



The Hon. Steven Guilbeault
Minister of Environment and Climate Change
Ottawa, Ontario

January 20, 2022

Dear Minister,

We request that this letter will be received as an official response to the [consultation exercise](#) posted on your departmental website. We recognize this consultation is designed for individuals, but no other opportunity has been presented to us and we want to contribute in a timely way.

The [on-line submission](#) has no opportunity for citizens to challenge the failure in Canada's plans to meet our Paris Agreement target of holding to no more than a 1.5 degrees C increase in global average temperature.

Instead, this online consultation, like the *Canada Net Zero Emissions Accountability Act*, seeks to recast our commitment outside of the language of the Paris Agreement from COP21 (December 2015). Rather than adhere to the commitment to hold to 1.5 degrees, Canada's Environment and Climate Change Department appears intent on thwarting that goal and replacing it with one more acceptable to Canada's fossil fuel industry interests: Net zero by 2050.

This must be called out. Some level of intellectual honesty must be demanded of our government.

The Paris Agreement goal, reinforced forcibly through COP26 in Glasgow, is to hold to 1.5 degrees C global average temperature increase. Canada's current NDC of 40-45% below 2005 levels by 2030 fails to do so.

The clever process through which Canada has removed 1.5 degrees C as a goal from law and policy is worth a forensic dissection. This political alchemy may have been accidental. However, the concerted effort of the Liberals, Conservatives and New Democrats on the Standing Committee on Environment and Sustainable Development to block the Green Party's C-12 amendments – amendments to specifically include 1.5 degrees C – makes this appear more intentional.

Given the new information since the passage of C-12 – from the Sixth Assessment Report of Working Group 1 of the Intergovernmental Panel on Climate Change (IPCC) in August 2021, the conclusions from COP26 in November 2021, as well as

the change at the top with you as Minister – surely this omission of 1.5 degrees C as our goal can be revisited.

1. Review of replacing 1.5 degrees C with Net Zero as though they are the same

The IPCC Special report on 1.5 degree C (October 2018) set out clearly:

“In model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO₂ **emissions decline by about 45% from 2010 levels by 2030...** reaching net zero around 2050 ...” (emphasis added)

This key finding is from [Chapter 3](#) of the same report:

“The rate of change for several types of risks may also have relevance, with potentially large risks in the case of a rapid rise to overshooting temperatures, even if a decrease to 1.5°C can be achieved at the end of the 21st century or later (*medium confidence*). If overshoot is to be minimized, the remaining equivalent CO₂ budget available for emissions is very small, which implies that **large, immediate and unprecedented global efforts to mitigate greenhouse gases are required** (*high confidence*).” (emphasis added)

Of course, the IPCC call for “immediate and unprecedented global efforts” was made three years ago. Given the rapidly closing window on holding to 1.5 degrees C, not only every year counts; every month counts.

The Canadian government’s Nationally Determined Contribution (NDC) of 40-45% below 2005 by 2030 appears to be an attempt to appear compliant with the IPCC advice. Sadly, the former minister, Jonathan Wilkinson, confirmed in a Vancouver CBC Radio interview with Stephen Quinn that we were more likely to hit 40% than 45%. In fact, Canada is the only nation to express its NDC as a range, creating the impression our target is 45% when, in reality, our government will declare 40% consistent with our goal.

The NDC ignores the reality that Canada must be more ambitious than other countries as we have the worst record in the G7, having allowed our emissions to increase to 21% above 1990 levels. The Green Party of Canada continues to press for 60% reductions below 2005 levels by 2030. Sometimes this is referenced as our “fair share” of greenhouse gas (GHG) emission reductions.

As a result of Canada’s historic contribution to overall accumulated GHGs levels, environmental justice demands that it, and other developed countries, do their fair share to offset the emissions of developing countries. Recognition of this fact should be consistently noted in all government emissions reduction plans. “Fair share” should not just be viewed as an afterthought.

The current NDC is actually far short of our “fair share” at any level of global equity, as explained in [this article](#) by Prof. Simon Donner, who now serves as a member of the Net Zero Advisory Body:

“According to this analysis, for Canada to do its *fair share* to avoid 1.5°C of warming, our emissions would need to *decrease 96-99 percent* below current levels by the year 2030.” (Emphasis added). Other critiques have suggested even deeper cuts to meet the moral imperative of meeting our fair share of global effort.

“Net Zero by 2050” cannot be consistent with IPCC advice unless steep reductions are achieved by 2030. Worse, Net Zero by 2050 is premised on unproven, speculative, potentially fraudulent schemes to allow overshoot and reductions later. This is scientifically indefensible and unacceptable.

