May 18, 2023

A Distributional Analysis of the Clean Fuel Regulations

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 the Clean Fuel Regulations that will require reductions in the carbon intensity of gasoline and diesel used in Canada.

Lead analysts:

Nasreddine Ammar, Advisor-Analyst
Marianne Laurin, Analyst

Contributors:

Philip Bagnoli, Advisor-Analyst
Tim Scholz, Advisor-Analyst
Diarra Sourang, Advisor-Analyst

Prepared under the direction of:

Chris Matier, Director General

Nathalie Desmarais, Marie-Eve Hamel Laberge, Martine Perreault and Rémy Vanherweghem assisted with the preparation of the report for publication.

For further information, please contact the Office of the Parliamentary Budget Officer.

Yves Giroux
Parliamentary Budget Officer

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Highlights

Relative to household disposable income, PBO results show that the *Clean Fuel Regulations* are broadly regressive. That is, the cost to lower income households represents a larger share of their disposable income compared to higher income households.

At the national level, in 2030, the cost of the Clean Fuel Regulations to households ranges from 0.62 per cent of disposable income (or $231) for lower income households to 0.35 per cent of disposable income (or $1,008) for higher income households.

Relative to disposable income, the cost of the Clean Fuel Regulations to the average household in 2030 is the highest in Saskatchewan (0.87 per cent, or $1,117), Alberta (0.80 per cent, or $1,157) and Newfoundland and Labrador (0.80 per cent, or $850), reflecting the higher fossil fuel intensity of their economies.

Relative to disposable income, the cost of the Clean Fuel Regulations to the average household in 2030 is the lowest in British Columbia (0.28 per cent, or $384), reflecting the relatively muted impact on real GDP. That said, the cost to the average household in Ontario (0.35 per cent, or $495) and Quebec (0.39 per cent, or $436) is only modestly larger.

PBO estimates are based, in part, on data underlying the Regulatory Impact Analysis Statement provided by Environment and Climate Change Canada from their upper bound fuel price scenario. Consequently, PBO estimates should be regarded as upper bound estimates.

Summary

This report provides a distributional analysis of the Clean Fuel Regulations (CFR) that will require reductions in the carbon intensity of gasoline and diesel used in Canada.

Under the CFR, beginning on July 1, 2023, primary suppliers (that is, producers and importers) will be required to reduce the carbon intensity of the gasoline and diesel they produce and sell for use in Canada. Under the CFR, carbon intensity is measured as the quantity of carbon dioxide equivalent emissions that is released over the life cycle of the regulated fuel (that is, the emissions from the extraction, refining, distribution and use of the fuel).

Going forward, the limit for carbon intensity of gasoline and diesel will be lowered each year, with the ultimate reduction estimated by Environment and Climate Change Canada (ECCC) to be approximately 15 per cent (below 2016 levels) achieved by 2030. According to ECCC, the CFR "will deliver up to 26 million tonnes (Mt) of GHG emissions reductions in 2030".

This report uses estimates of the impact on gasoline and diesel prices, as well as the impact on labour and capital income (by province), provided by ECCC underlying their Regulatory Impact Analysis Statement for the CFR. To complement and build upon the qualitative distributional analysis provided in the regulatory statement, we use ECCC estimates of the economic impacts of the CFR to quantify the cost to households by income quintile for each province. Similar to our analysis of the federal fuel charge, the cost to households reflects "use-side" (changes in product prices) and "source-side" (changes in factor prices) components.

Our baseline scenario assumes status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The regulatory scenario

introduces the CFR and the costs are estimated relative to the baseline scenario. Our analysis focuses on the cost to households in 2030, the year in which the ultimate reductions in carbon intensity are achieved.

Key results

ECCC estimates that the CFR will increase the price of gasoline and diesel in 2030—the year in which the CFR reach full stringency—by up to 17 cents per litre and 16 cents per litre, respectively. Further, ECCC estimates that the CFR will decrease real GDP in Canada by up to 0.3 per cent (or up to $9.0 billion) in 2030.

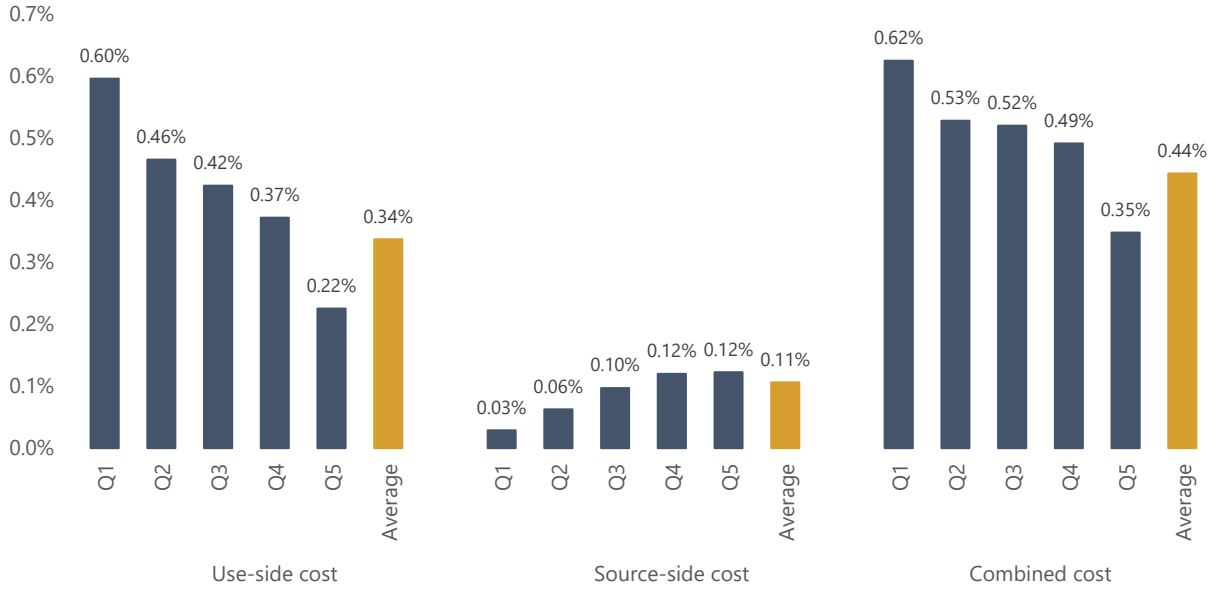
Relative to household disposable income, PBO results at the national level show that the use-side cost of the CFR is broadly regressive (Summary Figure 1). This is because lower income households generally spend a larger share of their income on transportation and other energy-intensive goods and services compared to higher income households.

