Cost of Compliance with Carbon Regulations for Canada's Rail and Truck Sectors

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Introduction

Canada has set a greenhouse gas (GHG) reduction target of 30% by 2030. To support this target, federal and provincial governments are developing a suite of policies aimed at reducing GHG emissions. The purpose of this study is to estimate the cost of compliance for Canada's rail and truck sectors with existing and emerging carbon pricing systems (carbon taxes, carbon levies and cap and trade), and the proposed federal Clean Fuel Standard (CFS) for the period 2015-2022.

Methodology

Costs were forecasted for the rail and truck sectors based on projected fuel consumption, carbon price policies by province, the federal CFS and the BC LCFS. Data sources and assumptions regarding fuel consumption and climate change policies are explained below.

Fuel Consumption. 2015 provincial fuel consumption for rail was provided by the Railway Association of Canada (RAC). Truck fuel consumption was obtained from NRCan's National Energy Use Database (NRCan, 2014). Consumption rates were assumed to remain constant over the modelling period.

Carbon Pricing Policy. In 2018, four jurisdictions have a price on carbon: British Columbia has a carbon tax, Alberta has a carbon levy, and Ontario and Quebec have a linked cap and trade system. The federal government's Pan-Canadian Framework on Climate Change and Clean Growth mandates a carbon pricing backstop that will be imposed on all provinces and territories with insufficient carbon pricing programs by 2019. C&T systems will not be subject to the backstop if they demonstrate "equivalency" of outcome. The federal carbon backstop will start at a minimum price of \$20/tonne CO_2 equivalent (tCO_2e) in 2019, rising to \$50/tCO_2e by 2022.

With regards to carbon pricing, this paper assumes that:

- Jurisdictions who have not announced a C&T system, or have not indicated a carbon price compliant with the backstop will have the federal backstop imposed upon them in 2019;
- Federal backstop carbon prices will be overlaid on existing carbon-pricing policies during all years when the federal minimum carbon-pricing is not met (this applies to Alberta and Manitoba);
- Carbon costs from jurisdictions with C&T (Ontario, Quebec, and Nova Scotia) are obtained by modelling allowance costs in the Western Climate Initiative (WCI), of which Ontario and Quebec are members.

Carbon pricing, converted to cents per litre of diesel, are provided in Table 1.

[1] Presented at the 53rd Annual Meetings of the *Canadian Transportation Research Forum*, June 3-6, 2018 at Gatineau, Quebec

Table 1 - Carbon price (carbon tax / C&T) prices converted to cents per litre of diesel

Carbon Price (cents/L diesel)	2015	2016	2017	2018	2019	2020	2021	2022
Alberta	0.00	0.00	5.35	8.03	8.19	8.35	10.95	13.69
British Columbia	7.67	7.67	7.67	10.15	11.65	13.16	14.66	15.04
Manitoba	0.00	0.00	0.00	0.00	7.52	8.21	10.95	13.69
Newfoundland & Labrador	0.00	0.00	0.00	0.00	5.48	8.21	10.95	13.69
New Brunswick	0.00	0.00	0.00	0.00	5.48	8.21	10.95	13.69
Nova Scotia	0.00	0.00	0.00	0.00	5.41	5.71	6.31	6.62
Ontario	0.00	0.00	5.48	5.11	5.41	5.71	6.31	6.62
Quebec	4.85	5.09	5.48	5.11	5.41	5.71	6.31	6.62
Saskatchewan	0.00	0.00	0.00	0.00	5.48	8.21	10.95	13.69
Northwest Territories	0.00	0.00	0.00	0.00	5.48	8.21	10.95	13.69
Yukon	0.00	0.00	0.00	0.00	5.48	8.21	10.95	13.69