That point was stressed once again in the Sixth Assessment Report of Working Group 1 of the IPCC released in August of 2021: “Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades.”

For the first time, the Sixth Assessment Report of Working Group 1 of the IPCC warned that global warming has already created some unstoppable, irreversible effects. For the first time, the [August IPCC report](#) warns that some low-likelihood, abrupt and catastrophic outcomes cannot be eliminated from risk assessment:

“Low-likelihood outcomes, such as ice-sheet collapse, abrupt ocean circulation changes, some compound extreme events, and warming substantially larger than the assessed very likely range of future warming, cannot be ruled out and are part of risk assessment.

“Low-likelihood, high-impact outcomes could occur at global and regional scales even for global warming within the very likely range for a given GHG emissions scenario. The probability of low-likelihood, high-impact outcomes increases with higher global warming levels (high confidence). ***Abrupt responses and tipping points of the climate system, such as strongly increased Antarctic ice-sheet melt and forest dieback, cannot be ruled out*** (high confidence).”

Lastly, Canada’s government, having signed and ratified the Paris Agreement and having concurred in the closing statement from COP26, must not, in good conscience, continue to develop a plan to the wrong target.

We quote from the COP26 Glasgow Climate Pact:

“3. Expresses alarm and utmost concern that human activities have caused around 1.1 °C of warming to date, that impacts are already being felt in every region

"4. Stresses the *urgency of enhancing ambition and action in relation to mitigation, adaptation and finance in this critical decade* to address the gaps in the implementation of the goals of the Paris Agreement." (Emphasis added).

To conclude our opening and urgent point, the proposed pathway to net zero by 2050 is inadequate. Moreover, it is dangerous. As the IPCC increasingly makes clear, every ton of GHG matters. Every increment of warming is an increased threat to millions of people and species.

Net Zero by 2050 is, as Greta Thunberg says, "surrender." We urgently recommend that overshoots and returns be rejected as too risky and unproven. Canada should adopt absolute zero by 2050 as the mid-century goal. In fact, our goal should be absolute zero now and ambition to achieve net negative emissions by 2050.

It is irresponsible to maintain that a plan to 2030 be based on emissions reductions we know to lead us closer to 3 degrees C global average temperature increase than to 1.5. We therefore structure our response to this consultation to provide advice as to how to achieve 60% reductions below 2005 levels by 2030. The addendum charts one such pathway, without any new mega dams or new nuclear facilities.

2. Canada has the potential to make a world of difference

Greens believe that action by Canada in 2022, substantially increasing its ambition to hold to 1.5 degrees C, could make a significant difference in increasing global momentum. COP26 failed to deliver sufficient levels of cumulative NDCs to create a viable scenario to hold to 1.5 degrees C.

The updated synthesis report from the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), delivered in the last week of COP26, confirmed that new NDC promises, if met, would lead to 13.7% *higher* global emissions in 2030 than in 2010. Before COP26 opened, the projections showed a 16% increase. The community of nations, collectively, shaved a small amount from the deeply dangerous overshoot.

Globally, Canada always punches above its weight. This is true in many areas of diplomacy and certainly on climate. At the Rio Earth Summit in June 1992, Canada arguably saved both the UNFCCC and the UN Biodiversity Convention. In November 2000, at COP6 *bis*, Canada played a key role in rescuing Kyoto.

Our destructive influence is also significant. Acting alone in March 2006, Canada sabotaged the UNFCCC system for a shared benchmarking of 1990 as a base year for all nations. In 2011, Canada became the only nation to have signed and ratified Kyoto and then legally withdraw. It has been argued that this created space for the US to legally exit the Paris Agreement.

In 2015, our Prime Minister declared “Canada is back!” and the world was encouraged. Later that week, Canada again exerted influence leading to major progress at COP21 when it was the first industrialized country to support the 1.5 degrees C goal in the text of the Paris Agreement.

Many Canadians, and particularly our national media, have little notion of our significant global influence – for good or for ill.

As the experience of COP26 confirms, leadership is sorely needed. The global climate effort must increase substantially well before the opening of COP27 in Sharm el-Sheikh, Egypt, in November. If not, 1.5 degrees C will go good and truly have slipped away. More resources will be required globally for triage. As the Prime Minister of Barbados, Mia Mottley, made clear at COP26: “Two degrees is a death sentence for us.”

Triage policy must pose questions such as:

- Which areas of the planet can remain productive agriculturally?
- Which areas are becoming too dangerous for permanent habitation?
- Where are the sacrifice zones?
- And how many climate refugees can industrialized countries accept?

