#### **RESEARCH FINDINGS**

JULY 2013

# BC'S CARBON TAX SHIFT AFTER FIVE YEARS: RESULTS An Environmental (and Economic) Success Story



A Research report by



## A U T H O R S

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BASED ON AN ARTICLE TO BE PUBLISHED IN THE NEXT ISSUE OF CANADIAN PUBLIC POLICY

**Canadian Public Policy** 

## ACKNOWLEDGEMENTS

#### THE AUTHORS WOULD LIKE TO THANK CANADIAN PUBLIC POLICY FOR PERMISSION TO RELEASE THIS PAPER IN ADVANCE OF ITS PUBLICATION IN THAT JOURNAL

THE AUTHORS WOULD LIKE TO THANK DANA ANTAKLY FOR HER RESEARCH CONTRIBUTIONS, AND PROFESSORS NANCY OLEWILER AND NIC RIVERS, AND ALEX WOOD, FOR REVIEWING AN EARLIER DRAFT OF THE PAPER.

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**Sustainable Prosperity** is a national research and policy network, based at the University of Ottawa. SP focuses on market-based approaches to build a stronger, greene**r** economy. It brings together business, policy and academic leaders to help innovative ideas inform policy development.

#### ABSTRACT

British Columbia's (BC) introduction of a revenue-neutral carbon tax shift in 2008 was controversial. This analysis compares changes in fuel consumption, greenhouse gas emissions and GDP between BC and the rest of Canada. It finds that in the four years since the tax was introduced, BC's per capita consumption of fuels subject to the tax has declined by 19% compared to the rest of Canada. At the same time, its economy has kept pace with the rest of Canada's. BC's experience mirrors the European experience with carbon tax shifting, and should inform the national debate on climate change policy.

#### INTRODUCTION

"Carbon tax" has become a four-letter word in Canadian federal politics. The ruling Conservatives have mounted an aggressive campaign to discredit the policy as a "jobkilling carbon tax (Conservative Party, 2012). Opposition leaders (except the Green Party's) have taken the bait – perhaps because they attribute (wrongly) Stéphane Dion's electoral demise to his carbon tax proposal – and are quick to disavow any support for such a measure. Yet most economists, and many leaders of Canadian businesses -including oil companies -- favour a carbon tax as the most cost-effective way to tackle greenhouse gas (GHG) emissions (Sustainable Prosperity 2011; Van Loon and Mayeda

2013).

British Columbia (BC) has had a carbon tax for over five years -- a fact that gets surprisingly little mention in the federal political debate. On 1 July 2008, BC brought in North America's first carbon tax shift. It imposed a price on the use of carbon-based fuels, with all the revenues going to fund corresponding cuts in other taxes (Duff 2008).

The tax is a central component of BC's climate change strategy, which aims to reduce GHG emissions by 33 percent below 2007 levels by 2020 (British Columbia 2008). It applies to almost all fossil fuel use in the province, including gasoline, diesel, propane, natural gas, and coal. The tax covers three quarters (77%) of the province's GHG emissions from residential, commercial and industrial sources (British Columbia Ministry of Finance, 2013a).<sup>1</sup>

BC's carbon tax shift was designed to be "revenue neutral"; all the revenues are to be used to reduce other taxes – mainly through cuts to income taxes (personal and corporate), as well as targeted tax relief for vulnerable households and communities – resulting in no overall increase in taxation (British Columbia 2010, 105-6).

When introduced in 2008, the tax was initially set at \$10 per tonne of carbon dioxide equivalent (CO2e). It was designed to rise by \$5 per year thereafter until it reached \$30 per tonne (roughly 7 cents per litre of gas) in 2012 (British Columbia 2008b, Schedule II).

The scheduled five-year ramp-up in the rate of the carbon tax was completed as of July 1 2012. This, combined with the contentious federal debate around carbon pricing, makes it an opportune occasion to assess the policy's effects – both environmental and economic – after its first five years of operation.

Based on a review of the available evidence, this paper concludes that BC's carbon tax shift has been a highly effective policy to date. It has contributed to a significant reduction in fossil fuel use per capita, with no evidence of overall adverse economic impacts, and has enabled BC to have Canada's lowest income tax rates. However, further economic analysis is needed to reach more firm conclusions about these effects and causality.

<sup>1</sup> It does not cover emissions from non-combustion sources, such as forest management, fugitive emissions, and certain industrial processes.