Clean Fuel Standard (CFS). A CFS (sometimes called LCFS, or low-carbon fuel standard) promotes the reduction of life cycle greenhouse gas (GHG) emissions from transportation fuels by mandating fuel carbon intensity (CI) reduction targets. To date, British Columbia is the only jurisdiction in Canada that imposes a CFS (called the BC-LCFS). In 2016, the federal government announced its plan to introduce a national CFS that will help further reduce Canada's GHG emissions. To-date, the federal government has published a framework discussion paper, but many details of the regulation are still unclear, and hence the projection of impacts is subject to multiple assumptions including:

- CFS is expected to begin in 2020 (final CFS regulations have an anticipated post date of mid-2019). Recent work commissioned by Navius Research (Navius Research, 2017) suggests that the CFS should apply a 10% reduction in the mandated CI of transportation fuels by 2030 compared to 2015 levels in order to achieve its reduction targets. This is assumed to be implemented linearly in the analysis.
- CFS cost of compliance is calculated as the cost of purchasing compliance credits and does not consider alternative costs of blending biofuels;
- Compliance units are valued at $171/tCO2e, based on the 2016 average credit price in British Columbia (Government of British Columbia, 2017).

Carbon pricing for the CFS, converted to cents per litre of diesel, are provided in Table 2.

Table 2: CFS credit prices converted to cents per litre of diesel

LCFS Credit Price (cents/L diesel)	2015	2016	2017	2018	2019	2020	2021	2022
British Columbia (BC-LCFS)	2.35	2.96	3.13	4.07	5.01	6.27	6.27	6.27
Rest of Canada (CFS)	-	-	-	-	-	0.57	1.14	1.71

Total Compliance Cost. The total compliance costs for each mode of transportation is calculated by summing the product of fuel consumption in each jurisdiction by the carbon prices and CFS credit prices (Table 1 and Table 2, respectively).

No carbon price / CFS interactions have been accounted for in this analysis. The CFS will result in biofuel blend rates increasing as diesel carbon intensity limits are reduced, but blend rates in this study are not projected to exceed 5% by 2022 and the impact on carbon price across Canada is unclear. For example, the Draft Carbon Backstop Act does not exempt the proportion of biofuel blended for diesel fuel blends under 5%. Given the speculative nature of the CFS analysis and that calculated costs are meant to be indicative, interactions were not considered to be material.

Results and Discussion

Carbon Pricing Compliance. Figures 1 and 2 present the annual costs associated with cap and trade and carbon taxes. For the rail sector, these costs for 2015 are estimated at CAD$47 million and are projected to

increase to CAD$243 million in 2022 (Figure 1). Class I freight transportation will incur 92% of these costs and the remaining 8% is attributed to shortline/regional and passenger transportation, proportional to fuel consumption. Carbon pricing increases dramatically in 2019 when outstanding provincial carbon pricing systems and/or the federal backstop are implemented. Cap and trade and carbon tax costs for the truck sector were estimated at CAD$351 million in 2015, and are forecasted to reach CAD$2.3 billion in 2022. Carbon pricing from the trucking sector follows a similar profile as rail. However, truck carbon pricing impacts are nearly 10X larger than costs from rail due to the higher fuel consumption of the trucking sector.

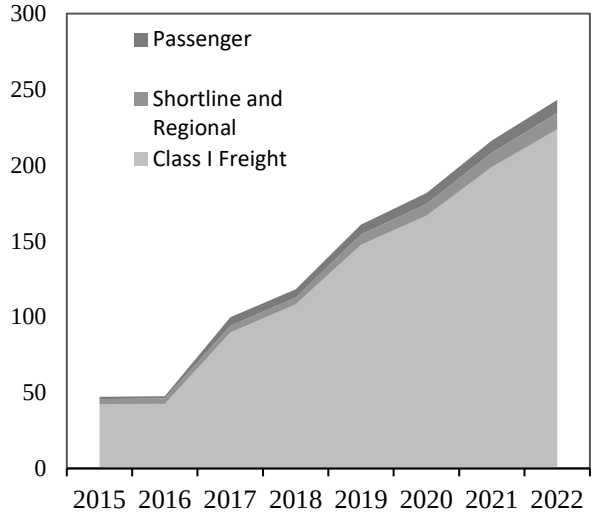

Figure 1: Carbon Tax/C&T costs for rail (CAD$ million)