PBO estimates indicate that the source-side cost is generally progressive, meaning that higher income households face larger costs relative to their disposable income. This reflects, in part, lower returns to capital relative to wages caused by the CFR. Given that capital income generally represents a larger share of total income for higher income households, their cost is proportionately larger. That said, the regressive use-side cost of the CFR dominates the progressive source-side cost.

- At the national level, in 2030, the cost of the CFR to households ranges from 0.62 per cent of disposable income (or $231) for lower income households to 0.35 per cent of disposable income (or $1,008) for higher income households.

Summary Figure 1

Household cost of the CFR in 2030 by income quintile, percentage of disposable income (national level)



Textual description:

	Use-side cost	Source-side cost	Combined cost
1st quintile	0.60%	0.03%	0.62%
2nd quintile	0.46%	0.06%	0.53%
3rd quintile	0.42%	0.10%	0.52%
4th quintile	0.37%	0.12%	0.49%
5th quintile	0.22%	0.12%	0.35%
Average	0.34%	0.11%	0.44%

Source:
Office of the Parliamentary Budget Officer.

Note:
PBO estimates are based, in part, on data underlying the CFR Regulatory Impact Analysis Statement provided by ECCC. Disposable income is based on status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The 1st quintile represents the lowest household income quintile; the 5th quintile represents the highest household income quintile.

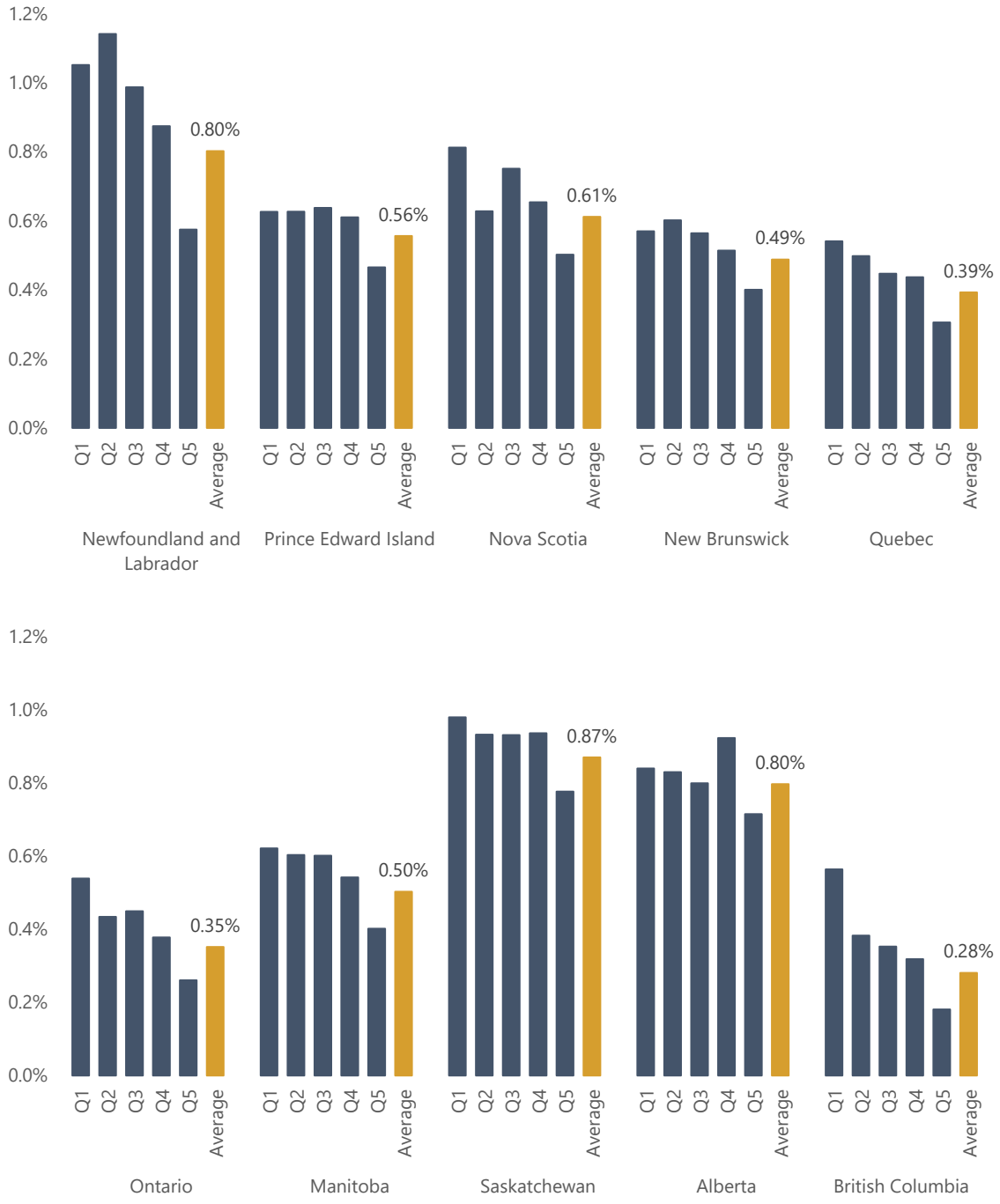
Totals may not add due to rounding.