We must assess the real costs of our current strategy of incrementalism. Our current increase of 1.1 degrees C above pre-Industrial global average temperature has unleashed unprecedented floods, droughts, landslides, tornadoes, heat waves and fires around the world. These impacts are global and hit home across Canada. As Canadians experienced in 2021, the climate emergency is real. It kills people. It plays havoc with our economy – in all areas and in all regions. It costs us billions of dollars in wrecked infrastructure and broken supply chains.

As an industrialized, fossil fuel producing country, Canada can lead the world by agreeing to set an end date for fossil fuel production. Canada should join the [Beyond Oil and Gas Alliance](#) along with other historic fossil fuel producing nations, such as Denmark, France, and Greenland. Canada should increase its NDC to 60% below 2005 by 2030. The specific steps to reach these goals are detailed in our submission.

We submit the impact will extend far beyond our shores – and beyond our generation. We can create the impetus for a major push of all nations to step up. Some nation has to go first. US President Joe Biden has stretched his personal political capital to deliver 1.5 degrees C as far as it can go. The European Union has pulled more than its weight. Our allies need us. We have to step up. This is the global political territory where our Prime Minister can be in line for a Nobel Prize.

3. Getting there from here – this online survey is fatally flawed

This consultation limits the horizons of opportunity to seven defined topics at no more than 1,000 characters per topic. It further limits public input to a short window over the holidays with minimal publicity to increase participation. Even with the welcome extension on the deadline, this consultation is, *prima facie*, an insult to meaningful public participation.

The topic areas found on the online survey are important, but insufficient. Overall, this online survey perpetuates a business-as-usual approach of incrementalism that fails to respect the motion passed by parliament on June 18, 2018 that we are in a climate emergency.

Missing are a number of topic areas and essential immediate steps:

- 1) 2022 must be established as the year in which GHG emissions peak and begin to fall in Canada. This implies that all fossil fuel production must also peak in 2022 and begin to fall. It is not enough to cap emissions from the oil sands, and potentially on an intensity basis. We must cap production and emissions and set a trajectory to zero now. Expanding on this point, committing to “cap Canada’s oil and gas emissions at the **pace and scale** needed to get to net zero” means taking a long time to ramp down the industry. This appears intended to provide industry with the opportunity to produce offsets through the unproven and cost-prohibitive fantasy of new carbon capture, utilization and storage (CCUS) technologies (among other possible contenders for addressing over-shoot). This appears to us to be a sleight of hand to allow no changes *at all* in levels of emissions for some decades. What is stated here is a cap – that’s all, no elimination of extraction *in toto* or even just new extraction. This, despite their recognition that the previous engagement survey showed that 81% of respondents wanted to pursue the development of renewable technologies.
- 2) Meaningful engagement of Indigenous governments to maximize economic development opportunities in nature-based climate solutions and deployment of renewable energy as a top priority, consistent with UNDRIP
- 3) All fossil fuel projects undertaken in violation of Section 35 of the Constitution and/or in violation of UNDRIP be immediately canceled.
- 4) Reject illegitimate and unproven schemes such as CCUS allowing for overshooting targets with the assumption of subsequent reversal. Such technologies can be encouraged, but as long as they remain unproven, carbon assumed to be eliminated must not be counted toward meeting our GHG emission reduction goals.
- 5) Ensure that any technologies receiving government support meet clear criteria for future benefit. For example, all emission reduction efforts receiving public dollars must be developed to maximize GHG reductions, at lowest costs, enhance employment benefits with the lowest possible transactional costs and

delays. Using such criteria, given current technologies and the reality of enormous costs for little return, will eliminate any new nuclear plants or mega dams from consideration.

- 6) All federal government spending to build or expand fossil fuel infrastructure must cease immediately.
- 7) No further permits for fossil fuel exploration or development in Canada's off-shore will be issued.
- 8) Banning the export of thermal coal, already promised by the government but not mentioned in this survey, will be accomplished by 2023.
- 9) The recommendations of the government-commissioned [Taskforce on Just Transition for Canadian Coal Power Workers and Communities](#) was tabled in December 2018. Coal workers are losing their jobs, but the just transition they were promised is nowhere in sight – nor mentioned in the consultation. It is urgent that it be honoured and expanded to all fossil fuel workers and communities.
- 10) All federal government infrastructure funding must be tied (as it was in the administration of former Prime Minister Paul Martin) to adherence to climate goals. Infrastructure must be designed to reduce carbon emissions over its lifetime, while also being built to anticipate and reduce risk from future events (as part of adaptation planning).
- 11) The federal government is the largest purchaser of all things in Canada. All government purchases, whether of vehicles or light bulbs, must be to advance the best possible technology and assist in bringing down the cost of carbon-cutting technology, even if the cost to government is increased. This strategy can boost Canadian climate saving technologies. A key example is green concrete. CarbonCure Technologies of Halifax is a world-leading developer of green concrete, transforming concrete from carbon threat to climate solution. All government purchases of concrete must be of green concrete. New vehicle purchases, including by Crown corporations like Canada Post, must be electric vehicles (EVs). The only exceptions would be cases where services are not available in EVs, such as in military applications. Further, Canada could retrofit all federal buildings to achieve net negative carbon status, leading the way and promoting cutting edge technologies in retrofits.
- 12) Canada will pursue through all multilateral arrangements – the World Bank, the International Monetary Fund, the World Trade Organization – global policy coherence to hold to 1.5 degrees C. This will require a global effort to renegotiate all Investor-State Protection Agreements within the WTO, an effort Canada should lead.
- 13) Omitted from this consultation is any reference to international development assistance and climate finance. Just as in COVID, where vaccinating people around the world protects us at home, Canada must significantly boost our commitment to assisting the developing world in both mitigation and adaptation. Funds should be primarily in grants, not loans. Climate finance must be consistent with all 17 Sustainable Development Goals to which Canada is also committed.

