August 31, 2016

Submission to the Federal / Provincial / Territorial Working Group on Putting a Price on Carbon

Submitted by: Richard Corley[1]

Executive Summary

There is a clear global consensus that putting a price on greenhouse gas (GHG) emissions can play an important role in efficiently cutting global and national GHG emissions. I am pleased to provide this submission (in response to the public request for suggestions on pricing carbon[2]) for consideration by the federal Minister of the Environment and Climate Change and the Federal / Provincial / Territorial Working Group. This submission contains suggested observations and recommendations concerning some elements of a national program to put a price on GHG emissions. Such a program could provide the economic foundation for a broader national climate change[3] policy and plan.[4]

Observations

1. In the short term, pricing GHG emissions at a sufficiently high level to directly impact consumer behaviour would not appear to be politically feasible. The price on GHG emissions should be increased, as rapidly as possible, to impactful levels. The revenue raised from pricing GHG emissions should be used exclusively to respond to and mitigate climate change and its impacts.

2. The pricing of GHG emissions should respect domestic and international jurisdictional norms and limits, be efficient, and not impact Canada's international competitiveness.

3. Public education about climate change is critically important in order for Canadians to understand the benefits of and to support charges on pollution, including a rapidly escalating price on GHG emissions.

---

[1] Toronto, Ontario. While I have benefitted from the input and valuable suggestions of many others, the views and recommendations expressed in this submission are mine alone and are not made on behalf of my partners, clients or any others.

[2] The term "pricing carbon" is used generally, and in this submission, as a short form for the term "pricing manmade GHG emissions". References in this submission to pricing or putting a price on carbon or on GHG emissions should be read as referring to putting a price on manmade GHG emissions. More generally, all other references to "carbon", e.g., in "border carbon adjustments", should similarly be read as referring to GHG emissions (the term carbon is commonly used as a short form for carbon dioxide (CO2), which is widely referred to as a proxy for all GHG emissions).

[3] In this submission "climate change" and "global warming" are used interchangeably to refer to the impacts on the global climate and environment caused by anthropogenic GHG emissions. "Climate change" refers to the broader range of environmental impacts, most of which are caused by the overall "global warming".

[4] I have concurrently prepared and plan to provide separate submissions with suggestions on "How and Where to Reduce Emissions" and on "Clean Technology, Innovation and Jobs".

Recommendations

I recommend that the pricing of GHG emissions in Canada reflect the following:

1. All programs providing direct and indirect subsidies of GHG emissions and GHG emitting products (i.e., negative prices on carbon) should be eliminated with respect to new investments.

2. A national minimum price per Tonne of CO_2e[5] (the Minimum Price) should be charged on all manmade GHG emissions in Canada. The Minimum Price should be substantial, should increase regularly by pre-determined amounts, and should be further increased as required to ensure net increases in end-user prices.

3. A separate pollution surcharge (based on expected lifetime GHG emissions) should be charged on all prescribed GHG emitting durable goods sold in Canada.

4. Each Province would have the option of establishing its own mechanisms, compliant with the Minimum Price, for setting and collecting the price on GHG emissions. In the absence of a compliant provincial regime, a federal levy on GHG emissions would apply.

5. All of the proceeds of the Minimum Price should be transparently applied exclusively to address climate change or in the form of dividends or tax breaks to the public (and for no other purposes), in the following suggested order of priority:

    a. to alleviate undue hardship in Canada caused by climate change or by the price on GHG emissions (but not through a subsidy of GHG emissions);

    b. to fund national low GHG emissions infrastructure;

    c. to fund research, innovation and related initiatives in support of the transition to a low GHG emissions economy;

    d. to alleviate international hardship caused by climate change; and

    e. as otherwise jointly determined by the federal government and the Provinces to support the transition to a low GHG emissions economy, which could include payments for initiatives under climate action plans, reductions in employment or other taxes, and/or payments of dividends.

6. The competitive playing field on which Canadian industries and workers compete should be levelled through the imposition of international trade compliant, carbon border adjustments or equivalent mechanisms.

---

[5] CO_2e refers to the global warming impact of GHGs in terms of the mass of carbon dioxide required to produce an equivalent global warming impact; for example the emission of 30 kg of CH_4 (methane) equals one Tonne CO_2e (as CH_4 has 34 times the global warming potential (GWP) of CO_2 measured over 100 years).

Discussion of and Rationale for Observations and Recommendations

Context and Background

Manmade GHG emissions (principally CO2) cause climate change, which has imposed and is projected to further impose increasingly high costs, in terms of both human impact and economic damage. The expected impacts have been described in the reports of the Intergovernmental Panel on Climate Change (IPCC)[6] but it has been suggested by a number of commentators that the IPCC reports may well understate the true extent of the foreseeable impacts.[7]

Evidence of global warming is widely available. The average temperature in the United States during the past decade was 0.8° Celsius (1.5° Fahrenheit) warmer than the 1901-1960 average, and the last decade was the warmest on record both in the United States and globally. Global sea levels are currently rising at approximately 1.25 inches per decade, and the rate of increase appears to be accelerating. The year 2015 surpassed 2014 as the warmest year on record, and 2016 is on track to be even warmer yet. Over the period 1948 to 2013, the average annual temperature in Canada has warmed by 1.6 °C (relative to the 1961-1990 average), a higher rate of warming than in most other regions of the world.[8]