The dominance of the regressive use-side cost of the CFR at the national level is consistent across provinces (Summary Figure 2).

- Relative to disposable income, the cost of the CFR to the average household in 2030 is the highest in Saskatchewan (0.87 per cent, or $1,117), Alberta (0.80 per cent, or $1,157) and Newfoundland and Labrador (0.80 per cent, or $850), reflecting the higher fossil fuel intensity of their economies.
- Relative to disposable income, the cost of the CFR to the average household in 2030 is the lowest in British Columbia (0.28 per cent, or $384), reflecting the relatively muted impact on real GDP due, in part, to revenues generated from existing provincial regulations. That said, the cost to the average household in Ontario (0.35 per cent, or $495) and Quebec (0.39 per cent, or $436) is only modestly larger, reflecting the lower fossil fuel intensity of their economies.

Summary Figure 2

Household cost of the CFR in 2030 by income quintile, percentage of disposable income (combined cost)



Textual description:

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Newfoundland and Labrador	1.05%	1.14%	0.99%	0.87%	0.57%	0.80%
Prince Edward Island	0.63%	0.63%	0.64%	0.61%	0.47%	0.56%
Nova Scotia	0.81%	0.63%	0.75%	0.65%	0.50%	0.61%
New Brunswick	0.57%	0.60%	0.56%	0.51%	0.40%	0.49%
Quebec	0.54%	0.50%	0.45%	0.44%	0.31%	0.39%
Ontario	0.54%	0.43%	0.45%	0.38%	0.26%	0.35%
Manitoba	0.62%	0.60%	0.60%	0.54%	0.40%	0.50%
Saskatchewan	0.98%	0.93%	0.93%	0.94%	0.78%	0.87%
Alberta	0.84%	0.83%	0.80%	0.92%	0.71%	0.80%
British Columbia	0.56%	0.38%	0.35%	0.32%	0.18%	0.28%

Source:
Office of the Parliamentary Budget Officer.

Note:
PBO estimates are based, in part, on data underlying the CFR Regulatory Impact Analysis Statement provided by ECCC. Disposable income is based on status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The 1st quintile represents the lowest household income quintile; the 5th quintile represents the highest household income quintile.

ECCC estimates of the economic impacts used in our analysis are based on their upper bound fuel price scenario presented in the regulatory statement. In addition, consistent with previous PBO analysis of carbon pricing, we assume full passthrough of the increase in gasoline and diesel prices (to non-fuel goods and services) on the use-side cost to households. Consequently, our estimates of the household cost should be regarded as upper bound estimates.

Introduction

Under the CFR, beginning on July 1, 2023, primary suppliers (that is, producers and importers) will be required to reduce the carbon intensity of the gasoline and diesel they produce and sell for use in Canada. Under the CFR, carbon intensity is measured as the quantity of carbon dioxide equivalent emissions that is released over the life cycle of the regulated fuel (that is, the emissions from the extraction, refining, distribution, and use of the fuel).

Going forward, the limit for carbon intensity of gasoline and diesel will be lowered each year, with the ultimate reduction estimated by ECCC to be approximately 15 per cent (below 2016 levels) achieved by 2030. According to ECCC, the CFR "will deliver up to 26 million tonnes (Mt) of GHG emissions reductions in 2030".[1]

According to ECCC, the CFR are among the most complex regulations it has ever developed.[2] In essence, the CFR establish a credit market where regulated parties (producers and importers of gasoline and diesel) must create or buy credits to comply with carbon intensity limits, which creates a market signal for investment in low carbon intensity fuels and technologies.[3] For a detailed description, please consult: Clean Fuel Regulations.

This report uses estimates of the impact on gasoline and diesel prices, as well as the impact on labour and capital income (by province), provided[4] by ECCC underlying their Regulatory Impact Analysis Statement for the CFR.[5] To complement and build upon the qualitative distributional analysis provided in the regulatory statement, we use ECCC estimates of the economic impacts of the CFR to quantify the cost to households by income quintile for each province.[6] Similar to our analysis of the federal fuel charge, the cost to households reflects "use-side" and "source-side" components.[7]

Similar to ECCC's regulatory analysis, our baseline scenario assumes status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The regulatory scenario introduces the CFR and the costs are estimated relative to the baseline scenario. Our analysis focuses on the cost to households in 2030, the year in which the ultimate reductions in carbon intensity are achieved.[8]

Caveats

ECCC estimates of the economic impacts used in our analysis are based on their upper bound fuel price scenario presented in the regulatory statement. In addition, consistent with previous PBO analysis of carbon pricing, we assume full passthrough of the increase in gasoline and diesel prices (to non-fuel goods and services) on the use-side cost to households. Consequently, our estimates of the household cost should be regarded as upper bound estimates.

Consistent with previous PBO analysis of carbon pricing and with the ECCC modelling used to assess the CFR, this report does not account for endogenous technological change where new technologies appear—in response to the CFR—that are more productive than existing technologies.[9] While such a scenario is possible (numerous past technological changes have transformed economies—and societies—because they were so much cheaper than their predecessors), it is not predictable.[10]

Consistent with previous PBO analysis of carbon pricing, the scope of this report is limited to estimating the distributional impact of the CFR. The report does not account for the benefits of reducing Canada's GHG emissions in terms of reducing the economic costs of climate change. Canada's own emissions are not large enough to materially impact climate change and therefore their reduction would not materially affect the Canadian economy. Of course, significant reductions in global GHG

emissions would help to lower the economic costs of climate change in Canada and elsewhere. As PBO noted recently, Canada's primary means of limiting the economic costs of climate change are through participation in a globally coordinated emissions reduction regime.[11]

Measuring the household cost of the CFR

In previous distributional analysis of the federal fuel charge[12], PBO distinguished between "use-side" and "source-side" costs to households, consistent with the framework used in academic research.[13]

The use-side captures the cost to the household in the form of higher product prices that it pays. The use-side cost is typically based on a partial equilibrium approach that is, overall production and factor prices in the economy are not affected by the policy change.[14] In our framework, the source-side cost to households captures the change in economy-wide production and factor prices that is, wages and returns to capital. To provide a broader perspective of the cost of the CFR to households, we estimate and combine both "sides" of the cost.