14) Lastly, adaptation should be part of our plans to 2030. Many adaptation strategies do double duty in mitigation. This is particularly true in the case of nature-based climate solutions, which are included in the survey, so we expand on this point below. It is an astonishing oversight that adaptation has been ignored in this exercise. We assume a separate process will be underway to address this deficiency. However, for optimum effectiveness, these silos – mitigation and adaptation – should be merged.

4. Addressing the seven topics in the online survey

Buildings: Canada has already pledged to net zero building stock, a net zero building code, and to energy efficiency and conservation improvements. These eco-efficiency upgrades have focussed primarily on residential properties and low income housing.

The programs need to be expanded to all commercial, industrial and institutional (municipalities, universities, schools and hospitals) properties. Insulation, heat pumps and modernized furnace equipment can cut carrying costs of properties dramatically while cutting millions of tons of GHG. Maximizing insulation is key to help our built infrastructure adapt to extreme weather events – deep freezes and heat domes. The missing piece is to maximize the deployment of localized renewable energy production on all new and existing buildings. Commercial buildings, hospitals, municipal buildings, universities and high schools offer major opportunities for solar panel arrays. Rooftops gardens offer sequestration opportunities. We must move from net zero buildings, to net negative.

Electricity: For years, Green strategies for carbon reduction have focused on what is now popularized in Saul Griffith's [Electrify: An Optimist's Playbook for Our Clean Energy Future](#).

Two key actions are required: decarbonize all electricity and connect all regions and provinces through a robust electricity grid, allowing for storage and flexibility in wheeling renewably sourced electricity from one place to another.

Discussion of a North American interconnected grid has been underway for two decades. Twenty years ago, the North American Commission for Environmental Cooperation led a tri-partite effort to review the potential for renewable electricity wheeling through jurisdictions and produced [this report](#).

It is dismaying that so little progress has been made in Canada. It appears that the federal government has been unwilling to take a lead in forging agreements. We note that the Infrastructure Bank has made solid strategic investments in inter-ties, but there is still no national commitment or plan.

Canada has a very solid base of renewable energy and long-standing plans to move to 100% renewable electricity. Key to the success of national renewable electricity

is using the grid for storage. Replacing coal with natural gas is not decarbonizing. We need to remove natural gas from the grid as well.

Many key inter-provincial links have been stymied by a lack of inter-ties. Traditionally, provincial monopolistic utilities have preferred building links and business relationships with neighbours in the US. To facilitate a national electricity grid, negotiations are required between each provincial utility with the federal government. Expropriation is an option, but an undesirable one. Bilateral negotiations, lubricated with funds for upgrading and expanding the grid, should be successful. These negotiations must begin now.

Some linkages – such as linking eastern Manitoba with western Ontario – will require substantial construction on Indigenous lands with major potential impacts on nature. Indigenous nations must be engaged immediately to ensure the route through the boreal is guided by traditional Indigenous knowledge, respecting sovereignty and treaties. There is no time to waste in beginning meaningful consultation to have a completed national renewable electricity corridor by 2030.

Heavy industry, including oil and gas: The federal government has existing authorities under the Canadian Environmental Protection Act (CEPA) to regulate any facility emitting GHG, just as Environment Canada and Climate Change can regulate dioxins and furans from pulp and paper mills.

As noted above, promoting carbon reduction innovations in different sectors can be advanced through tied funding and government procurement policies. The government has committed to end the export of thermal coal. CEPA can be used to expedite that commitment to 2023. Based on that precedent, the export of any fossil fuel products could be banned by 2030. The importation of fossil fuels products should also be banned by 2030.