In order to avoid dangerous climate change, the IPCC has determined that we should not cause warming in excess of 2 degrees C,[9] an increase which corresponds with roughly 450 parts per million (ppm) of CO2 in the atmosphere (human activities have already raised the level of CO2 from around 270 or 280 ppm to over 400 ppm – and the level is continuing to rise quickly).[10] Atmospheric CO2 levels of 450 ppm correspond to a total manmade global CO2 emissions budget on the order of 3,000 gigatonnes of CO2 (GtCO2), relative to the start of the industrial revolution. By 2011, approximately 2,000 GtCO2 had been emitted globally. Ongoing global emissions amount to about 35 GtCO2 per year, from fossil fuel and industrial processes only, and around 50 GtCO2e per year when other emissions are included.[11] Dividing the 3,000 GtCO2 total global budget for

---

[6] For example see the 2014 IPCC Synthesis Report at: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf.

[7] For examples see: http://news.yale.edu/2016/04/07/climate-models-have-underestimated-earth-s-sensitivity-co2-changes-study-finds, http://www.reuters.com/article/us-climatechange-antarctica-idUSKCN0WW239 and https://www.skepticalscience.com/ipcc-scientific-consensus-intermediate.htm.

[8] See: http://climatechange.gc.ca/default.asp?lang=En&n=036D9756-1

[9] The COP 21 UN Climate Change Conference acknowledged that 2 degrees C of global warming would pose unacceptable risks and adopted 1.5 degrees C as the preferred target. See: http://newsroom.unfccc.int/unfccc-newsroom/finale-cop21/. More recently published papers have documented the incremental harm which would likely result from the further increase in temperature from 1.5 degrees C to 2 degrees C. For example see: http://static2.egu.eu/media/filer_public/a2/93/a2934a6d-5c10-4c32-a6f8-26fca570d714/esd-2015-68_1.pdf. However, achievement of the 1.5 degrees C target seems increasingly unlikely as this target is expected to be surpassed within five years at the current rates of GHG emissions. See: https://www.carbonbrief.org/analysis-only-five-years-left-before-one-point-five-c-budget-is-blown.

[10] See: http://climate.nasa.gov/vital-signs/carbon-dioxide/ and http://climate.nasa.gov/news/2413/record-annual-increase-of-carbon-dioxide-observed-at-mauna-loa-for-2015/

[11] See: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf .

CO2 emissions by the population of the planet gives a total per capita CO2 budget of a little over 400 Tonnes of CO2. On a per capita basis, Canadians have already emitted more than twice this amount, and currently emit CO2 at more than three times the global average per capita rate.[12] (Canadians each emit, on average, around 16 Tonnes of CO2 per year, relative to the international average of around 5 Tonnes of CO2 per capita per year.)[13] To put this in context, global per capita emissions equal to Canadians' historical emissions alone would have already resulted in global emissions in excess of 6,000 GtCO2, an amount expected to result in catastrophic global warming on the order of 4 degrees C.[14]

What is at stake? It is difficult to do justice to the seriousness of the threat posed by global warming and climate change without sounding hyperbolic. However, the U.S. Department of Defence, in its July 2015 "Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate" described the impacts and dangers as follows:

> *The National Security Strategy, issued in February 2015, is clear that climate change is an urgent and growing threat to our national security, contributing to increased natural disasters, refugee flows, and conflicts over basic resources such as food and water. These impacts are already occurring, and the scope, scale, and intensity of these impacts are projected to increase over time.*[15]

In a recent article Bill McKibben has characterized the battle against global warming and climate change as World War III, and has called for the same level of industrial mobilization to fight this battle as was mustered in the previous World Wars. His article begins as follows:

> *In the North this summer, a devastating offensive is underway. Enemy forces have seized huge swaths of territory; with each passing week, another 22,000 square miles of Arctic ice disappears. Experts dispatched to the battlefield in July saw little cause for hope, especially since this siege is one of the oldest fronts in the war. "In 30 years, the area has shrunk approximately by half," said a scientist who examined the onslaught. "There doesn't seem anything able to stop this."*
>
> *In the Pacific this spring, the enemy staged a daring breakout across thousands of miles of ocean, waging a full-scale assault on the region's coral reefs. In a matter of months, long stretches of*

---

[12] In fact the average Canadian cumulative per capita carbon emissions have been calculated to equal 360 Tonnes C (1320 Tonnes CO2e) an amount which is more than three times the per capita budget. See: http://climate.uvic.ca/people/nswart/Alberta_oil_sands_2C_warming.html.

[13] See: http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts_pc1990-2014 and https://en.wikipedia.org/wiki/List_of_countries_by_carbon_dioxide_emissions.

[14] See: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf. The expected implications of each additional degree C increase in global temperature are discussed by Mark Lynas in his 2007 book "Six Degrees: Our Future on a Hotter Planet". See: https://en.wikipedia.org/wiki/Six_Degrees:_Our_Future_on_a_Hotter_Planet and https://www.youtube.com/watch?v=7T9IjSEqT74.