For the use-side cost of the CFR, consistent with our analysis of the federal fuel charge, we assumed that there is full passthrough of the price changes for gasoline and diesel from suppliers to households estimated by ECCC under the regulatory scenario.[15] The use-side captures both direct and indirect channels. The direct channel reflects household purchases of higher priced gasoline and diesel. The indirect channel reflects purchases of other goods and services with higher gasoline and diesel prices embedded in them.[16]

For the source-side cost, we used estimates of the impacts on labour and capital income (adjusted for inflation) generated by EC-PRO[17], ECCC's computable general equilibrium model used in its regulatory analysis of the CFR.[18] Projections of nominal household disposable income in our baseline scenario do not include the impact of the CFR on household labour and capital income.

To allocate the use-side and source-side costs by province[19] and by household income quintile, we apply the same methodology used in our previous distributional analyses of federal carbon pricing.[20]

On the use-side, we use historical distributional data on fuel use to allocate direct costs and interprovincial input-output modelling to allocate indirect costs. On the source-side, we use the Social Policy Simulation Database and Model (SPSD/M) to allocate the impacts on factor incomes. The assumptions and calculations underlying the SPSD/M simulation results were prepared by PBO analysts; the responsibility for the use and interpretation of these data is entirely that of PBO analysts.

Economic impacts of the CFR – ECCC estimates

As indicated by ECCC in its regulatory analysis, the CFR will affect the economy via two main channels:

- Increasing production costs for primary suppliers (through incremental compliance and administrative costs), will increase gasoline and diesel prices for households and industrial users. Credit creation will make low-carbon fuels and energy sources relatively less expensive.

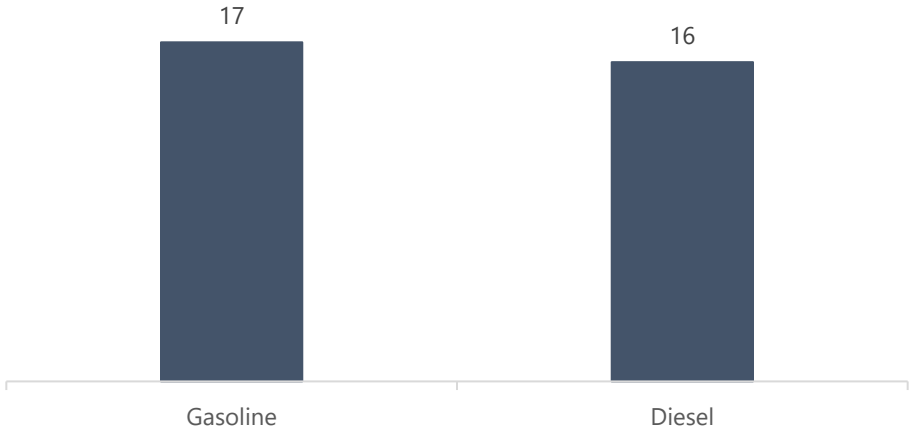
- The increase in production costs for sectors using these gasoline and diesel will result in changes to output. The change in relative prices of fuel will lead to decreased (end-use) demand for fossil fuels and increased (end-use) demand for lower carbon fuels and energy sources.

ECCC used the department's computable general equilibrium model, EC-PRO, to evaluate the direct impact of the CFR as well as the effect of relative price changes on Canadian economic activity and GHG emissions.

Based on EC-PRO modelling, ECCC estimates that the CFR will lead to increases in the price of gasoline and diesel in 2030—the year in which the CFR reach full stringency—of 17 cents per litre and 16 cents per litre, respectively (Figure 1).[21] ECCC notes that these estimates are based on an upper bound fuel price scenario where all credits are sold at the marginal cost per credit.[22]

Figure 1

ECCC estimated impact of the Clean Fuel Regulations on gasoline and diesel prices in 2030 (cents per litre) – upper bound fuel price scenario



Textual description:

	Gasoline	Diesel
Price	17	16

Source:
Environment and Climate Change Canada (EC-PRO modelling).

Note:
These ECCC estimates are based on an upper bound fuel price scenario where all credits are sold at the marginal cost per credit.

ECCC estimates that the CFR will decrease real GDP in Canada by up to 0.3 per cent (or up to $9.0 billion) in 2030 when the carbon intensity requirements for gasoline and diesel reach full stringency (Figure 2). The economic impact associated with the CFR will vary by province and by sector.

As ECCC notes, the CFR will have a "negligible" GDP impact on British Columbia (-0.1 per cent) due to revenues generated from the existing Renewable and Low Carbon Fuel Requirements Regulation (LCFR) and baseline credits from supplying fuel or energy to advanced vehicle technologies in the province.[23]

Figure 2

ECCC estimates of the impact of the CFR on real GDP in 2030 – upper bound fuel price scenario, per cent

Textual description:

	Real GDP impact
Newfoundland and Labrador	-1.0%
Prince Edward Island	-0.6%
Nova Scotia	-0.7%
New Brunswick	-0.6%
Quebec	-0.3%
Ontario	-0.3%
Manitoba	-0.4%
Saskatchewan	-0.9%
Alberta	-0.4%
British Columbia	-0.1%
Canada	-0.3%

Source:
Environment and Climate Change Canada.

