



The Stakes are Too High

To Be Tricked by the Numbers

CONTENTS

EXECUTIVE SUMMARY	2
Context	2
Results of Model Projections	3
PBO Analysis and Implications	4
Introduction	6
Context	6
Results of Model Projections	9
Table 1	9
Canada’s Greenhouse Gas Emissions (Mt) Under Current Policies	9
Table 2	12
The Politicians and Media Are Missing the Point	13
Conclusion	14

Cover image licensed from Shutterstock.

THE STAKES ARE TOO HIGH TO BE TRICKED BY THE NUMBERS

EXECUTIVE SUMMARY

Last week, the Parliamentary Budget Office (PBO) published a report in which it estimated that, in order for Canada to reach its self-imposed target of a 30% reduction in greenhouse gas emissions by 2030, the carbon tax rate would have to increase from \$50 per tonne in 2022 to \$102 per tonne in 2030.

CONTEXT

Canada's political target (there are no legal obligations) is to reduce greenhouse gas (GHG) emissions by 30 per cent below 2005 levels by 2030. National emissions in 2017 were 716 million tonnes (Mt) of carbon dioxide equivalent, and the 2030 target is 513 Mt, so the goal we have imposed on ourselves is a reduction of 203 Mt in just over 12 years. The policy framework for this is the Pan Canadian Framework for Clean Growth and Climate Change.

As further background, global emissions continue inexorably to rise. They have risen in 23 of the last 27 years, and they rose by two per cent in 2018, twice the average annual rate over the previous decade. This is due to economic and population growth in Asia and the Middle East. Canada's emissions account for 1.6 per cent of the global total.

In theory, carbon taxes are ideal policy instruments to reduce emissions, when they provide clearer and more comprehensive signals to buyers and sellers as to how they should change their behavior. If the revenues received from the taxes were returned to taxpayers through a reduction in the rates of other generally applied taxes like corporate income taxes, the recycling of revenues back into the economy might even stimulate the economy. In practice in Canada, carbon taxes have just been added on to over 600 existing regulations, subsidies and other programs, eliminating whatever theoretical advantage they might have had. Further, rather than recycle the funds completely and in ways that stimulate the economy, Canadian governments have adopted a balkanized regime in which some provinces (e.g. Quebec) simply use the funds for other public programs and the

federally-imposed regime is designed to achieve income redistribution rather than emissions reduction or economic stimulus. Politics, not economic theory, has been the prime influence on the design of the Canadian carbon tax system.

To assess the effects of carbon taxes on the whole economy, both Environment and Climate Change Canada (ECCC) and the PBO used mathematical representations of the economy called “general equilibrium models”, or CGE models. These models are based on the theory that economies move inexorably from one state of “general equilibrium” to another, with relatively low “transaction” costs, or costs of change. They measure the effects of policy changes on income, employment, trade and investment, but they do not attempt to assess who the winners and losers in the economy might be.

RESULTS OF MODEL PROJECTIONS

ECCC projected results of the implementation of policies under the Pan Canadian Framework to 2030. These include the policies and programs implemented by federal and provincial governments since 2015, the carbon pricing systems, and the additional measures that have been announced but not yet fully implemented. They also include a reduction in emissions attributable to Land Use, Land Use Change and Forestry (LULUCF). Reviewing their results, I found:

- The 48 Mt reduction in the electricity sector appears to be premised on the almost complete phase out of coal-fired power plants, which in 2017 produced 57.4 Mt, by 2022. The current Alberta regime foresees coal-fired power plants operating until 2030.
- The projected 33 Mt reduction in transportation emissions is surprisingly large. The only significant potential for emissions reduction in this sector lies in reduced emissions from light duty passenger vehicles. In 2017, cars, SUVs and pickup trucks emitted 85.1 Mt, so a 33 Mt reduction is 39 % of that. It is virtually impossible for carbon taxes to have so large an effect during a period when they will be phasing up to 11 cents per litre on the price of gasoline; 11 cents per litre is only an 8% increase in the national average pump price of \$1.35 per litre in 2018.
- The projected 22 Mt reduction in emissions from buildings by 2022 marks a 24% reduction from 2017 emission levels of 85 Mt. Again, carbon taxes alone will be far too low to produce such a reduction. Is the government signaling that it will impose expensive requirements for the retrofitting of all existing buildings?