The impact of these steps will be to ensure that, on a rapidly declining basis, the use of fossil fuels by Canadians will be from Canadian-only sources. This will assist in cushioning the impact for fossil fuel dependent communities. It will also end Canada's practice of shipping millions of tonnes of GHG emissions offshore. By focusing on import and export, jurisdictional considerations are avoided. Provincial and territorial governments control most natural resources (other than mining uranium); the federal government controls import and export, as well as having the right to regulate toxic substances, under federal criminal law powers.

The oil sands sector, in particular, needs to face the reality that it will cease producing by 2030. There can be no justification, environmentally or economically, for completing the Trans Mountain pipeline expansion. There is a large opportunity for this government to convert the TransMountain Corporation, a wholly owned government entity and Crown corporation, into a public vehicle to boost adaptation and climate resiliency. This potential was recently demonstrated when TMX pipeline construction workers in the Fraser Valley shifted to the urgent priority of repairing highways and broken supply chains following the devastating floods and landslides. The permanent revision of the mandate of the TransMountain corporation to one

assisting in fire fighting, increased fire preparedness and work in adaptation of critical infrastructure is a wise move to save lives and protect our economy.

Once the oil sands are no longer producing, the focus of much work well past 2030 will be in remediation of tailing ponds and mining sites. Abandoned oil wells will continue to require clean-up with an effort to repurpose the deep wells, where potential exists, to geothermal energy production. Those wells without sufficient energy at depth can at least preheat water for such things as maintaining greenhouses.

Canada is committed to a 75% reduction in methane by 2030. Banning fracking is a major step in meeting this target. Banning fracking can be done at the federal level using CEPA. Quebec, Nova Scotia, Newfoundland and Labrador and New Brunswick placed bans on fracking, although the Conservative government of Blaine Higgs in New Brunswick lifted it quietly for one project. First Nations in New Brunswick have objected. Fracked gas has the [same carbon footprint as coal](#). Pursuing fracked gas as a climate solution is a new definition of insanity.

Work in methane reduction through regulations must be revisited to close loopholes, enhance monitoring and ensure best available technology is deployed in working sites and abandoned ones, such as the abandoned Donkin Mine in Nova Scotia. The report of the Commissioner of Environment and Sustainable Development (November 25, 2021) revealed that the Onshore Emissions Reduction Fund to reduce methane from the oil industry had not resulted in any measurable reductions, and might have increased emissions instead. The program is essentially a new subsidy. The same could be said of the methane reduction plans for the agriculture sector. These funds are poorly designed. They may not result in any methane reductions, but instead be untied subsidies to large industrial agriculture. Spending programs to reduce methane must result in demonstrable, new reductions. Issues of additionality must be anticipated in designing any such funding.

Transportation: Transportation accounts for 25% of Canada's GHG. Decarbonizing transport is doable and essential by 2030. Huge potential exists in the following immediate moves:

- Regulate light trucks and SUVs to Corporate Average Fuel Economy (CAFE) standards
- Ensure all new vehicles sold in Canada are zero carbon by 2030
- Accelerate the retirement of the internal combustion fleet and transition to EVS through tax incentives which decrease over time to zero by 2035. The faster you switch, the more cash you get back.
- Ensure bio-fuels from non-food sources, such as waste fat or cellulosic ethanol, are available for the agriculture and fishing sector by 2025. Both sources are well-distributed across Canada. Biodiesel from waste fat can be produced relatively cheaply and easily from small business.

- Ensure that global marine shipping and aviation fuels face a carbon price to drive fuel switching and electrification, while also creating a global fund to meet climate finance targets. A global carbon tax for international transportation of people and goods was first proposed by former French president Nicolas Sarkozy. The Harper administration opposed it but given the prime minister's call for a global carbon tax at COP26, it appears an excellent bid for Canada to pursue in advance of COP27.
- Make public transit affordable, reliable and low carbon within cities and between them, investing in bus and rail. So far, major federal funding for public transit has been limited to transport within our cities. VIA Rail funding enhancements have been limited to the Windsor-Quebec corridor. Huge gaps exist across Canada where there is literally no public transport other than flying. Unlike Amtrak in the US, VIA Rail has no legislative framework or mandate. In this Parliament, we must legislate a mandate for VIA Rail to deliver safe, reliable, low-carbon, affordable passenger transportation across Canada. Our rail network must be supplemented by affordable, low-carbon bus service between communities. Meeting the need for safe, affordable and reliable ground transportation across Canada is also required by the recommendations of the Inquiry into Missing and Murdered Indigenous Women and Girls. It is an aspect of reconciliation as was recently and specifically underscored by the [September decision of the Appeals Division of the British Columbia Supreme Court](#) on the E and N railway lands.
- Canada must boost our domestic production of electric and potentially other zero-carbon vehicles. But we must be realistic about the hyped opportunity for a car battery sector. We are far behind other competitors. We do seem to have potential for a global niche in electric battery powered commercial air travel as pioneered commercially by Harbour Air in British Columbia.