Note:
These ECCC estimates are based on an upper bound fuel price scenario where all credits are sold at the marginal cost per credit. The real GDP impacts are estimated relative to the 2030 Emissions Reduction Plan without the CFR.

ECCC estimates indicate that the GDP impacts in the Atlantic provinces are larger (in absolute terms), or more negative, compared to other provinces, with the exception of Saskatchewan. According to ECCC, this reflects fewer opportunities for primary suppliers in these provinces to create credits to meet their own annual reduction requirement, as well as their relatively lower baseline EV and low-carbon fuel uptake.[24]

In the case of Saskatchewan, the negative GDP impact of the CFR is estimated to be among the largest, as the upstream petroleum sectors are largely located in that province, and the existing adoption of low-carbon fuels under the *Renewable Diesel Act* is limited.[25]

Estimates of the household cost of the CFR in 2030 by income quintile

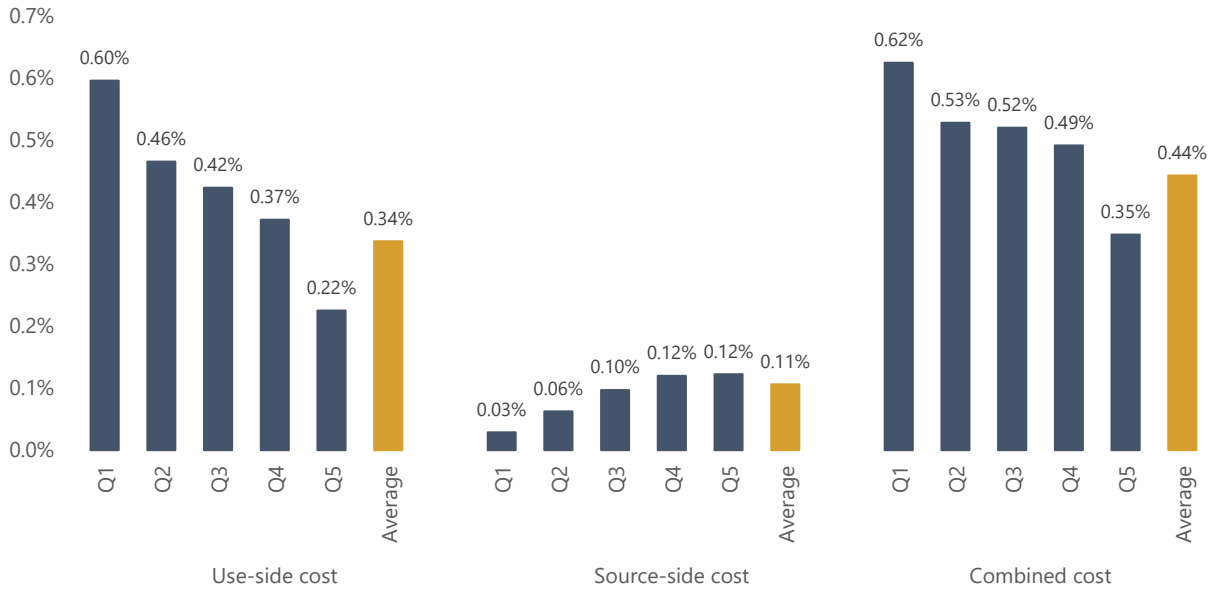
Figure 3 shows the distribution across income quintiles of both the use-side and source-side cost, as well as the combined cost of the CFR for households at the national level.

Relative to household disposable income, our results at the national level show that the use-side cost of the CFR is broadly regressive. That is, the use-side cost for lower income households represents a larger share of their disposable income compared to higher income households. This is because lower income households generally spend a larger share of their income on transportation and other energy-intensive goods and services compared to higher income households. Our finding with respect to the regressivity of the use-side cost of the CFR is consistent with the qualitative analysis contained in ECCC's regulatory statement.

The source-side cost is generally progressive, meaning that higher income households face larger costs relative to their disposable income. This reflects, in part, lower returns to capital relative to wages caused by the CFR. Given that capital income generally represents a larger share of total income for higher income household, their cost is proportionately larger.

Figure 3

Household cost of the CFR in 2030 by income quintile, percentage of disposable income (national level)



Textual description:

	Use-side cost	Source-side cost	Combined cost
1st quintile	0.60%	0.03%	0.62%
2nd quintile	0.46%	0.06%	0.53%
3rd quintile	0.42%	0.10%	0.52%
4th quintile	0.37%	0.12%	0.49%
5th quintile	0.22%	0.12%	0.35%
Average	0.34%	0.11%	0.44%

Source:
Office of the Parliamentary Budget Officer.

Note:
PBO estimates are based, in part, on data underlying the CFR Regulatory Impact Analysis Statement provided by ECCC. Disposable income is based on status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The 1st quintile represents the lowest household income quintile; the 5th quintile represents the highest household income quintile.

Totals may not add due to rounding.

The regressive use-side cost dominates the progressive source-side cost. Consequently, the combined cost of the CFR to households is broadly regressive for households at national level.

- At the national level, in 2030, the cost of the CFR to households ranges from 0.62 per cent of disposable income (or $231) for lower income households to 0.35 per cent of disposable income (or $1,008) for higher income households.