#### THE PAPER'S APPROACH

The primary objective of BC's carbon tax shift is to promote reductions in greenhouse gas (GHG) emissions and fuel use, through a price on carbon. The accompanying tax cuts are meant to avoid an overall tax increase and to provide economic stimulus (to offset any adverse effects from the carbon tax). Consistent with those objectives, this paper focuses primarily on the policy's environmental effectiveness, i.e. reducing fuel use and emissions. It also briefly discusses its economic and fiscal impacts.

The equity (distributional) impacts of the carbon tax shift, particularly on vulnerable communities and households, are also an important consideration. That issue falls outside the scope of this paper, but has been discussed in previous studies (Lee and Sanger 2008; Sustainable Prosperity 2011b).

In terms of methodology, the paper examines the changes in fuel use in BC since 1 July 2008, when the tax shift came in, and compares them with changes that have occurred in the rest of Canada in that time. The fuel use figures come from dataset Supply and Disposition of Refined Petroleum Products (Statistics Canada 2013a).<sup>2</sup> The paper also examines changes in GHG emissions and GDP since the introduction of the tax (by calendar year, rather than a 1 July to 30 June fiscal year, due to data availability). GDP figures come from Statistics Canada, 2013c. GHG emissions data come from Canada's National Inventory Report (Environment Canada 2013). To factor out population change effects, the comparisons are made on a per capita basis.

The comparison with the rest of Canada is useful, since it helps to factor out any effects resulting from GDP changes. For example, the economic downturn of 2008-9 reduced GHG emissions (by reducing economic activity), but that downturn affected all of Canada, so one would expect to see even greater emissions declines in BC, if the carbon tax was having an effect.

For the sake of brevity, this report will use the term "fuel" to refer to all refined petroleum products in the dataset. Particular types of fuel, such as gasoline, will be specifically identified where referenced.

#### ENVIRONMENTAL EFFECTS (FUEL USE & GHGs)

BC's carbon tax aims to reduce the use of fossil fuels, and thereby GHG emissions. It is useful to look at both of these measures, in order to assess the effectiveness of the tax. Data on changes in fuel use are particularly informative, since they are available up to the end of 2012, whereas GHG emissions data is available only up to the end of 2011. As fuel use data can provide a more current picture of the effects of BC's carbon tax, by including effects through 2012 (when the tax rate continued to rise), it will be the main focus of this report.

It should be noted that, while the data presented below may be useful in showing a correlation between fuel use (or GHG emissions) and the carbon tax, they cannot show conclusively that the tax shift is what caused all the change in BC's performance. More rigorous methods, such as econometric or modeling analysis, will be required to better determine the specific effects of the tax shift.

#### **FUEL USE**

	2008/09	2009/10	2010/11	2011/12	2008-12 Total
<b>BRITISH COLUMBIA</b>	-5.4%	-3.6%	-2.4%	-7.1%	-17.4%
<b>REST OF CANADA</b>	-3.4%	-0.7%	<b>3.9</b> %	1.7%	1.5%
DIFFERENCE	-2.1%	-3.0%	-6.3%	-8.8%	-18.8%

TABLE 1: PER CAPITA CONSUMPTION OF PETROLEUM FUELS SUBJECT TO BC CARBON TAX (% CHANGE)

Source: Statistics Canada, author calculations. Figures may not add, due to rounding. Years beginning July 1.

To help understand the environmental effects of the carbon tax, we compared fuel consumption in BC to the consumption in the rest of Canada, on a per capita basis, counting only those fuels that are subject to the carbon tax.<sup>3</sup> The comparison uses a base year of July 1 2007 – June 30 2008 (right before the tax came in) and compares it to July 1 2008 – June 30 2012. The finding is that BC's fuel consumption per person has fallen every year since the carbon tax came in; overall, it declined by 17.4 per cent from the 2007/08 base year to 2011/12 (Table 1). Moreover, it declined 18.8 percent more than in the rest of Canada during this four year period – a remarkably large difference.

<sup>2</sup> Statistics Canada also has a data set on retail sales of motor vehicle fuel (Statistics Canada 2012). Since BC's carbon tax covers much more than just motor vehicle fuels, the more comprehensive dataset on refined petroleum products sales was used (Statistics Canada 2013). Also, the retail sales dataset is only published annually, whereas the refined petroleum products database is updated monthly, and thus gives more current results.