Agriculture and waste: The agriculture sector could play a major role in addressing the climate emergency, just as it is a major victim of climate impacts from droughts to floods to heat waves. Intense regenerative agriculture could assist in carbon sequestration. Bringing the agricultural community on board is critical, but not through hand-outs untied from measurable reductions. While some claim regenerative agriculture could solve the climate crisis, others are more cautious, as this [report from World Resources Institute](#) demonstrates.

Accounting for carbon storage in soils remains challenging, with numerous complicating factors. For example, building organic matter in the soil uses additional nitrogen, and if this is added as synthetic fertilizer, the emissions this generates should be part of the equation. Soil carbon sequestration can increase rapidly at the beginning, when initial organic matter is low, and then at a decreasing rate, and carbon storage potential is finite. As a result, incentives based on carbon storage can create unfair advantages in the form of large program transfers in the short term for large corporate farming that adopt practices in the short term, to the disadvantage of farms that have been slowly building soil organic matter for decades. If we do not ensure that incentives are fair and equitable, policies will continue to tip the scale in favour of big corporate globalized

agribusiness, feeding a trend that has contributed to increasing the agriculture sector's emissions in so many different ways.

It is unquestionably good for the environment and biodiversity to move to greater sequestration in our soils. There are multiple benefits, but they must not be over-counted. Still, we underestimate the benefits of grasslands for carbon sequestration. We likely overestimate the damage of meat production in assuming that any meat production has the same negative impacts as industrial livestock production. Confined feedlot operations rely on massive carbon-intensive inputs of soybeans and corn. As well, for some ecosystems, such as grasslands, having hooved animals on the land, raised on grass, enhances the health of soils and carbon sequestration. More research is needed in this area. So too are partnerships with agriculture, particularly to assist in measures that advance mitigation and adaptation.

Food waste is a huge issue. We waste about a third of food in Canada. Avoiding food waste is a carbon reduction plan and could assist in ensuring adequate nutrition for all.

Nature-based climate solutions (NBCS): The need to better integrate biodiversity and climate goals was a major take-away from COP26. Most measures in the NBCS toolkit will enhance biodiversity, carbon sequestration (mitigation) and adaptation. For Canada, immediate measures include the following (where NBCS programmes meet both adaptation and mitigation goals, we use the notation "AM++"). All of them have climate and biodiversity benefits:

- Tree planting across the landscape in ecologically appropriate species -AM++
- Urban tree planting, especially creating shade to combat urban heat islands -AM++
- Residential tree planting with deciduous trees to reduce air conditioning demand -AM++
- Rooftop tree planting on high rise buildings – AM++
- Eelgrass restoration in coastal zones
- Focus replanting particularly in those areas devastated by wildfires to help hold slopes, soil and enhance fisheries habitat – AM++
- Stop all logging of old growth forests
- Restore health of watersheds
- Protect peat lands
- Restoration of hedgerows in agricultural areas, restoration of principles and practices of the Prairie Farm Rehabilitation Board (developed after the Dustbowl era of the 1930s, canceled by the Conservative administration in the 41st Parliament)
- Restore and protect riparian zones

For these and other programs, partnerships with the rural municipal governments of Canada (through the Federation of Canadian Municipalities) and with Indigenous

Peoples and nations, particularly the Indigenous Guardians program (within the Indigenous Leadership Initiative) will likely produce faster results than a one project at a time approach through departmental funding approvals.

The 2026 interim objective: Canada's current 2030 NDC is a barrier to holding to the 1.5 degrees C global target. Adopting 60% below 2005 by 2030 is key. The shape of the GHG reduction curve must start very steeply. Based on 60% cuts by 2030, an interim target of 30% below 2005 by 2026 is intuitive. However, we need to build confidence, so we propose an interim target of 20% below 2005 by 2026, with success accelerating in the second half of the decade.

5. What do you see as the barriers or challenges to reducing emissions in these sectors? Do you have suggestions on how to overcome these barriers?

The IPCC Special Report on 1.5 degrees C set out that there are no technological barriers, no scientific barriers, no economic barriers to holding to 1.5 degrees C. Our only barrier is the lack of political will. Overcoming this barrier in Canada will take courage.