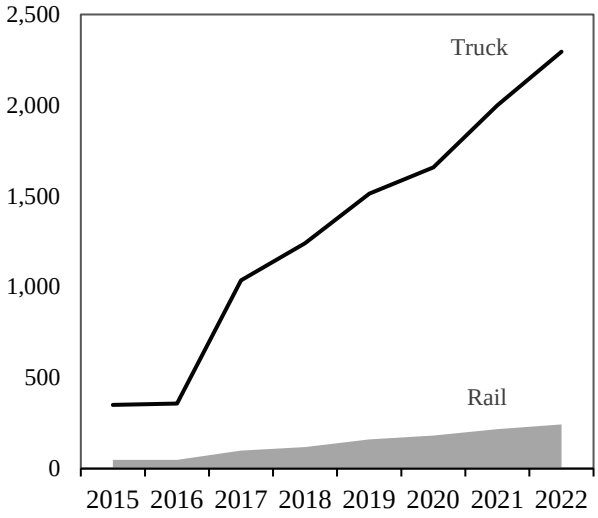

Figure 2: Carbon Tax/C&T costs for rail compared to truck (CAD $ million)

CFS Compliance. Figures 3 and 4 illustrate the CFS compliance costs for rail and truck transportation. Compliance costs from 2015 to 2019 represents costs incurred from the BC-LCFS only and increase more rapidly in 2020 when the federal CFS is assumed to take effect. CFS compliance costs are expected to be lower than carbon pricing costs.

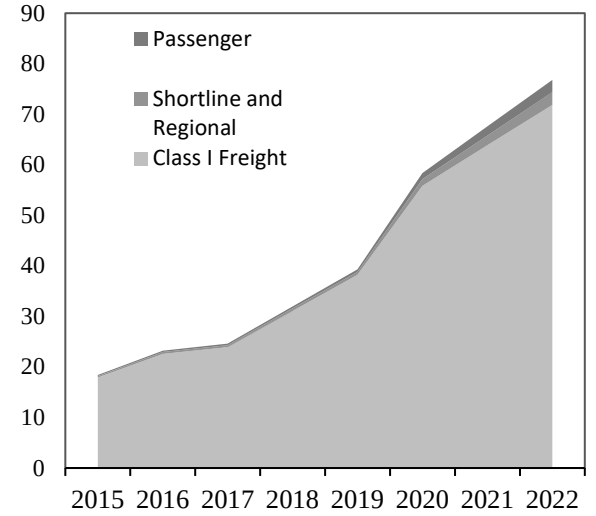

Figure 3: CFS costs for rail (CAD$ million)

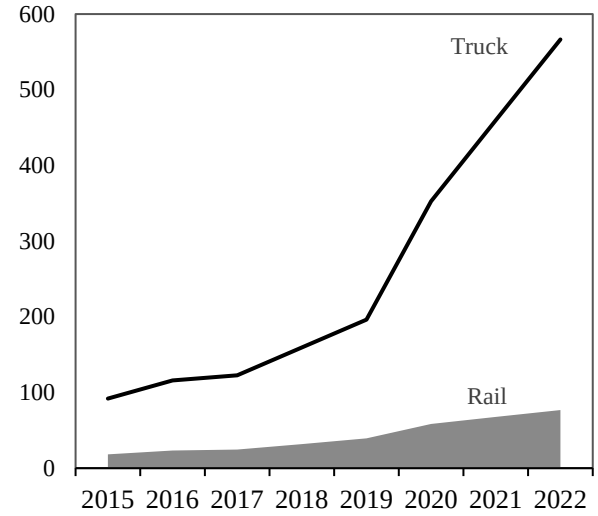

Figure 4: CFS costs for rail compared to truck (CAD $ million)

Total Compliance Costs. Total compliance costs for rail and truck transportation are presented in Figure 5 and Figure 6, respectively. For rail transportation, total annual compliance costs amount to CAD$66 million in 2015, and are projected to reach CAD$320 million in 2022. For truck transportation, annual compliance

costs are calculated as CAD$443 million in 2015 and approximately CAD$2.9 billion in 2022. Table 3 lists the compliance costs for rail and truck transportation.yy each policy mechanism.