<sup>3</sup> The petroleum fuels subject to the tax and included in our analysis are: propane, butane, naphtha, motor gasoline, stove oil/kerosene, diesel fuel oil, light & heavy fuel oils, petroleum coke, and still gas. Aviation fuel is omitted because fuel used for flights outside BC is not taxed, and that accounts for the bulk of aviation fuel consumption (and the available data are not separated into extra- and intra-provincial flights). Natural gas is not included in this analysis because it is not part of this Statistics Canada data set; however available evidence suggests that it shows a similar pattern to that of other fuels (BC 2012b)

To better decipher what role the carbon tax played in these changes, it is also helpful to look at trends before July 2008. If the tax was a major driver of the post-2008 changes, we would expect to see that the rate of change in fuel use in BC compared to the rest of Canada declined more sharply in 2008-12 than in 2000-2008. And indeed that is what occurred. From 2000 to 2008, average per capita fuel consumption in BC declined by 0.1 percent per year less than in the rest of Canada; whereas from 2008-12 it declined by 5.0 percent per year more than in the rest of Canada - a substantial difference (Figure 1). So, while BC was doing about as well as the rest of Canada in reducing fuel use before 2008, it has done much better since the carbon tax came in - suggesting that the tax was an important contributor to BC's success in reducing fuel use in the past four years.

carbon tax (Figure 2). The consistency of this pattern across multiple fuels reinforces the inference that the tax contributed to this change. (It was not simply due to increased cross-border gas buying, as some speculate). By contrast aviation fuel, which is mainly exempt from the carbon tax,<sup>4</sup> did not follow this pattern; its sales changed about equally in BC and the rest of Canada during this period – further suggesting that the carbon tax contributed to the differences in the use of the other (taxed) fuels.

While this paper is the only one, to our knowledge, to examine overall fuel use changes since the carbon tax, a soon-to-be-published paper (Rivers and Schaufele 2013) specifically examines changes in motor vehicle fuel use due to the carbon tax. Using econometric methods, they

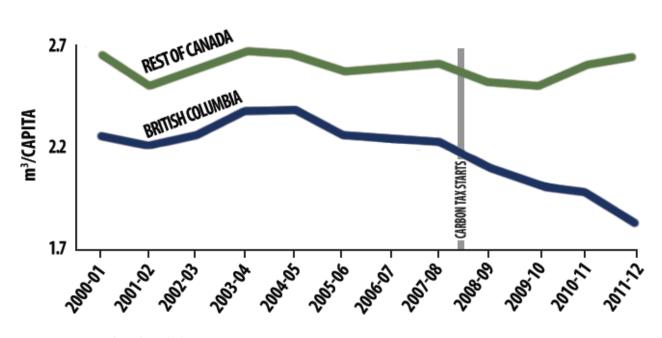


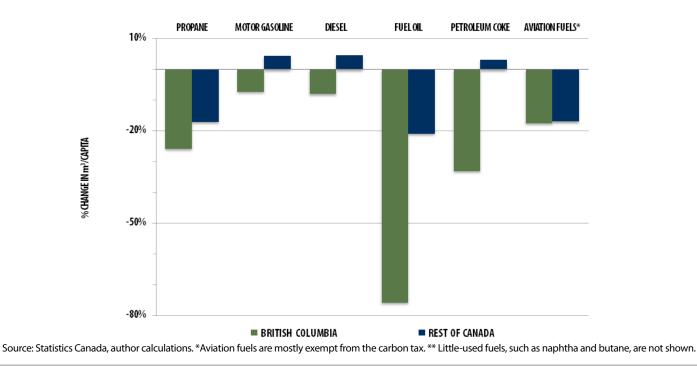
FIGURE 1: SALES OF PETROLEUM FUELS SUBJECT TO BC CARBON TAX (2000-2012)

Source: Statistics Canada, author calculations

BC's per capita consumption of petroleum products also improved in comparison with other provinces. Among Canada's largest provinces (and largest fuel consumers), BC has made the most rapid progress in reducing fuel use since 2008, when the carbon tax came in. BC now has the lowest per capita fuel use of any province in Canada, passing Ontario (which was consistently ahead before BC's carbon tax shift).

Also noteworthy is that BC had much greater reductions than the rest of Canada for all fuel types subject to the estimate a roughly 10 per cent reduction in motor fuel use from the carbon tax through to the end of 2011 (very similar to our findings). Of particular interest, they find that the tax induced reductions 7.1 times greater than would be expected from a similar change in just the price of fuel (as opposed to a fuel tax).