[15] See: http://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery. The likelihood of conflicts arising from global warming is further explored, from a military perspective, by the historian and author Gwynne Dyer in "Climate Wars: The Fight for Survival as the World Overheats", see: https://www.amazon.ca/Climate-Wars-Fight-Survival-Overheats/dp/1851688145 and https://www.youtube.com/watch?v=RK5l_0bm6ko. A longer term perspective on the likely implications for civilization is provided by Naomi Oreskes and Erik M. Conway in "The Collapse of Western Civilization: A View from the Future", see: http://www.collapseofwesternciv.org/.

> *formations like the Great Barrier Reef—dating back past the start of human civilization and visible from space—were reduced to white bone-yards.*
>
> *Day after day, week after week, saboteurs behind our lines are unleashing a series of brilliant and overwhelming attacks. In the past few months alone, our foes have used a firestorm to force the total evacuation of a city of 90,000 in Canada, drought to ravage crops to the point where southern Africans are literally eating their seed corn, and floods to threaten the priceless repository of art in the Louvre. … And as in all conflicts, millions of refugees are fleeing the horrors of war, their numbers swelling daily as they're forced to abandon their homes to escape famine and desolation and disease.*
>
> *World War III is well and truly underway. And we are losing.*
>
> *For years, our leaders chose to ignore the warnings of our best scientists and top military strategists. Global warming, they told us, was beginning a stealth campaign that would lay waste to vast stretches of the planet, uprooting and killing millions of innocent civilians. But instead of paying heed and taking obvious precautions, we chose to strengthen the enemy with our endless combustion; a billion explosions of a billion pistons inside a billion cylinders have fueled a global threat as lethal as the mushroom-shaped nuclear explosions we long feared. Carbon and methane now represent the deadliest enemy of all time, the first force fully capable of harrying, scattering, and impoverishing our entire civilization.*[16]

The COP 21 Paris Agreement reflects and confirms the global consensus that business-as-usual is no longer an option. It has been suggested that Canadians have a responsibility, due to our disproportionately large historical and ongoing GHG emissions, to rapidly reduce our own emissions, and to help to compensate those who are today bearing the cost of the global warming that we helped to cause.[17] Pricing our GHG emissions can play an important role in enabling Canada to efficiently achieve these objectives.

As an economic matter, GHG emissions have a high social cost which is not today being borne by the polluters, but is instead being borne by the current and future generations of the global public in form of personal harm and property damage, higher insurance premiums, higher taxes and in other ways. However, rather than consistently pricing GHG emissions so as to reduce and redress this harm, some of our current policies and rules provide subsidies for the exploration and exploitation of fossil fuels and the resulting GHG emissions (effectively, a negative price on GHG emissions).

Observations

1. A national scheme to put a price on GHG emissions could serve as an important element of a broader national climate change policy and plan. In the short term, pricing GHG emissions at a sufficiently high level to directly impact consumer behaviour would not appear to be politically feasible. The price on GHG emissions should be increased, as rapidly as possible, to impactful levels. The revenue raised

---

[16] See: https://newrepublic.com/article/135684/declare-war-climate-change-mobilize-wwii?utm=350org.

[17] For some examples see: http://www.conferenceboard.ca/hcp/details/environment/greenhouse-gas-emissions.aspx, http://www.desmog.ca/2015/04/16/the-faulty-logic-behind-argument-canadas-emissions-drop-bucket, http://foecanada.org/en/canadas-fair-share/, http://gdrights.org/wp-content/uploads/2009/06/gdrs_canada.pdf, http://www.policynote.ca/whats-canadas-carbon-debt/, http://climateactionnetwork.ca/wp-content/uploads/2015/04/INDCBackgrounderFinalMarch2015.pdf, and https://www.pembina.org/reports/our-fair-share-report.pdf.

from pricing GHG emissions should be used exclusively to respond to and mitigate climate change and its impacts.

There can be no doubt about the benefits of a substantial and increasing price on GHG emissions as part of the solution to GHG emissions.[18] While I am philosophically supportive of the revenue neutral, fee and dividend approach advocated by James Hansen, the Citizen's Climate Lobby and a number of prominent economists, I am not recommending that all revenues from the price on GHG emissions be returned to the public, for the reasons detailed below.

While the universal, ongoing and robust implementation of a revenue neutral, fee and dividend model, 30 years ago would likely have achieved the desired results, it would now seem to be too little and too late to serve as the complete solution. The urgency of the problem, international fairness considerations, the delayed responses to incremental changes in price, market failures, and other real world social and political limitations, suggest the use of a more robust approach, which employs the full suite of regulatory and economic policy tools, rather than a fee and dividend model under which all of the revenue is returned to the public.

Manmade global warming is advancing more rapidly and is now expected to become irrevocably dangerous within a shorter time period than previously believed.[19] The current high levels of GHG gases in the atmosphere, in combination with the other factors discussed below, suggest that a concerted, multi-faceted response (under which at least part of the revenue from the price on GHG emissions is used to fund other initiatives to address climate change) is now appropriate and necessary.