Canada – as a constitutional monarchy with a strong federation of 10 provinces and three territories – presents challenges. Our federal government increasingly acts as a maître d' to difficult restaurant customers, with the mantra, "the customer is always right" (acknowledging unintentional plagiarism of former Prime Minister P.E. Trudeau's reference to the federal government as the head waiter.)

We need the federal government, and particularly the Prime Minister, to show leadership – and courage. It is not defensible to say our structural and political reality is an insurmountable barrier.

Our uniquely Canadian jurisdictional barriers and conflicts cannot equal those of the separate nation-states within the European Union (EU). The EU has done a better job finding consensus and burden-sharing to meet climate goals among and between the twenty-seven nations speaking twenty-four official languages than has Canada.

We need to revisit the strategies of early environmental successes in Canada – on acid rain and on ozone. The best way to achieve a national plan is through individual bilaterals, one jurisdiction at a time. Progress begets progress.

As well, we now have the imprimatur from the Supreme Court of Canada for federal actions on climate. We need to reconfigure our policy and constitutional lens. For example, the constitution clearly makes forest management a provincial area of authority. But carbon sequestration is not forest management. It is a response to an emergency. The provincial right to set annual allowable cuts remains unchallenged. Federal programs such as a commitment to planting two billion trees has not been challenged. Actions to enhance carbon sequestration and protect

existing carbon sinks is not an intrusion into provincial jurisdiction Any impact on forest management is purely incidental.

While the First Ministers format for decision making, with one province able to stymie progress, has been a barrier for climate action, it is not the case that Canadians as a whole need to be kept from consensus decision, multi-stakeholder efforts. The repeal of the National Roundtable on Environment and Economy Act (as part of omnibus bill C-38 in spring 2012) was a loss, as was the cessation of the *ad hoc* Projet de Société, under former Environment Minister Jean Charest. More engagement and hands-on participation, with less mediated engagement through governmental entities like the Net Zero Advisory Body (NZAB) and Canadian Institute for Climate Choices would help build momentum. We do not reject the value of such bodies. In many ways, they are only now getting up and running. However, citizen engagement is not a robust focus of their work at this time.

6. Conclusion

The Green Party of Canada hopes to engage further in the details covered in cursory fashion here. We attach, as an addendum, our [2019 calculations to get to 60% below 2005 by 2030](#). This is not modelling. It is actual data. Three years later, the slope needs to be steeper. It is not a prescription, but one example of a pathway to 60% below 2005 by 2030.

The alternatives to aggressive, deep cuts in emissions are dreadful. In the last six months alone, we have seen what 1.1 degrees C looks like in lost lives and billions of dollars in damage. The costs of inaction – and the costs of incremental actions – are unacceptably high.

Look up.

On behalf of the Green Party of Canada:

Dr. Amita Kuttner, Interim leader
Lorraine Rekmans, President
Elizabeth May, MP, Parliamentary leader
Mike Morrice, MP.

Shadow Cabinet Climate experts:

- Dr. Imre Szeman
- Dr. Farrukh Chishtie
- Dr. Devyani Singh

Cc: The Right Hon Justin Trudeau, Prime Minister
The Hon Chrystia Freeland, Deputy Prime Minister
Hon. Jonathan Wilkinson
Hon Omar Alghabra

Hon Patty Hajdu
Hon Marc Miller
Hon Dominic Leblanc
Julie Dabrusin, MP, Parliamentary Secretary to Ministers Guilbeault and Wilkinson
Yves Giroux, Parliamentary Budget Officer
Jerry DeMarco, Commissioner for Environment and Sustainable Development