ECCC acknowledged in its fall 2018 report that the measures taken and anticipated to date would not attain the 2030 emissions reduction target. The purpose of the PBO report was thus to determine how the target might be achieved relying exclusively on increased carbon taxes. PBO assumed that, over the period to 2030, the Canadian GDP would increase by 28 per cent, and the population by 16 per cent. This growth, however, has no effect on emissions. (Presumably, this is based on the further assumption that the increases in national income and population are offset by improvements in the emissions intensity of the economy.)

The PBO report concluded that, to reduce Canada's emissions by 79 Mt and attain the target, an additional carbon price rising from \$6 per tonne in 2023 to \$52 per tonne in 2030 would be required. Thus, with the new taxes plus the \$50 per tonne tax in place in 2022, in 2030 households and businesses would face an explicit carbon price of \$102 per tonne, along with a host of "complementary measures". PBO then proceeded to show how, using the ENVISAGE CGE model, the effects on GDP would be minimal, meaning a 0.5 % reduction in GDP arising from the carbon price of \$50 per tonne, plus an additional -0.35 % reduction arising from the incremental taxes by the year 2030.

Reviewing the PBO results, I found:

- The largest impact is in the oil and gas sector. Emissions reductions of 37 Mt against a base of 195 Mt in both 2017 and 2022 means a 19% reduction in oil and gas emissions over eight years. As the changes are allegedly driven exclusively by new taxes, one can presume that most or all of the impact would fall upon the costliest production, which is from the oil sands. Oil sands emissions in 2017 were from mining (16.4 Mt), *in situ* production (41.7 Mt) and upgrading (22.4 Mt), for a total of 80.5 Mt. A 37 Mt reduction from the oil sands would be a 46% cut.
- The 52 MT reduction in transportation emissions by 2030, if imposed entirely on light duty passenger vehicles, would mean a 61% reduction from 2017. There appears to be no way this could be accomplished on the basis of taxes alone, as even a \$102 per tonne tax means only a 23 cent per litre tax on gasoline, an increase motorists would bitterly resent but largely ignore in their driving habits (as has been shown in the high tax European regimes). An emissions reduction this large is simply not credible, absent major new regulatory restrictions on transportation.

Both analyses ignore the reality of forcing large emissions reductions on people's lives. Whether done by taxes or regulations, emissions reductions measures will raise the costs for business that cannot be passed on to consumers when competing firms that do not face the same taxes have their costs left unaffected. The rates used in carbon tax regimes in other countries vary widely from a low equivalent to US \$1 per ton in Mexico and Poland to a high of US \$139 per ton in Sweden. Within western Europe, the rates range widely as well, with one group of countries using rates of US \$9 per ton or less, and most others with rates in the range of US \$16 to \$29 per ton. In China, the average rate is about US \$2 per ton. As carbon taxes and/or the costs of regulation rise ever higher in Canada, firms will move their investment, and ultimately their headquarters and operations, to lower-cost jurisdictions.

Page | 5

In fact, Canada's economy is uniquely vulnerable to the adverse effects of emission-reduction measures that raise costs. Here, where 48 per cent of the GHG emissions occur in two provinces (Alberta and Saskatchewan), where much of the economic activity is in energy-intensive resource-based industries, and where climate and geography give rise to higher energy demands than in most other countries, an all-out effort to reduce fossil fuel emissions will be especially detrimental, both in economic and political terms.

THE STAKES ARE TOO HIGH TO BE TRICKED BY THE NUMBERS

INTRODUCTION

The debate over national climate policy in Canada took another turn last week with the publication of a report by the Parliamentary Budget Office (PBO). In that report, the PBO estimated that, in order for Canada to reach its self-imposed target of a 30% reduction in greenhouse gas emissions by 2030, the carbon tax rate would have to increase from \$50 per tonne in 2022 to \$102 per tonne in 2030. Andrew Scheer, the Conservative leader, used this news as evidence that the carbon tax was as harmful as he had claimed, and that he would find a way to meet the target without taxes. Catherine McKenna, the Environment Minister, turned slightly Conservative blue and announced that by no means would the Liberal government, after (of course) being re-elected, raise the rate of the tax above \$50 per tonne.