International fairness considerations, arising from Canadians' disproportionate historical and ongoing levels of GHG emissions, would suggest that at least some of the proceeds from a price on Canadian GHG emissions should be dedicated to helping to mitigate the impact of global warming on less developed countries (which have contributed much, much less to the problem, but are being more directly and seriously impacted by global warming).[20]

Market failures also limit the effectiveness of fee and dividend models. As reflected in the McKinsey GHG emission cost mitigation curves,[21] opportunities to achieve net savings of as much as 150 Euros per Tonne of CO2 equivalent (CO2e) go unrealized due to persistent market failures. Sources of market failures may include factors

---

[18] For example, see: "Achieving 2050: A Carbon Pricing Policy for Canada" National Round Table on the Environment and the Economy, 2009 http://neia.org/wp-content/uploads/2013/04/carbon-pricing-advisory-note-eng.pdf

[19] For example, see: http://www.atmos-chem-phys.net/16/3761/2016/acp-16-3761-2016.pdf discussed in http://www.nytimes.com/2016/03/23/science/global-warming-sea-level-carbon-dioxide-emissions.html?_r=0.

[20] Discussed in greater detail in the materials cited in footnote 17.

[21] See: http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/a-cost-curve-for-greenhouse-gas-reduction.

such as: high costs of information and transactions, impacts of climate change disinformation, relatively low incremental costs for individual consumers, lack of access to capital, capital costs and expenses being borne by different parties, path dependency, and general societal and personal inertia.

A price on GHG emissions which is sufficiently large to be meaningful is not realistic in the current political context, and is unlikely to be realistic in the near-term future. For example, the current price under the cap and trade regime in Quebec is less than 10% of that expected to be required for the price on carbon to have a reasonable prospect of directly driving material changes in consumer behaviour.[22]

Also, in order to have an effect on consumer behaviour, an increased price on GHG emissions needs to increase the price paid by consumers for fossil fuelled energy, which will not be the case if the underlying price of the fossil fuels fall. The recent declines (and foreseeable future declines) in the price of fossil fuels will largely or completely undercut the effectiveness of any currently contemplated price on carbon, and require that future increases overcome the impact of both past and future declines in the underlying price of fossil fuels. Realistically, this means that it will be the other initiatives which are funded by the price on carbon, rather than the price itself, which will be the key to effective action on climate change, for at least the near term future.[23]

The above analysis is consistent with the results of the research performed by Professor Marc Jaccard. In his recent article: "Want an effective climate policy? Heed the evidence" he stated that "Carbon taxes and caps may be most effective in economic theory, but smart regulation will produce better climate policy for our political reality".[24] His article points out that the most effective policies, e.g., those mandating the closing of coal-fired electricity plants may well have an implicit cost of GHG emissions which exceeds the price which could be achieved through an explicit pricing model, and are only feasible as a result of popular support for the specific policy (and the price being implicit, rather than explicit).

In summary, while a price on GHG emissions is clearly an important part of the solution, and may be used to fund other important climate change initiatives, within the current political realities, a revenue neutral fee and dividend model is clearly not the most effective approach.

2. <u>The pricing of GHG emissions should respect domestic and international jurisdictional norms and limits, be efficient, and not impact Canada's international competitiveness.</u>

---

[22] See: "Achieving 2050: A Carbon Pricing Policy for Canada" National Round Table on the Environment and the Economy, 2009 http://neia.org/wp-content/uploads/2013/04/carbon-pricing-advisory-note-eng.pdf

[23] This assumes that the price on carbon is unlikely to reach $200 per Tonne CO2e within the next few years.

[24] See: http://policyoptions.irpp.org/magazines/february-2016/want-an-effective-climatepolicy-heed-the-evidence/.

While the international and interprovincial aspects of the regulation of climate change clearly provide the federal government with the jurisdiction to implement a national regime for the pricing of GHG emissions, the history of our confederation would suggest that the federal government exercise such powers in a manner which intrudes as little as possible on provincial rights. There are a number of areas, including privacy and health care, in which the federal government has set minimum standards and then permitted the Provinces to implement their own regimes which are compliant with those minimum standards. This same approach could be employed with respect to pricing GHG emissions.

Similarly, the pricing of GHG emissions should be implemented in a manner which complies with Canada's obligations under its international trade agreements and other treaties.

Efficiency is fostered by the implementation of GHG pricing arrangements which are national (to avoid inter-provincial market distortions), transparent, fair, consistent and predictable (to facilitate planning and the required investments).

The competitiveness of Canadian firms may be protected through the implementation of border carbon adjustments (to impose the Minimum Price on the CO2e embedded in imports, and to refund the price paid for GHG emissions embedded in Canadian exports), or through other programs to level the playing field, especially for carbon-intensive, trade-exposed Canadian businesses.

3. <u>Public education about climate change is critically important in order for Canadians to understand the benefits of and to support charges on pollution, including a rapidly escalating price on GHG emissions.</u>

Public education about: (i) the serious and imminent threat posed by manmade global warming; (ii) Canadians' disproportionate historical and ongoing contributions to this global problem; (iii) the steps which Canadians can take to rapidly and cost-effectively reduce our collective GHG emissions; and (iv) the opportunities for Canadians to thrive in the low GHG emissions economy, is critical to public acceptance of a significant price on GHG emissions. I would therefore suggest that public education be a top priority of the federal government's climate action plan.

Canadians need to understand and accept that the problem is real and serious, that Canada has done much too little to date to address it, and, most critically, that business-as-usual, or any course of action which requires only modest or incremental changes, is not a viable or an acceptable option.