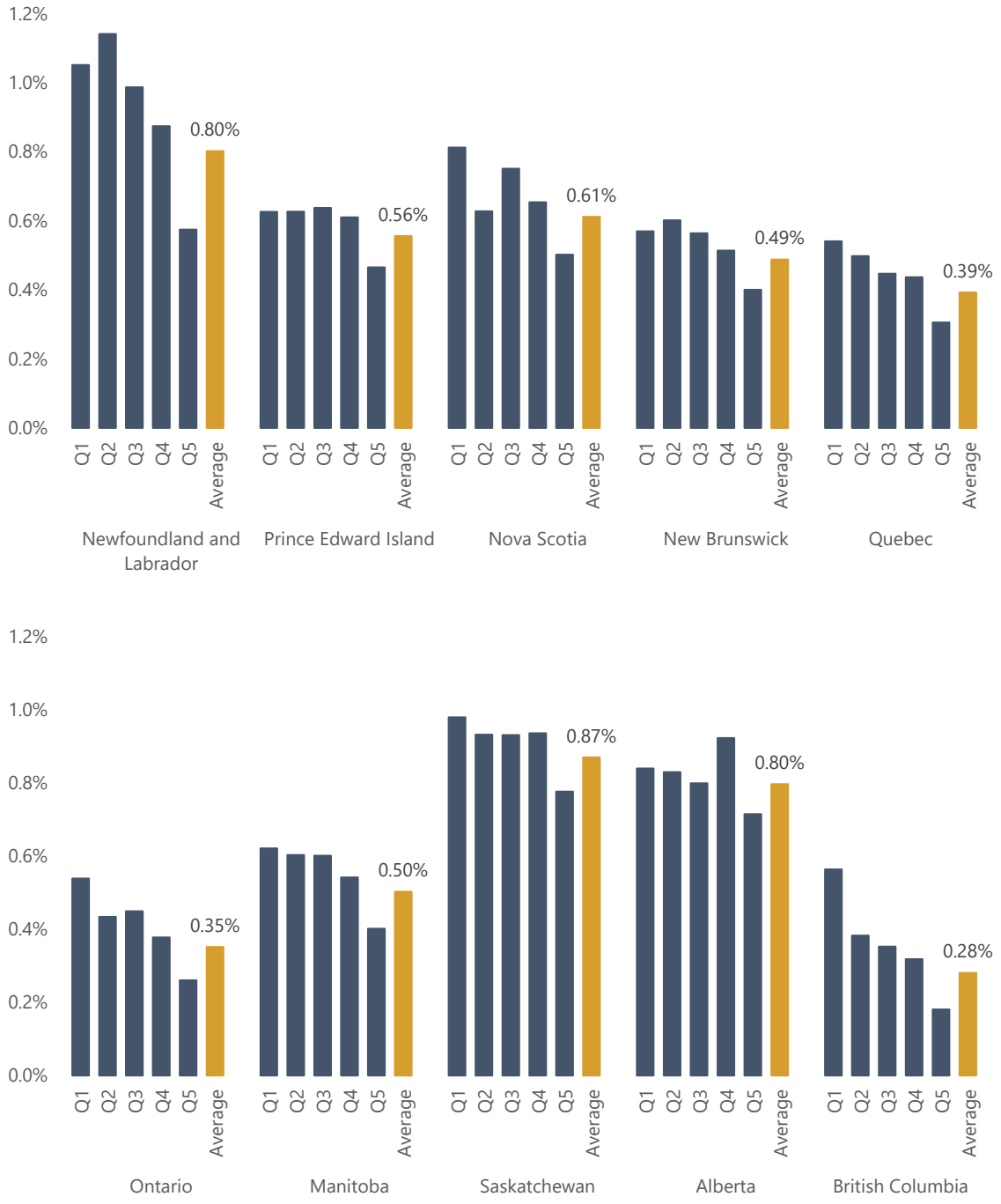
The dominance of the regressive use-side cost of the CFR at the national level is consistent across provinces (Figure 4). Appendix A provides detailed use-side, source-side and combined costs of the CFR in 2030 by province.

The variation in household cost of the CFR across provinces reflects differences in the distribution of employment and capital income combined with the differential composition of their spending on fuels and other goods and services.

- Relative to disposable income, the cost of the CFR to the average household in 2030 is the highest in Saskatchewan (0.87 per cent, or $1,117), Alberta (0.80 per cent, or $1,157) and Newfoundland and Labrador (0.80 per cent, or $850), reflecting the higher fossil fuel intensity of their economies.
- Relative to disposable income, the cost of the CFR to the average household in 2030 is the lowest in British Columbia (0.28 per cent, or $384), reflecting the relatively muted impact on real GDP. That said, the cost to the average household in Ontario (0.35 per cent, or $495) and Quebec (0.39 per cent, or $436) is only modestly larger, reflecting the lower fossil fuel intensity of their economies.

Figure 4

Household cost of the CFR in 2030 by income quintile, percentage of disposable income (combined cost)



Textual description:

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Newfoundland and Labrador	1.05%	1.14%	0.99%	0.87%	0.57%	0.80%
Prince Edward Island	0.63%	0.63%	0.64%	0.61%	0.47%	0.56%
Nova Scotia	0.81%	0.63%	0.75%	0.65%	0.50%	0.61%
New Brunswick	0.57%	0.60%	0.56%	0.51%	0.40%	0.49%
Quebec	0.54%	0.50%	0.45%	0.44%	0.31%	0.39%
Ontario	0.54%	0.43%	0.45%	0.38%	0.26%	0.35%
Manitoba	0.62%	0.60%	0.60%	0.54%	0.40%	0.50%
Saskatchewan	0.98%	0.93%	0.93%	0.94%	0.78%	0.87%
Alberta	0.84%	0.83%	0.80%	0.92%	0.71%	0.80%
British Columbia	0.56%	0.38%	0.35%	0.32%	0.18%	0.28%

Source:
Office of the Parliamentary Budget Officer.

Note:
PBO estimates are based, in part, on data underlying the CFR Regulatory Impact Analysis Statement provided by ECCC. Disposable income is based on status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The 1st quintile represents the lowest household income quintile; the 5th quintile represents the highest household income quintile.