CONTEXT

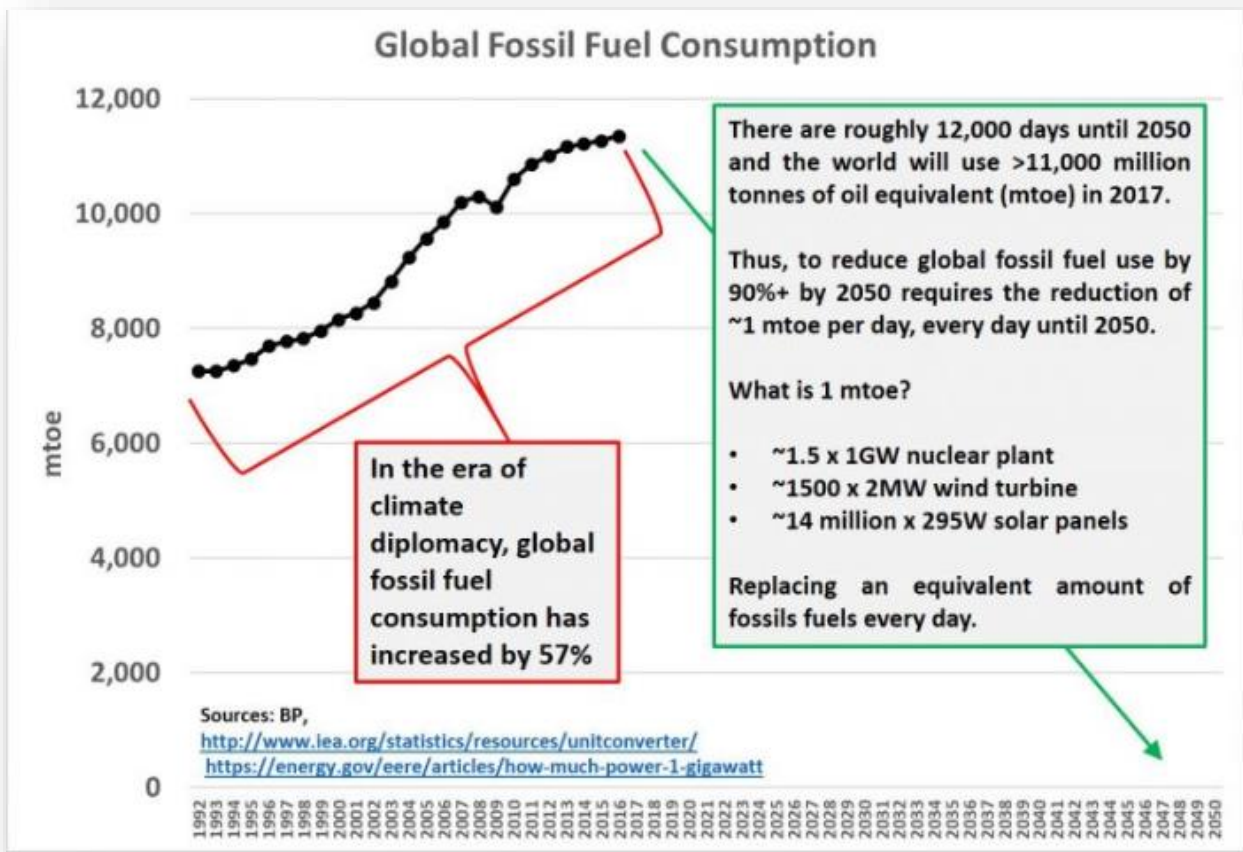
Canadians on both sides of the climate policy divide can perhaps be forgiven for wondering what exactly is going on and who can be believed. They have good reason to be confused. To explain why, allow me to take you through the maze one step at a time.

