, the latter signifying the added cost to taxpayers and society of raising revenue through taxes that distort economic decisions.” Retrieved from <https://www.bus.umich.edu/otpr/Wp2001-7paper.pdf>.
11. In academic research, the fiscal and economic impacts of carbon pricing on households are typically referred to as “use-side” and “source-side” impacts, respectively. For example, see Fullerton et al. (2010), Rausch et al. (2011), and Goulder et al. (2019).
12. Department of Finance Canada. (2020). Climate Action Incentive Payment Amounts for 2021. Retrieved from <https://www.canada.ca/en/departement-finance/news/2020/12/climate-action-incentive-payment-amounts-for-2021.html>
13. In comparison to our 2020 report, which estimated household net carbon costs over 2019-20 to 2024-25, the removal of Ontario from the federal OBPS results in more households receiving rebates that exceed the total amount they pay in terms of the federal carbon levy.
14. Congressional Budget Office. (2021). Distributional Effects of Reducing Carbon Dioxide Emissions with a Carbon Tax. Retrieved from <https://www.cbo.gov/publication/57399>
15. PBO uses the computable general equilibrium model ENVISAGE (Environmental Impact and Sustainability Applied General Equilibrium) to quantify the income effects of the federal carbon pricing.
16. As noted in PBO’s June 2021 report using ENVISAGE, the negative GDP impact is not intended to be viewed in isolation. Climate change itself will have potential costs, and unforeseen technological breakthroughs in response to carbon pricing could mitigate the negative effect on GDP. Such a technology breakthrough scenario is possible but could take time to occur. Thus, the negative impact of the policy on GDP could persist for a long period of time before any offsetting impacts would be realized. PBO’s modelling—and the negative impact it illustrates—is thus an anchor on expectations, rather than a forecast per se.
17. The detailed sectoral impacts by labor type from the model ENVISAGE were mapped into Statistics Canada’s Social Policy Simulation Database and Model (SPSD/M), which produced the geographic (by province) and household income (by quintile) results.

The total worker compensation by industry and education level in SPSPD/M was used as a proxy for the sectoral labour income by work type provided by the model ENVISAGE.

Dividend income, capital gains and interest and other investment income from Canadian Corporations in SPSPD/M are used as a proxy for the return on investments.
18. CBO (2021) mentions that the exact magnitude of the changes in relative factor returns depends on model assumptions about the mobility of labour and capital. For example, models that assume relatively greater labour mobility tend to find smaller effects on wages. Retrieved from <https://www.cbo.gov/publication/57399>.

19. Statistics Canada data on the full-time workers show that 45 per cent of workers without a certificate, diploma or degree are employed in manufacturing and utilities, trades, transportation and machinery, or natural resources, agriculture and related production. However, only 21 per cent of workers with the highest certificate, diploma or degree are employed in the same sectors. Retrieved from <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dv-vd/occ-pro/index-eng.cfm>.
20. On a cash basis all proceeds raised are returned to the jurisdiction of origin. However, on a fiscal year basis there are timing (or accounting) differences between when proceeds are received and when they are returned through the benefits system, resulting in an impact on the budgetary balance. For simplicity, for this report, we have assumed that there is no impact on the budgetary balance from these timing difference. Our March 2022 Economic and Fiscal Outlook accounts for these timing differences, for further details please see: <https://www.pbo-dpb.gc.ca/en/blog/news/RP-2122-030-S--economic-fiscal-outlook-march-2022--perspectives-economiques-financieres-mars-2022>