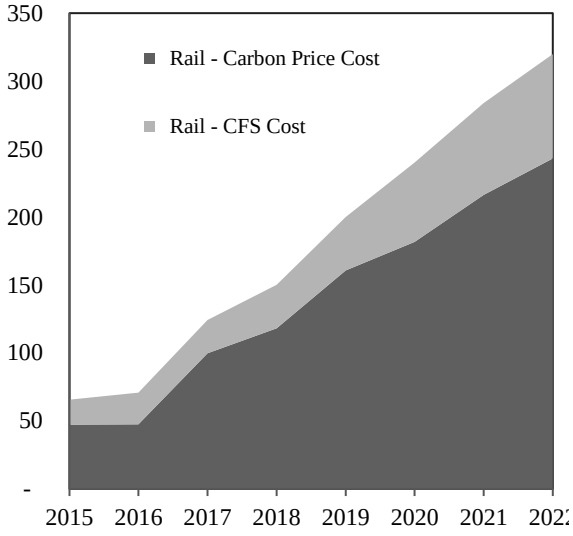

Figure 5: Compliance costs for rail transportation (CAD$ Million)

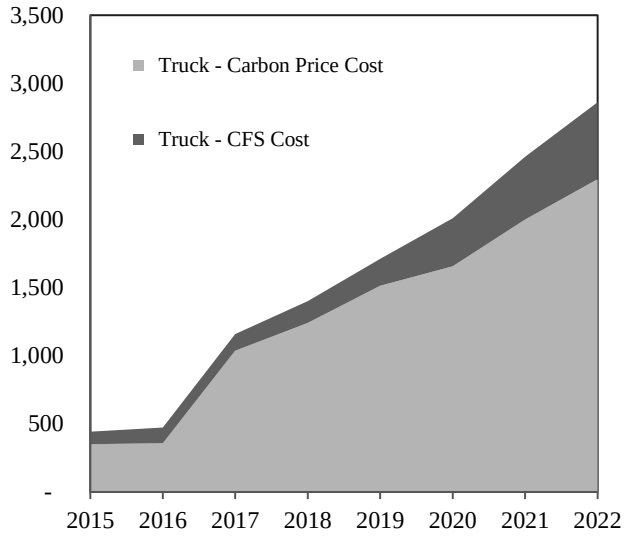

Figure 6: Compliance costs for truck transportation (CAD$ Million)

Table 3: Modeled rail and trucking compliance costs

(CAD million)	2015	2016	2017	2018	2019	2020	2021	2022	Total
Rail -Compliance Cost	**66**	**71**	**124**	**150**	**200**	**240**	**284**	**320**	**1,455**
Rail - Carbon Price Cost	47	48	100	118	161	182	216	243	1,115
Rail - CFS Cost	18	23	25	32	39	58	68	77	340
Truck -Compliance Cost	**443**	**474**	**1,160**	**1,401**	**1,710**	**2,010**	**2,460**	**2,862**	**12,518**
Truck - Carbon Price Cost	351	358	1,037	1,241	1,514	1,657	2,000	2,295	10,453
Truck - CFS Cost	92	116	123	160	196	353	459	566	2,065

Conclusion

Emerging nationwide carbon pricing and CFS will result in compliance costs to the freight rail and trucking industries. Total compliance costs over the modeling period amount to approximately CAD$1.5 billion and CAD$12.5 billion for freight rail and truck, respectively.

References

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