First, you need some basics. Regardless of what one thinks of the scientific thesis that underlies the western world's fixation on the climate change issue, the really important policy questions concern whether the countries of the world will make the enormous expenditures needed to "transition" from the present global energy situation to one in which carbon dioxide emissions are sharply reduced. As fossil fuels, the primary human-related source of carbon dioxide emissions, now constitute 84 per cent of the world's energy supply, this is no small feat. Governments have been promising to reduce emissions since 1992; they have missed every target, by increasingly large amounts, but they keep promising.

Canada's most recent promise, reaffirmed in 2015, is that we will reduce emissions by 30 per cent below 2005 levels by 2030. National emissions in 2017 were 716 million tonnes (Mt) of carbon dioxide equivalent, and the 2030 target is 513 Mt, so the goal we have imposed on ourselves is a

reduction of 203 Mt in just over 12 years. The policy framework for this is the Pan Canadian Framework for Clean Growth and Climate Change.

As further background, global emissions continue inexorably to rise. They have risen in 23 of the last 27 years, and they rose by two per cent in 2018, twice the average annual rate over the previous decade. This is due to economic and population growth in Asia and the Middle East. Canada's emissions account for 1.6 per cent of the global total.



Source: Roger A. Pielke, Jr.

Economists have defended on theoretical grounds the use of carbon taxes as ideal policy instruments to reduce emissions. In theory, prices (as affected by taxes) provide clearer and more comprehensive signals to buyers and sellers as to how they should change their behavior. If the revenues received from the taxes were returned to taxpayers through a reduction in the rates of other generally applied taxes like corporate income taxes, the recycling of revenues back into the economy might even stimulate the economy. In practice in Canada, as I have [explained at length elsewhere](#), carbon taxes have just been added on to over 600 existing regulations, subsidies and other programs, eliminating whatever theoretical advantage they might have had. Further, rather

than recycle the funds completely and in ways that stimulate the economy, Canadian governments have adopted a balkanized regime in which some provinces (e.g. Quebec) simply use the funds for other public programs and the federally-imposed regime is designed to achieve income redistribution rather than emissions reduction or economic stimulus. Politics, not economic theory, has been the prime influence on the design of the Canadian carbon tax system.

One final point of background is important. When economists seek to assess the effects of a new tax, policy or program measure on the whole economy, they tend to use mathematical representations of the economy called “general equilibrium models” or CGE models. These models are based on the theory that economies move inexorably from one state of “general equilibrium” to another, with relatively low “transaction” costs, or costs of change. They measure the effects of policy changes on income, employment, trade and investment, but they do not attempt to assess who the winners and losers in the economy might be. To quote Clive George, an expert in international trade:

“The economic gains (or losses) estimated by a CGE model are not necessarily reliable predictions. Equilibrium analysis has been subject to severe criticism since its inception, not least because no real economy is ever in equilibrium. What we call an equilibrium “model” is no more than a set of simultaneous equations that calculate the difference between two supposed equilibrium states. One of these represents the current situation while the other incorporates the proposed changes in taxes and trade parameters. In no sense does the analysis model the actual economic processes through which unneeded production facilities close, new ones are planned and then built, land is put to new uses, and people who become surplus to economic requirements in one sector seek employment in another. The calculation provides only an indication of the eventual outcome in what is referred to as the “long-run”, when the imagined equilibrium conditions have been restored. John Maynard Keynes famously pointed out that in the long run we are all dead.”

This is important because both Environment and Climate Change Canada (ECCC) and the Parliamentary Budget Office (PBO) used GCE models to assess the impacts of imposing carbon taxes on the Canadian economy. The PBO, in fact, accepted as given the results of the analysis done by ECCC in the fall of 2018 in which the department assessed the likely effects in 2022 and beyond of climate policies announced, implemented and anticipated. PBO did not revisit the assumptions used by ECCC or compare the effects of carbon taxes to 2022 to those it projected to 2030.