Recommendations

I recommend that the pricing of GHG emissions in Canada reflect the following:

1. <u>All programs providing direct and indirect subsidies of GHG emissions and GHG emitting products (i.e., negative prices on carbon) should be eliminated with respect to new investments.</u>

   All tax, exploration, development, investment and any other form of direct and indirect subsidy programs for the exploration for, development or use of any fossil fuel, or for other activities which produce GHG emissions should be ended, with respect to any new projects or investments. Subsidies and benefits for existing projects and investments should be wound down in a manner which is fair to investors but does not extend the benefits beyond their initial commitment period.

2. <u>The Minimum Price should be charged on all manmade GHG emissions in Canada. The Minimum Price should be substantial, should increase regularly by pre-determined amounts, and should be further increased as required to ensure net increases in end-user prices.</u>

   While the specific mechanisms (carbon price, or cap and trade auction) and the actual price could be set by each Province (as further discussed below), there should be a national Minimum Price which would apply, without exception or discrimination (e.g., no offsets), to the GHG emissions embodied in or released by all products and services sold in the Province, and to prescribed GHG emitting durable goods (as further discussed below). The Minimum Price should apply to the emissions released in connection with the manufacture, provision and use of products and services in Canada, including all those resulting from the combustion of petroleum, gas and coal.

   Fairness, efficiency, consistency, transparency and predictability are among the objectives which could be advanced with such a pricing model. In the absence of a committed and predictably increasing Minimum Price, businesses understandably have been and will be reluctant to invest in the research and development, innovation or the technologies required to substantially mitigate future GHG emissions.[25] Certainty and predictability can be expected to increase competition in the development and implementation of non-emitting technologies, and to lower the cost of reducing GHG emissions.

---

[25] As noted in the September 2014 *New Climate Economy Report* by The Global Commission on the Economy and Climate (see: http://newclimateeconomy.report/TheNewClimateEconomyReport.pdf) at page 18: "*The current vacillating and mixed signals on climate policy in many countries, especially in terms of a predictable carbon price, pose a significant dilemma for investors. … many low-carbon investments are riskier and less profitable than they might be with strong climate policies. This uncertainty has raised the cost of capital and encouraged investors to hedge their bets between high- and low-carbon assets. Investment, jobs and growth all suffer as a result.*"

As noted above, in order to impact consumer behaviour, the Minimum Price will have to materially increase the price paid by consumers for fossil fuelled energy, which will not be the case if decreases in the prices of fossil fuels effectively undo the impact of the Minimum Price. The recent declines[26] and the foreseeable future declines[27] in the prices of fossil fuels (as fossil fuel assets are stranded[28]) would largely or completely undercut the impacts on consumer decisions[29] of the prices on carbon which are currently in place or contemplated by governments in Canada.[30]

Consequently, the Minimum Price should have two components, a base amount which would be substantial and would steadily and predictably increase (for example, an initial amount of $50 /Tonne of CO2e which would increase by $5 / Tonne of CO2e every six months), plus a price adjustment which would be calculated annually and would overcome the impact of declines in the underlying prices of fossil fuels. For example, a price on CO2 on the order of $150 to $200/Tonne of CO2e would be required to restore the price of gasoline in Toronto to levels paid at the peak in 2014.[31] The price adjustment could be calculated relative to the average prices in 2013 and could be phased in over a five year period, after which it would be increased (but never decreased) annually for any further average declines in the underlying fossil fuel prices, relative to the baseline year.

Such a pricing mechanism would provide both consumers and the investors with the clarity and certainty upon which to base purchase and investment decisions.

---

[26] In recent years oil, coal and gas prices have all fallen by approximately 50% or more. See: http://www.infomine.com/investment/metal-prices/crude-oil/5-year/, http://www.infomine.com/investment/metal-prices/coal/5-year/, and http://www.infomine.com/investment/metal-prices/natural-gas/5-year/.

[27] As discussed in the April 2015 HSBC Global Research report, "*Stranded assets: what next? How investors can manage increasing fossil fuel risks*" improvements in energy efficiency and advancements in renewables, battery storage and other technologies will impact demand for fossil fuels and drive down prices. See: http://www.businessgreen.com/digital_assets/8779/hsbc_Stranded_assets_what_next.pdf The dramatic declines in the prices for oil and coal seen in the past few years reflect the market impacts of demand falling below projected levels. Falling demand will continue to drive prices down to the marginal cost of the remaining producers as decisions are made about the stranding of fossil fuel assets.

[28] As noted by the OECD in "*Divestment and Stranded Assets in the Low-carbon Transition - Background paper for the 32nd Round Table on Sustainable Development*" held on 28 October, 2015 in Paris, "*stranded assets are an inevitable effect of effective climate policy*". See: https://www.oecd.org/sd-roundtable/papersandpublications/Divestment%20and%20Stranded%20Assets%20in%20the%20Low-carbon%20Economy%2032nd%20OECD%20RTSD.pdf. See also: https://en.wikipedia.org/wiki/Carbon_bubble, http://www.demos.org/news/beware-carbon-bubble, and http://www.carbontracker.org/report/unburnable-carbon-wasted-capital-and-stranded-assets/.