Appendix A: Detailed results

Household cost of the CFR in 2030 by income quintile, Canada

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$220	$318	$433	$555	$653	$436
% of disposable income	0.60%	0.46%	0.42%	0.37%	0.22%	0.34%
Source-side cost	$11	$43	$99	$179	$356	$137
% of disposable income	0.03%	0.06%	0.10%	0.12%	0.12%	0.11%
Combined cost	$231	$361	$532	$734	$1,008	$573
% of disposable income	0.62%	0.53%	0.52%	0.49%	0.35%	0.44%

Household cost of the CFR in 2030 by income quintile, Newfoundland and Labrador

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$354	$542	$744	$752	$915	$661
% of disposable income	1.03%	0.97%	0.87%	0.61%	0.40%	0.62%
Source-side cost	$8	$98	$101	$326	$410	$189
% of disposable income	0.02%	0.17%	0.12%	0.26%	0.18%	0.18%
Combined cost	$362	$640	$844	$1,079	$1,325	$850
% of disposable income	1.05%	1.14%	0.99%	0.87%	0.57%	0.80%

Household cost of the CFR in 2030 by income quintile, Prince Edward Island

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$194	$329	$457	$596	$770	$470
% of disposable income	0.63%	0.57%	0.54%	0.49%	0.35%	0.46%
Source-side cost	$0	$34	$81	$143	$240	$100
% of disposable income	0.00%	0.06%	0.10%	0.12%	0.11%	0.10%
Combined cost	$194	$363	$538	$739	$1,010	$569
% of disposable income	0.63%	0.63%	0.64%	0.61%	0.47%	0.56%

Household cost of the CFR in 2030 by income quintile, Nova Scotia

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$239	$312	$514	$583	$719	$473
% of disposable income	0.75%	0.53%	0.61%	0.48%	0.32%	0.46%
Source-side cost	$21	$57	$121	$211	$396	$161
% of disposable income	0.07%	0.10%	0.14%	0.17%	0.18%	0.16%
Combined cost	$260	$369	$635	$794	$1,115	$635
% of disposable income	0.81%	0.63%	0.75%	0.65%	0.50%	0.61%

Household cost of the CFR in 2030 by income quintile, New Brunswick

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$183	$316	$420	$495	$624	$408
% of disposable income	0.55%	0.55%	0.49%	0.41%	0.29%	0.40%
Source-side cost	$5	$31	$65	$123	$244	$94
% of disposable income	0.02%	0.05%	0.08%	0.10%	0.11%	0.09%
Combined cost	$188	$347	$485	$618	$868	$501
% of disposable income	0.57%	0.60%	0.56%	0.51%	0.40%	0.49%

Household cost of the CFR in 2030 by income quintile, Quebec

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$175	$271	$344	$476	$593	$372
% of disposable income	0.53%	0.46%	0.39%	0.37%	0.24%	0.34%
Source-side cost	$3	$22	$50	$84	$163	$64
% of disposable income	0.01%	0.04%	0.06%	0.07%	0.07%	0.06%
Combined cost	$178	$293	$394	$560	$755	$436
% of disposable income	0.54%	0.50%	0.45%	0.44%	0.31%	0.39%

Household cost of the CFR in 2030 by income quintile, Ontario

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$211	$301	$444	$515	$647	$424
% of disposable income	0.52%	0.41%	0.40%	0.32%	0.20%	0.30%
Source-side cost	$6	$21	$58	$96	$178	$72
% of disposable income	0.01%	0.03%	0.05%	0.06%	0.06%	0.05%
Combined cost	$217	$322	$502	$611	$825	$495
% of disposable income	0.54%	0.43%	0.45%	0.38%	0.26%	0.35%

Household cost of the CFR in 2030 by income quintile, Manitoba

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$230	$368	$489	$608	$823	$504
% of disposable income	0.60%	0.54%	0.50%	0.43%	0.31%	0.41%
Source-side cost	$7	$41	$102	$154	$233	$107
% of disposable income	0.02%	0.06%	0.10%	0.11%	0.09%	0.09%
Combined cost	$237	$408	$592	$762	$1,056	$611
% of disposable income	0.62%	0.60%	0.60%	0.54%	0.40%	0.50%

Household cost of the CFR in 2030 by income quintile, Saskatchewan

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$379	$544	$717	$946	$1,299	$777
% of disposable income	0.92%	0.77%	0.67%	0.63%	0.48%	0.60%
Source-side cost	$24	$114	$284	$467	$811	$340
% of disposable income	0.06%	0.16%	0.26%	0.31%	0.30%	0.26%
Combined cost	$403	$659	$1,001	$1,414	$2,110	$1,117
% of disposable income	0.98%	0.93%	0.93%	0.94%	0.78%	0.87%

Household cost of the CFR in 2030 by income quintile, Alberta

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$311	$444	$536	$842	$716	$570
% of disposable income	0.70%	0.56%	0.46%	0.50%	0.23%	0.39%
Source-side cost	$59	$211	$399	$712	$1,553	$587
% of disposable income	0.13%	0.27%	0.34%	0.42%	0.49%	0.40%
Combined cost	$370	$655	$935	$1,554	$2,269	$1,157
% of disposable income	0.84%	0.83%	0.80%	0.92%	0.71%	0.80%

Household cost of the CFR in 2030 by income quintile, British Columbia

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	Average
Use-side cost	$200	$260	$350	$445	$503	$352
% of disposable income	0.56%	0.36%	0.32%	0.29%	0.16%	0.26%
Source-side cost	$2	$14	$34	$51	$60	$32
% of disposable income	0.01%	0.02%	0.03%	0.03%	0.02%	0.02%
Combined cost	$202	$274	$384	$497	$564	$384
% of disposable income	0.56%	0.38%	0.35%	0.32%	0.18%	0.28%

Source:
Office of the Parliamentary Budget Officer.