ECCC Analysis and Implications

The following table summarizes the assessment of ECCC on emissions to 2030, starting in 2017, the most recent year for which ECCC has published emissions data. Note that the figures used in the ECCC and PBO reports used 2016 as the base.

TABLE 1
CANADA'S GREENHOUSE GAS EMISSIONS (MT) UNDER CURRENT POLICIES

Sector	2017	Current Policy (2030)	Change from 2017
Electricity	74	26	- 48
Oil and Gas	195	195	0
Industry	73	86	+13
Transportation	174	141	-52
Agriculture	72	74	+2
Buildings	85	65	-20
Waste and others	42	41	-1
LULUCF	n.a.	-37	-37
Total	716	592	-124

Source: ECCC, Parliamentary Budget Office

As previously indicated, these figures show the projected results of the implementation of policies under the Pan Canadian Framework. These include the policies and programs implemented by federal and provincial governments since 2015, the carbon pricing systems, and the additional measures that have been announced but not yet fully implemented. They also include a reduction in emissions attributable to Land Use, Land Use Change and Forestry (LULUCF).

It is appropriate to examine each of these emission reduction estimates more closely against the sub-sector emissions totals. When one does that, one finds that:

- The 48 Mt reduction in the electricity sector appears to be premised on the almost complete phase out of coal-fired power plants, which in 2017 produced 57.4 Mt, by 2022. The current Alberta regime foresees coal-fired power plants operating until 2030.
- The lack of any reduction in emissions from the oil and gas sector during this period will be controversial from opposing perspectives – those who see this as the largest target for emissions reduction and those who see this as already placing a hard cap on oil and gas emissions as early as 2022.
- The anticipated growth in industrial emissions appears to reflect optimism about investment in the Canadian industry not shared by the financial media.
- The projected 33 Mt reduction in transportation emissions is surprisingly large. The only significant potential for emissions reduction in this sector lies in reduced emissions from light duty passenger vehicles. In 2017, cars, SUVs and pickup trucks emitted 85.1 Mt, so a 33 Mt reduction is 39 % of that. It is virtually impossible for carbon taxes to have so large an effect during a period when they will be phasing up to 11 cents per litre on the price of gasoline; 11 cents per litre is only an 8% increase in the national average pump price of \$1.35 per litre in 2018. There will be an improvement in the fuel efficiency of new vehicles due to more stringent regulations, but that will take time to work its way through the existing vehicle stock.
- The projected 22 Mt reduction in emissions from buildings by 2022 marks a 24% reduction from 2017 emission levels of 85 Mt. Again, carbon taxes alone will be far too low to produce such a reduction. Indeed, even with major changes in new building standards, we are unlikely to see emissions reductions of this magnitude. Is the government signaling that it will impose expensive requirements for the retrofitting of all existing buildings?

The LULUCF is a mystery. The United Nations Framework Convention on Climate Change has long recognized the potential contribution of land-based carbon sinks in forests and agriculture, but up to now Canada's extensive reforestation activities have not been counted in the annual reports on greenhouse gas mitigation. No details were provided by either ECCC or PBO to explain why the UN would now accept a LULUCF adjustment to emissions totals.

PBO Analysis and Implications

ECCC acknowledged in its fall 2018 report that the measures taken and anticipated to date would not attain the 2030 emissions reduction target. The purpose of the PBO report was thus to

determine how the target might be achieved relying exclusively on increased carbon taxes. In preparing such an analysis, PBO made some important assumptions including the following:

- The additional carbon taxes would apply more broadly than the current carbon tax, covering all sectors of the economy and applying to all provinces and territories.
- The revenues from additional carbon pricing would be returned to households in lump-sum payments.
- Over the period to 2030, the Canadian economy is projected to increase by 28 per cent, and the population by 16 per cent. This growth, however, has no effect on emissions. (Presumably, this is based on the further assumption that the increases in national income and population are offset by improvements in the emissions intensity of the economy.)