[29] For example see: https://www.thestar.com/business/2015/06/19/why-hybrid-car-sales-are-stalling.html.

[30] Which are typically between $10 and $50 / Tonne CO2e.

[31] A price on CO2 of $200/Tonne corresponds to $0.47/ litre which was approximately the amount by which the price of gasoline in Toronto fell early in 2015, relative to its 2014 peak. See: http://www.torontogasprices.com/retail_price_chart.aspx.

3. <u>A separate pollution surcharge (based on expected lifetime GHG emissions) should be charged on all prescribed GHG emitting durable goods sold in Canada.</u>

A separate pollution surcharge is intended to reflect, in the purchase price, part of the harm that will result from the use of prescribed GHG emitting durable goods. This surcharge would help consumers to better appreciate (at the time of purchase) the GHG impacts of their purchases, and to level the playing field between polluting and non-polluting durable goods.

The pollution surcharge recognizes that the proposed price on GHG emissions will be far too low, for the foreseeable future, to significantly affect purchases of prescribed GHG emitting durable goods, and that additional steps need to be taken to overcome inertia and the path dependencies associated with legacy GHG emitting technologies. Once purchased, each new GHG emitting good will have effectively locked in the production of GHG emissions and the resulting environmental harm for its expected lifetime (in most cases, regardless of the subsequent increase in the price of GHG emissions). The pollution surcharge should help to steer Canadians toward purchases of lower emitting products, with a view to substantially cutting overall future Canadian GHG emissions. It should also help to mitigate opposition to the continuing increases in the Minimum Price (by reducing the number of and the extent to which Canadians will be adversely impacted by such increases).

The pollution surcharge would be calculated based on the expected lifetime emissions of the prescribed durable good (in Tonnes of CO2e) multiplied by the current Minimum Price per Tonne of CO2e. In this way, those purchasing, for example, a gas-guzzling vehicle which averages 16 l/100km of gas consumption would pay four times the pollution surcharge as for a car which averages 4 l/100km. To minimize market disruptions, the pollution surcharge could be ramped up over an appropriate period of time.

In order to be prescribed, GHG emitting durable goods would have to meet one of the two following criteria. First, GHG emitting durable goods for which there are viable, non- or minimal-emitting alternatives. The pollution surcharge would ramp up with respect to such goods as non-emitting alternatives become widely available in the market. Second, GHG emitting durable goods used principally for recreational purposes.

GHG emitting durable goods which might satisfy the first criteria (as viable alternatives are developed and become generally available), could include personal vehicles (cars, motorcycles, and light trucks), gas and oil furnaces and water heaters, heavier trucks, lawn care equipment, light boats, and other similar GHG-emitting durable goods for which non-emitting alternatives exist, or are developed. GHG emitting durable goods in the second category could include gas powered model aircraft, personal aircraft and watercraft, off road vehicles, and other similar recreational products. Rebates could be provided where, for example, recreational vehicles are required for and used in the operation of a working farm or other business purposes.

4. Each Province would have the option of establishing its own mechanisms, compliant with the Minimum Price, for setting and collecting the price on GHG emissions. In the absence of a compliant provincial regime, a federal levy on GHG emissions would apply.

   For example, a cap and trade program which auctioned off GHG emissions permits for all emissions, at no less than the national Minimum Price (but which could result in higher prices), is an example of one mechanism which a Province could employ to satisfy the Minimum Price requirement. Such a cap and trade program could be extended across multiple Provinces, or other jurisdictions which agreed to the same Minimum Price for GHG emissions. A levy on GHG emissions, similar to that implemented in British Columbia, is another example of a mechanism which could be used to comply with this requirement. A levy of this type on GHG emissions could be used as the default pricing mechanism in the absence of a compliant provincial regime. [32]

5. All of the proceeds of the Minimum Price (Proceeds) should be transparently applied exclusively to address climate change or in the form of dividends or tax breaks to the public (and for no other purposes), in the following suggested order of priority:

   a. to alleviate undue hardship in Canada caused by climate change or by the price on GHG emissions (but not through a subsidy of GHG emissions);

      Since a principal rationale for the price on GHG emissions relates to the increasingly serious incidents of extreme weather which are made more likely by climate change, the funding of disaster and emergency relief to alleviate the resulting hardship to Canadians should be given a top priority.

      Top priority should similarly be given to the relief of any hardship caused to less advantaged Canadians by the imposition of the price on GHG emissions. Low income families in the North and in rural settings could be among possible candidates for such assistance. The compensation should not, however, be based on fossil fuel consumption or the GHG emissions of individual recipients, and should place a premium on enabling the recipients to reduce their dependency on the consumption of GHG emitting fuels.