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4 See note 3 supra.
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#### FIGURE 2: SALES OF SPECIFIC PETROLEUM FUELS (2007/8 TO 2011/12)

#### **GREENHOUSE GAS EMISSIONS**

The ultimate goal of BC's carbon tax is to reduce GHG emissions, by taxing the fossil fuels that cause them. However, data on GHG emissions is available only through 2011. Therefore, while changes in fuel use (through 2012) provide the most current indicator of the tax's effects, it is also worthwhile to review the changes in GHG emissions, to get a fuller picture. To that end, we compare GHG emissions in BC to emissions in the rest of Canada, counting only those sources that are subject to the BC carbon tax (as was done for fuel use).<sup>5</sup>

# TABLE 2: GHG EMISSIONS PER CAPITA FROM SOURCES SUBJECT TO BC CARBON TAX (% CHANGE)\*

	2008	2009	2010	2011	total 2008-11
BC	-1.5%	-6.7%	-1.1%	-2.4%	-10.0%
<b>REST OF CANAD</b>	A -3.6%	-3.9%	- <b>0.9</b> %	<b>3.9</b> %	-1.1%
DIFFERENCE	2.1%	-2.8%	-0.2%	-6.3%	-8.9%
rce: GHG emissions data					

rce: GHG emissions data from Environment Canada, National Inventory Report; population data from Statistics Canada. Years beginning Jan. 1.

\*Excludes aviation, fugitive emissions, and electricity & heat generation GHG emissions.

From 2008 to 2011, BC's per capita GHG emissions associated with carbon taxed fuels declined by 10.0 percent, a substantial reduction. During this period, BC's reductions outpaced those in the rest of Canada by almost 9 percent (Table 2). These GHG reductions were similar to those seen in fuel use during this same 2008-11 time period.<sup>7</sup>

Moreover, the experience in BC to date is consistent with the results witnessed in seven European countries that brought in carbon tax shifts in the 1990s.<sup>6</sup> In those countries, the tax shifts caused estimated GHG emission reductions ranging from 2 to 7 percent (over a decade or more), according to a major empirical study funded by the EU (Ekins 2007, 41).<sup>8</sup>

BC's carbon tax shift is only 4 years old, so it is too early to draw fi m conclusions, but its GHG reductions are trending in the same direction as those seen in European countries with more than 15 years of data; indeed BC's reductions to date appear to be even greater (consistent with the fact that its carbon tax rate is now higher and more comprehensive than in most European countries).

<sup>5</sup> See note 3 supra. Also, since coal was not included in the fuel use data, emissions from coal power generation are excluded from the GHG analysis. Since BC generates very little of its energy from coal, this omission should not be significant.

<sup>6</sup> Each country studied had somewhat different policies. But the taxes generally were on energy use and/or CO2 emissions, and the revenues generally were used to reduce taxes on income and/or labour (Andersen et al 2007).

<sup>7</sup> This difference may be because the GHG data cover a somewhat different time period; they include the first half of 2028 (before the carbon tax came in) and exclude the first half of 2021(when fuel use declined sharply) – both of which could explain the somewhat larger decline seen in fuel use.

<sup>8</sup> The results are based on actual emissions through to 2006, and estimated emissions to 2012. The negligible decline observed in Slovenia's GHG emissions is because its carbon tax mainly involved renaming existing energy taxes, and so did not change the price signal (Andersen et al 2007, 6).

#### ECONOMIC EFFECTS (GDP)

When the carbon tax was brought in, there were predictions that it would harm BC's economy. Four years later, the data show that BC's economy has slightly outperformed the rest of the country over the period that the carbon tax has been in place (Table 3).<sup>9</sup>

#### TABLE 3: BC AND CANADA GDP PER CAPITA

	2008	2009	2010	2011	2008-11 Total
BRITISH COLUMBIA	-1.16%	-3.90%	1.64%	1 <b>.92</b> %	-0.15%
REST OF CANADA	-0.45%	-3.88%	1 <b>.9</b> 1%	1.38%	-0.23%
Source: Statistics Canada (2002 chained dollars), author calculation. Years					

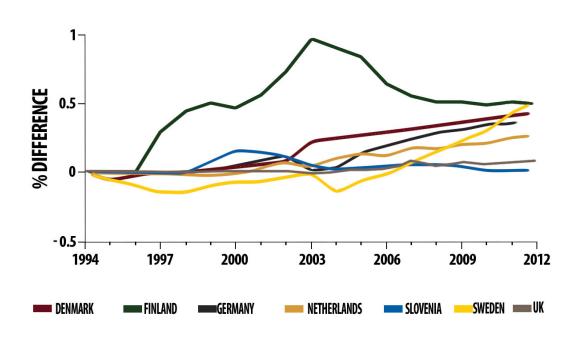
Source: Statistics Canada (2002 chained dollars), author calculation. Years beginning Jan. 1.