The last assumption is especially important. Over the period 2009 to 2017, Canada's GHG emissions grew from 682 Mt to 716 Mt, an annual average increase of 4.5 Mt per year. The only period of significant emissions decline since 1990 was from 2007 to 2009, when emissions fell by 63 Mt, or 31.5 Mt per year, during the worst recession since the Great Depression. To meet the 2030 target, the emissions decline from 2017 to 2030 would have to maintain an annual average rate of decline of almost 17 Mt per year. It strains credibility to think that this could be accomplished during a period of significant economic growth.

The PBO report concluded that, to reduce Canada's emissions by 79 Mt and attain the target, an additional carbon price rising from \$6 per tonne in 2023 to \$52 per tonne in 2030 would be required. Thus, with the new taxes plus the \$50 per tonne tax in place in 2022, in 2030 households and businesses would face an explicit carbon price of \$102 per tonne, along with a host of "complementary measures". PBO then proceeded to show how, using the ENVISAGE CGE model, the effects on GDP would be minimal, meaning a 0.5 % reduction in GDP arising from the carbon price of \$50 per tonne, plus an additional -0.35 % reduction arising from the incremental taxes by the year 2030.

Both major political parties found joy in the PBO report. Just as Andrew Scheer was able to use the PBO report to criticize the Trudeau government for hiding how high carbon taxes would have to rise, the Trudeau government was able to use the PBO report to claim that the overall effect of carbon taxes on national income and growth would be small.

The PBO analysis deserves the same critical review as that of the ECCC fall report.

Table 2 summarizes PBO’s estimates of the emissions reductions that would be achieved by economic sector in 2030 due to the incremental carbon taxes imposed after 2022.

TABLE 2

<u>Sector</u>	<u>Incremental Reductions</u>	<u>Total Reductions in 2030</u>
Electricity	4	52
Oil and Gas	37	37
Industry	8	-5*
Transportation	19	52
Agriculture	3	-3*
Buildings	8	28
Waste and others	4	5
LULUCF	0	37
Total	79	203

*A minus number indicates an increase in emissions.

Again, one can gain a better understanding of the implications of these reductions by comparing them to the sub-sector totals.

- The largest impact is in the oil and gas sector. Emissions reductions of 37 Mt against a base of 195 Mt in both 2017 and 2022 means a 19% reduction in oil and gas emissions over eight years. As the changes are allegedly driven exclusively by new taxes, one can presume that most or all of the impact would fall upon the costliest production, which is from the oil sands. Oil sands emissions in 2017 were from mining (16.4 Mt), *in situ* production (41.7 Mt) and upgrading (22.4 Mt), for a total of 80.5 Mt. A 37 Mt reduction from the oil sands would be a 46% cut. Even with major efficiency improvements and no additional oil sands production, that would be extremely unlikely.
- The 52 MT reduction in transportation emissions by 2030, if imposed entirely on light duty passenger vehicles, would mean a 61% reduction from 2017. There appears to be no way this could be accomplished on the basis of taxes alone, as even a \$102 per tonne tax means only a 23 cent per litre tax on gasoline, an increase motorists would bitterly resent but

largely ignore in their driving habits (as has been shown in the high tax European regimes). An emissions reduction this large is simply not credible, absent major new regulatory restrictions on transportation.

- The incremental emissions reduction of 8 Mt in the buildings sector does not appear beyond reason given the size of the taxes. Whether it is feasible or not, however, this would impose a major additional cost burden on homeowners, businesses and major institutions like schools and hospitals.

THE POLITICIANS AND MEDIA ARE MISSING THE POINT

Missing from the political and media reaction to the PBO report was a sense of the longer term. If, indeed, Canadian governments are to sign on completely to the thesis that humans are causing catastrophic global warming, and that Canada's emissions reductions will have an important effect on that, they will be driven to embrace the ever-more-demanding emissions cuts proposed by the United Nations and those advocating the concept of a "climate emergency". The goal of a 50% emissions reduction from 2010 levels, as previously endorsed at UN meetings, and the more recent "Green New Deal" goal of a 45% reduction from 2005 levels by 2030 would require much, much higher taxes and regulatory restrictions on people and business. The former National Roundtable on the Environment and the Economy in 2012 argued for a carbon tax of \$300 per tonne; even that may not be high enough.