[32] The merits of the imposition of the Minimum Price, relative to the option of an unconstrained cap and trade model, are further discussed in Attachment A.

b. to fund national low GHG emissions infrastructure;

There are a number of elements of infrastructure, including high speed rail, interprovincial electrical transmission grid, and trans-Canada infrastructure for electric transportation which the federal government should help to fund, in collaboration with the Provinces, with the assistance of the Proceeds.

c. to fund research, innovation and related initiatives in support of the transition to a low GHG emissions economy;

As with the low GHG emissions infrastructure, there are a number of policies and programs, including support for cleantech research and development, and commercialization and adoption, which the federal government should help to fund, in collaboration with the Provinces, with the assistance of the Proceeds. [33]

d. to alleviate international hardship caused by climate change; and

In light of Canadians' disproportionate historical and ongoing contributions to global climate change, it is fair and reasonable that Canadians contribute a meaningful part of the Proceeds to alleviate climate change-related problems and hardship suffered in less developed parts of the world. (Where feasible, such relief should include the supply of Canadian clean technologies to assist recipients to overcome their hardships while transitioning to low GHG emissions technologies.)

e. as otherwise jointly determined by the federal government and the Provinces to support the transition to a low GHG emissions economy, which could include payments for initiatives under climate action plans, reductions in employment or other taxes, and/or payments of dividends.

The balance of the Proceeds should be used, as determined by the federal and relevant provincial governments, to support other initiatives to help reduce GHG emissions and facilitate the transition to the low GHG emissions economy and/or to return proceeds to the economy in the form of a dividend or tax cuts (or to some combination of the above). As a general principle, it would seem to be economically, and also politically, desirable, as the total magnitude of the Proceeds increase, for the program to visibly return at least some of the Proceeds to the voting public (whether in the form of lower taxes and/or dividend payments), but a decision to return some or substantially all Proceeds to the public should in no way detract from the implementation of the above priorities, and other complementary economic, behavioural and/or regulatory policy measures.

---

[33] Examples of policies to support cleantech innovation and commercialization, and the mitigation of GHG emissions are discussed in my submissions on "Clean Technology, Innovation and Jobs" and on "How and Where to Reduce Emissions".

Assuming that the revenues from the price on GHG emissions were to be fully and transparently returned to the economy (whether through investments in low GHG emissions technologies or through the return of funds to the public through a dividend or tax reductions), the increasing energy efficiency and productivity,[34] increasing investments in declining marginal cost technologies (which are continually growing exponentially), and local investments in energy conservation, generation and storage projects should be stimulative to the Canadian economy

6. <u>The competitive playing field on which Canadian industries and workers compete should be levelled through the imposition of international trade compliant, carbon border adjustments or equivalent mechanisms.</u>

The imposition of a consistent and universally applicable national Minimum Price may be expected to increase the overall efficiency of Canada's reductions of GHG emissions and reduce the opportunities for special interests to seek concessions which could otherwise undermine the effectiveness and the efficiency of the system. It could also enable the imposition of appropriate border adjustments without breaching Canada's international trade obligations.[35]

Border adjustments can help to level the playing field by ensuring that the GHG emissions embedded in all goods and services consumed in Canada (whether produced in Canada or abroad) face a consistent price on their embedded GHG emissions, and by relieving Canadian exports of a cost which is not faced by their foreign competitors. In this way border adjustments could prevent any adverse impact on Canadian businesses or workers, and help to encourage the production and consumption of low GHG emissions goods and services in Canada, without adversely impacting exporters.

Such border adjustments could potentially be administered using an extension of the GST/HST system to collect the national Minimum Price on imports (to the extent that the country of origin had not already done so) and to rebate the Proceeds with respect to exports (to the extent that the destination country was not imposing a comparable price on GHG emissions). This approach to border adjustments should largely eliminate pressures to move economic activities to lower carbon price jurisdictions while respecting the sovereignty of other jurisdictions. (Over time, as a

---

[34] Resulting from the increasing penetration of high efficiency, electric-powered and digitally controlled clean technologies at continually decreasing prices.

[35] While concerns have been expressed that border adjustments could potentially run afoul of the rules of the World Trade Organization (WTO), Stiglitz and Hillman (and others) provide compelling arguments that the non-discriminatory extension of the domestic climate policy to imports should raise no such concerns. See: Stiglitz, Joseph E. (2013) "Sharing the burden of saving the planet: Global social justice for sustainable development." In *The Quest for Security: Protection without Protectionism and the Challenge of Global Governance*, ed. Mary Kaldor and Joseph E. Stiglitz (New York: Columbia University Press) pp. 161–190 and Hillman, Jennifer, "Changing Climate for Carbon Taxes: Who's Afraid of the WTO?", July 2013 at http://www.climateadvisers.com/wp-content/uploads/2014/01/2013-07-Changing-Climate-for-Carbon-Taxes.pdf

price on GHG emissions becomes the international norm, it is expected that Minimum Price and those under other programs would converge and be harmonized, such that border adjustments would not apply within trading-blocks which had adopted consistent GHG emissions pricing models.)

While border adjustments would appear to be difficult to implement, and not essential at the current, relatively low, prices on GHG emissions, as the Minimum Price continues to rise, and the imposition of such a price becomes increasingly internationally consistent, it is likely that such border adjustments will become both more important and feasible. In the interim, Canada could implement programs such as an output rebate model to alleviate any undue hardship faced by trade-exposed, carbon intensive industries. Under an output rebate model, trade-exposed carbon-intensive industries could be compensated for the cost of compliance with domestic climate policies based on their output.

Questions of the Carbon Pricing Mechanisms Working Group

On the website, the Carbon Pricing Mechanisms working group posed a series of questions which submissions were invited to address. My responses to these questions follow:

1. How can carbon pricing mechanisms help Canada meet emission reductions targets? How could these mechanisms be designed and interact to support clean economic growth?