The difference in GDP change is very small (0.1 percent per year from 2008-11); moreover, the carbon tax is just one small factor in BC's overall economic picture. Therefore, while it would be a stretch to claim that the tax shift has had a positive impact on the

economy, the data at least appears to indicate it has not had a negative effect. And that is a very significant result. BC has brought in a serious policy to curb fuel use and GHG emissions – that seems to be working. It has a carbon price that is higher than anywhere else in North America, and most other countries in the world. Yet there is no evidence at this point that it is harming BC's economy.<sup>10</sup>

It is too early to draw solid conclusions on the tax shift's economic effects – that would require more time and rigorous economic analysis. But the GDP effects to date in BC are consistent with those seen in European countries which have had a carbon tax shift in place for over a decade. The same major EU-funded study cited above, applying a widely used economic model, found that the overall effect on GDP of carbon tax shifts in the seven countries studied had been neutral or slightly positive, albeit with some fluctuation in the initial years (Ekins 2007, 41). (See figure 3). This European experience seems consistent with the initial trends emerging in BC, after four years of experience with its carbon tax shift.





Source: Ekins 2007.

**9** GDP data for provinces is available from Statistics Canada only through to the end of 2011 at the time of writing.

10 That is not to say that no firms or households have experienced adverse economic impacts. No doubt some have. But the economy-wide impacts from the tax shift seem to have been neutral or positive.

#### **FISCAL IMPACTS**

The fact that BC's carbon tax -- like its older European counterparts – does not appear have had an overall adverse economic impact can be traced in large part to the use of a tax shift.<sup>11</sup> The increase in carbon taxes is matched by an equivalent reduction in other distortionary taxes. Specifically, the carbon revenue is being used mainly to reduce the corporate income tax rate, and the two lowest personal income tax rates by 5 percent (British Columbia, not dated b). It also funds a low-income tax credit (in 2008) and a rebate up to \$200 for northern and rural BC homeowners (British Columbia 2012a).

While the tax is meant to be revenue neutral, the government has in fact returned \$500 million more in income tax cuts than it has collected in carbon tax to date (British Columbia 2012a, 66; British Columbia 2013b, 67).<sup>12</sup>

As a result of the carbon tax shift, BC is tied with Alberta and New Brunswick for the lowest corporate income tax rate in Canada (Canada Revenue Agency 2012). It also has the lowest personal income tax rate in Canada, for those earning up to \$119,000 (British Columbia, 2013c).

#### CONCLUSION

Almost all economists, and most Canadian business and environmental leaders, believe that a carbon price is the most cost effective tool for reducing GHG emissions (Sustainable Prosperity 2011). BC's carbon tax shift is providing increasing evidence that they are right. Since 2008, when the tax came in, fuel use in BC has dropped substantially – 19 percent more per capita than in the rest of Canada – and GHG emissions are trending in the same direction. At the same time, BC's GDP growth has kept pace with the rest of Canada's, suggesting that the tax shift has not harmed the province's economy. However, the policy is just four years old, and further study is needed to reach firm conclusions about its exact environmental and economic effects.

BC took a risk in introducing the carbon tax, which was initially quite controversial. It is one of the few North America states or provinces with a price on carbon -- a price that is among the highest in the world. That risk seems to have been rewarded. BC households and businesses now pay the lowest income taxes in Canada, due to the tax shift, and use the least amount of fuel per capita of any Canadian province. BC is also decoupling its economic growth from fuel consumption (and GHG emissions) faster than the rest of Canada. In other words, it is building a low carbon economy – which should position it well for future success if global markets continue to evolve in that direction. It will also help to shelter the BC economy from future petroleum price increases and volatility.

Finally, it is also worth briefly noting the carbon tax's political impacts. The opposition NDP made the tax a major issue in the 2009 provincial election, but it did not hurt the governing Liberal party that introduced it, as they achieved a small gain in seats.<sup>13</sup> The carbon tax now enjoys bipartisan support, and a 64 percent public approval rating (Environics 2012) – remarkable for a tax. Thus, the actual experience with carbon taxation in BC – its environmental, economic and political impacts – appears to be directly opposite to the perceived reality in the federal political debate on this issue.

<sup>11</sup> This revenue recycling was cited as a key reason why carbon tax shifts in seven

European countries had small positive effects on GDP (Ekins 2007, 43).

 $<sup>12\,</sup>$  This discrepancy may be partly because greater-than-expected reductions in fuel use are causing lower government carbon tax revenue.

<sup>13</sup> While one cannot say that this gain was due to the carbon tax, at least the tax does not appear to have hurt the (Liberal) party that brought it in.

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