The difference between the Conservative and Liberal positions on climate policy are far smaller than both parties would like to acknowledge. The Liberals now appear to have abandoned any pretense that carbon taxes will rise to levels that reflect the "social cost of carbon" or even to levels that will attain the 2030 target. So, if they really are serious about reducing emissions, they must rely on regulations and subsidies, including intervening to stop major energy projects from proceeding. The Conservatives, having correctly noted the public's hatred of taxes as policy instruments but nonetheless committed to the 2030 target, are left with only the option of regulations and subsidies, a distinctly non-conservative policy approach.

Neither party can avoid the reality of forcing large emissions reductions on the ground, in people's lives. Regardless of whether governments intrude with heavy-handed and intrusive regulations or bludgeon people with taxes, the only ways to reduce emissions by the amounts intended are to strike at the heart of the Canadian energy economy. The Canadian federal "backstop" carbon tax regime that now applies in five provinces and two territories imposes rising taxes on all businesses, but provide limited and, to date, uncertain levels of rebates. These taxes cannot be passed on to consumers when competing firms that do not face the same taxes have their costs left unaffected. The rates used in carbon tax regimes in other countries vary widely from a low equivalent to US \$1

per ton in Mexico and Poland to a high of US \$139 per ton in Sweden. Within western Europe, the rates range widely as well, with one group of countries using rates of US \$9 per ton or less, and most others with rates in the range of US \$16 to \$29 per ton. In China, the average rate is about US \$2 per ton.

Canada's principal international trade partners are the United States, China, Japan and Mexico. Almost 78 per cent of Canada's \$377 billion in exports in 2017 was to the United States and China. Neither jurisdiction is implementing a federal carbon tax. In the circumstances, it seems highly likely that the increasing burden of carbon taxes on Canadian firms will affect their ability to compete in foreign markets and to attract foreign investment in future. As carbon taxes and/or the costs of regulation rise ever higher in Canada, firms will move their investment, and ultimately their headquarters and operations, to lower-cost jurisdictions.

In fact, Canada's economy is uniquely vulnerable to the adverse effects of emission-reduction measures that raise costs. Here, where 48 per cent of the GHG emissions occur in two provinces (Alberta and Saskatchewan), where much of the economic activity is in energy-intensive resource-based industries, and where climate and geography give rise to higher energy demands than in most other countries, an all-out effort to reduce fossil fuel emissions will be especially detrimental, both in economic and political terms.

Of course, the current comments from federal politicians may all be just about politics. For almost three decades in Canada, politicians followed the credo that, "There is no political downside to promising to reduce emissions, only to actually doing so". That brought short term political gain but at the long-term cost of yielding the moral high ground to environmental lobbyists who care far less about Canada's wellbeing than they do about serving a global agenda.

CONCLUSION

The ECCC and PBO modelling exercises have produced more numbers, and numbers alone often just confuse people. Fundamentally, GCE models cannot capture the costs and tradeoffs involved. They cannot measure the macroeconomic effects of promoting western secession or of losing high-paying industrial jobs to China. They cannot measure the losses of personal economic freedom involved when governments decide whether people can use cars or that they know best which energy sources people must produce or use.

The real issue is not about the numbers. It is about whether Canadians should inflict upon themselves immense costs to slightly reduce emissions in a world in which global emissions rise inexorably every year due to trends in other countries. The stakes, in terms of our costs and standard of living, indeed perhaps our continued existence as a Confederation, are far too high for us all to be tricked by the numbers.



Image licensed from Shutterstock.

About the Author

Robert Lyman is an Ottawa energy policy consultant and former public servant of 27 years, a diplomat for 10 years prior to that. His complete biography can be read [here](#).

About

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens who are celebrating its 16th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO₂).

Friends of Science Society
P.O. Box 23167, Mission P.O.
Calgary, Alberta
Canada T2S 3B1

Toll-free Telephone: 1-888-789-9597

Web: friendsofscience.org

E-mail: contact@friendsofscience.org

Web: climatechange101.ca