   The mechanisms detailed above employ GHG emissions pricing to help Canada to meet its targets by increasing the cost of GHG emissions, and also the cost of prescribed durable GHG emitting goods (which produce avoidable GHG emissions). These mechanisms give effect to the "polluter pay" principle and make polluting activities and goods relatively more expensive, thereby encouraging the adoption of clean alternatives, and supporting Canadian markets for clean technologies. The redeployment of the Proceeds to directly support clean economic growth and to support the infrastructure initiatives, economic incentives and smart regulations proposed in my submission on "How and Where to Reduce Emissions" and the innovation initiatives proposed in my submission on "Clean Technology, Innovation and Jobs" should, in combination, support clean economic growth and the transition to a clean energy economy.

2. What are key design parameters for carbon pricing mechanisms?

   The key design parameters of the GHG emissions pricing mechanism, and the rationale for the mechanism, are set out above in the sections on Observations and Recommendations above, and in Attachment A.

3. How can governments address competitiveness issues (e.g., for trade-exposed and emissions-intensive industries)?

   A non-discriminatory, universal, national, Minimum Price on all GHG emissions, coupled with robust, high integrity border adjustments, for both import and export trade, together with the development of international trading-blocks having common carbon pricing mechanisms and rules, would provide the best long-term mechanism for addressing competitiveness issues. While the system should be designed with the ultimate adoption of this model in mind, interim measures to protect trade-exposed and emissions-intensive industries, such as export rebates or compensation for the cost of compliance with domestic climate policies with output rebates, will likely be required.

4. How can carbon pricing systems be designed to consider region-specific challenges, such as those facing Indigenous, northern and remote communities?

   As set out in the Recommendations, above, while the Minimum Price should be consistently applied on a national basis, the Proceeds should be applied, as a top priority, to alleviate and redress any undue hardships caused in Canada by climate change or by the price on GHG emissions (but not as a subsidy of GHG emissions).

5. How can carbon pricing systems be developed in such a way that protects economic development initiatives or benefits for remote northern and Indigenous communities?

   As set out above, the Proceeds should be applied to alleviate and redress any undue hardships caused in Canada by climate change or by the price on GHG emissions in a manner which places a premium on enabling the recipients to reduce their dependency on the consumption of GHG emitting fuels (thereby supporting local, low GHG emissions economic development initiatives).

6. What are some key criteria for businesses (e.g., price certainty, compliance mechanisms, trading possibilities, complexity, etc.)?

   As set out in the Recommendations above, fairness, efficiency, consistency, transparency and predictability are among the key objectives which should be advanced by the carbon pricing mechanism. While the Provinces should be provided with flexibility as to the precise mechanism, the certainty provided by a consistent and predictably increasing Minimum Price on GHG emissions will be the key to robust business investments in emissions reductions. The same will be true of the pollution surcharge which is to be applied to prescribed GHG emitting goods.

Attachment A

A Minimum Price on GHG Emissions vs. Unconstrained Cap and Trade

General Observations

The following are among the principles, considerations and observations which have led me to favour the imposition of a consistent, national Minimum Price on GHG emissions, rather than a cap and trade regime without the constraint of a national Minimum Price.

1. The impact of GHG emissions is cumulative. Every additional Tonne of CO2e causes additional harm and should therefore be priced accordingly. From an environmental perspective there is no such thing as a "free" Tonne of CO2e, and there are no "safe" levels of CO2e emissions. (In fact we need negative CO2e emissions in order to reduce the CO2 in the atmosphere from its current, demonstrably unsafe, 400+ ppm level to below the 350 ppm level which scientists hope will prove to be safe.)

2. Canadians have already cumulatively emitted, on a per capita basis, more than twice their Global CO2 Budget. Having already emitted much more than our "fair share" we need to put a Minimum Price on each and every additional Tonne of CO2e and allocate a portion of such price to redress some of the harm we are causing elsewhere in the world.

3. Price certainty and predictability are essential in order for businesses to efficiently finance investments to reduce CO2 emissions. Price certainty will help to drive innovation and the development of a more robust cleantech industry. This will not be the case if a cap and trade system is unconstrained and can result in volatile and, potentially, unpredictably low prices per Tonne of CO2e.

4. While a cap and trade regime may be added to and combined with the Minimum Price, in order to ensure the achievement of a prescribed level of reductions, if the Minimum Price resulted in greater reductions than those prescribed by the cap and trade regime this outcome would benefit Canada, as there is no level of CO2e emissions which is "safe".

5. A universally applicable and non-discriminatory Minimum Price would enable the implementation of border adjustments in compliance with trade laws.

6. A consistent price signal drives efficient market responses and avoids market distortions.[36]

7. The Minimum Price on GHG emissions ensures a reasonably predictable and consistent stream of revenue to help fund the clean energy transition (and reduces the amounts which would otherwise be siphoned off by traders and other transaction costs).

8. It is easier to harmonize international regimes based on a Minimum Price than those based on national or regional emissions caps.

---

[36] As discussed in the February 2008 Congressional Budget Office study "Policy Options for Reducing CO2 Emissions" the use of a fixed carbon price would appear to provide substantial efficiency benefits relative to the application of an inflexible cap. See: https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/02-12-carbon.pdf.