Note:
PBO estimates are based, in part, on data underlying the CFR Regulatory Impact Analysis Statement provided by ECCC. Disposable income is based on status quo policy (including the federal fuel charge increasing to $170 per tonne, along with provincial carbon pricing policies) in which the CFR are not implemented. The 1st quintile represents the lowest household income quintile; the 5th quintile represents the highest household income quintile.

Notes

[1] What are the Clean Fuel Regulations? Environment and Climate Change Canada.

[2] Emissions Reductions Through Greenhouse Gas Regulations. Office of the Auditor General.

[3] What are the Clean Fuel Regulations? Environment and Climate Change Canada.

[4] PBO Information Request IR0667.

[5] Regulatory Impact Analysis Statement for the Clean Fuel Regulations. Canada Gazette.

[6] In its regulatory impact analysis, ECCC provided a cost-benefit analysis of the CFR using the social cost of carbon (SCC) to represent the benefit of reducing GHG emissions. The PBO acknowledges, without endorsement, the cost-benefit analysis provided by ECCC in its regulatory impact analysis.

PBO does not provide social cost-benefit or comparative policy analyses. Once the Government has articulated its objectives and the policy instruments to achieve them, PBO does not then estimate the (monetized) social benefits of the policy, nor the economic and financial impact of hypothetical scenarios in which alternative policy instruments are considered.

[7] See PBO's March 2023 report, A Distributional Analysis of the Federal Fuel Charge under the 2030 Emissions Reduction Plan and March 2022 report, A Distributional Analysis of Federal Carbon Pricing under A Healthy Environment and A Healthy Economy.

[8] As noted in ECCC's regulatory analysis, carbon intensity reduction requirements after 2030 will be subject to a review and could be amended.

[9] See PBO's June 2021 report, Beyond Paris: Reducing Canada's GHG Emissions by 2030.

[10] PBO has also noted that such technological breakthroughs could take time to occur and so the negative impact of carbon pricing on the economy could persist for a long period of time before any offsetting impacts would be realized. See Note 7.

[11] See PBO's November 2022 report, Global greenhouse gas emissions and Canadian GDP.

[12] See Note 7.

[13] For example, see: Fullerton, D., and Heutel, G. (2010). Analytical General Equilibrium Effects of Energy Policy on Output and Factor Prices. The B.E. Journal of Economic Analysis and Policy, 10 (2);

Rausch, S., Metcalf, G. E., and Reilly, J. M. (2011). Distributional Impacts of Carbon Pricing: A General Equilibrium Approach with Micro-Data for Households. Energy, 33: S20–S33;

Williams III, R. C., Gordon, H., Burtraw, D., Carbone, J. C., & Morgenstern, R. D. (2015). The initial incidence of a carbon tax across income groups. National Tax Journal, 68(1), 195-213; and,

Goulder, L. H., Hafstead, M. A., GyuRim, K., and Xianling, L. (2019). Impacts of a Carbon Tax Across US Household Income Groups: What Are the Equity-Efficiency Trade-offs? Journal of Public Economics, 175, 44–64.

[14] For example, see the partial equilibrium analysis of carbon pricing by Winter, J., Dolter B., and Fellows, G.K. (2023). Carbon Pricing Costs for Households and the Progressivity of Revenue Recycling Options in Canada. Canadian Public Policy, forthcoming.

[15] Our use-side cost estimates also reflect the volumes of fuel use projected by ECCC in its regulatory analysis.

[16] Our assumption of full passthrough of the gasoline and diesel price increase on the use-side likely differs from the (partial) fuel price passthrough generated by ECCC's EC-PRO model. Consequently, our estimates of the use-side cost should be regarded as upper bound estimates.

[17] Specifically, to derive the source-side cost, we applied ECCC impact estimates (in percentage terms) to PBO projections of household labour and capital income (in nominal terms). Our source-side cost estimates also account for the reduction in personal income taxes paid and government transfers received by households resulting from lower labour and capital income due to the CFR.

[18] In our distributional analysis of the federal fuel charge, we used the computable general equilibrium model ENVISAGE (Environmental Impact and Sustainability Applied General Equilibrium) to estimate the source-side impacts on household income.

[19] We exclude the territories from our analysis due to a lack of data.

[20] For additional methodological details, please see previous PBO reports:

A Distributional Analysis of Federal Carbon Pricing under A Healthy Environment and A Healthy Economy (March 2022).

Reviewing the Fiscal and Distributional Analysis of the Federal Carbon Pricing System (February 2020).

Fiscal and Distributional Analysis of the Federal Carbon Pricing System (April 2019).

[21] In ECCC's (partial equilibrium) fuel price analysis presented in the CFR regulatory statement, the upper bound estimates for gasoline and diesel pools are, respectively, 13 cents per litre and 16 cents per litre adjusted for inflation (Table 23). The values shown in Figure 1 are based on general equilibrium results (EC-PRO modelling) and are expressed in nominal terms.

[22] According to Environment and Climate Change Canada, a more likely scenario would result in some credits being sold in the credit market (at market value), and some being created and used by primary suppliers to meet their own annual reduction requirement.

[23] The LCFR was implemented in 2010, requiring fuel suppliers to progressively lower the average carbon intensity of the fuels they supply in British Columbia by 10 per cent by 2020. In 2020, BC extended the LCFS and increased the carbon-intensity reduction requirement to 20 per cent by 2030. For additional information, please consult: New carbon-reduction requirements lower emissions on the road.

[24] See Note 5.

[25] The *Renewable Diesel Act* requires fuel distributors to include 2 per cent renewable diesel content. The province also has a 7.5 per cent ethanol mandate. Retrieved from: What are the Clean Fuel Regulations?

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