Mission: Possible

Projections, 2020-2050

**Reductions in CO₂ Emissions
Production of Renewable Energy**

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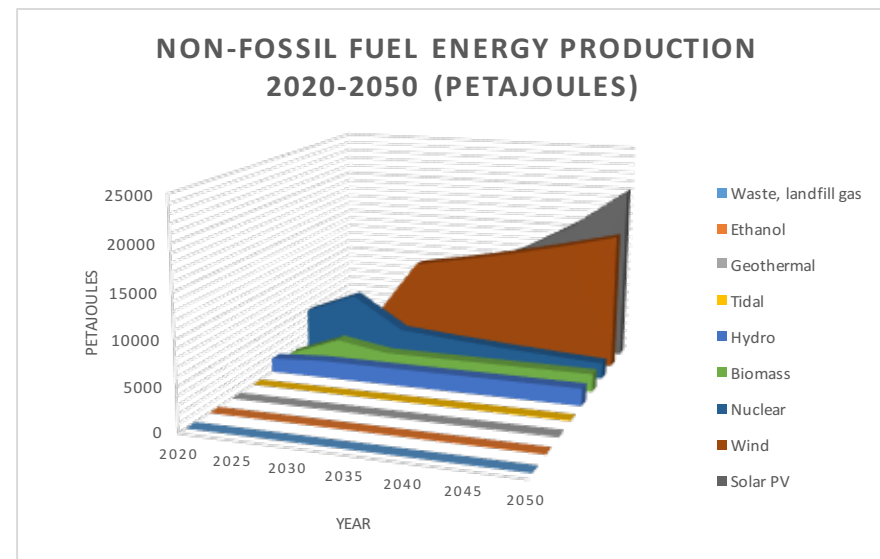
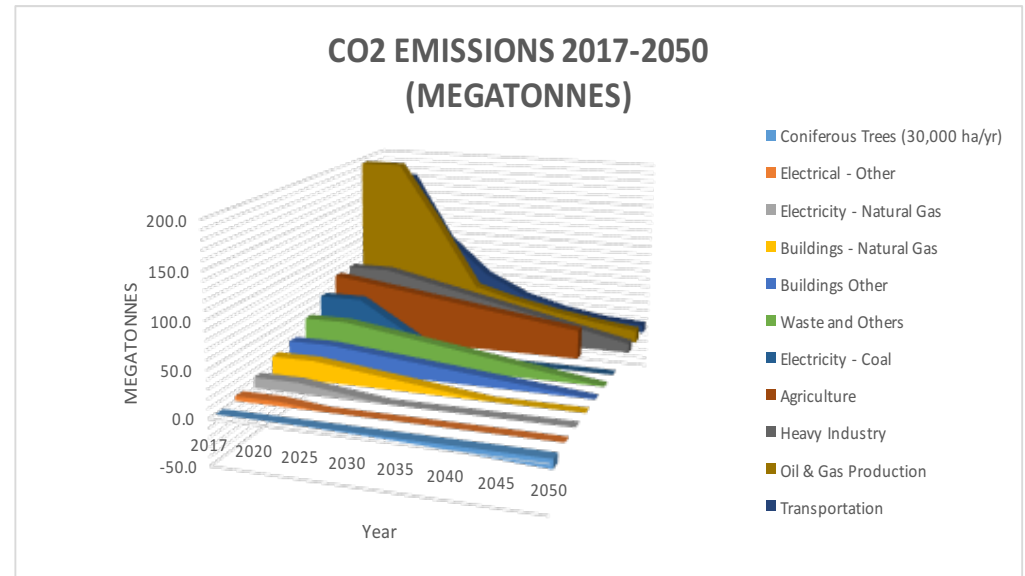
SUMMARY

These two graphs summarize this study. Supporting data and details are in the body of the document.

The first figure shows projected decreases of CO₂ emissions from industrial and household activities, and the projected uptake of atmospheric CO₂ from newly planted coniferous trees. The bulk of the reductions are from dramatically reduced oil & gas production and from shifts in the transportation sector. Coal is not used. Cumulative output is reduced 60% by 2030, the first goal of “Mission: Possible”.

By 2050, CO₂ emissions have been reduced by 92%. The remaining 8% still emitted from agriculture, heavy industry, transportation and legacy oil & gas production is expected to be balanced by other carbon sinks: more forest planting, improved agricultural practices, advances in bio-energy carbon capture and storage, and other as yet unproven technologies.

The second figure shows electricity production from various non-fossil fuel sources. In this scenario, solar photo-voltaics (PV) and wind provide most of the power. Hydro and nuclear power decrease gradually from peaks around 2030. As detailed in the text and tables following, there is likely to be more power produced from other renewable sources – biomass, geothermal and tidal all have substantial potential, and all will be developed to some extent.



PURPOSE OF THIS DOCUMENT

1. At the 21st Conference of the Parties (“COP21”) in Paris in 2015, Canada and the other nations of the world committed to limiting global average temperature increases to 1.5°C above pre-industrial levels, or at least as far below 2°C as possible¹.
2. The Intergovernmental Panel on Climate Change (“IPCC”) compared the implications of 1.5°C or 2°C temperature increases. The IPCC report of October 2018², approved by all governments, concluded that an increase of 1.5°C was likely to allow survival of the biosphere, albeit with substantial impacts.
3. The IPCC reported that the 1.5°C goal could be met by reducing CO₂ emissions 45% below 2010 levels by 2030, and achieving carbon-dioxide-neutrality by 2050. The IPCC stated that deploying existing technologies to replace fossil fuels with renewable energy, along with a rapid halt to deforestation and substantial re/afforestation, would likely be sufficient to achieve that goal, if tackled immediately and with urgency.
4. A 45% global reduction in GHGs by 2030 should therefore be viewed as an internationally accepted binding constraint on CO₂-emitting economic activity.
5. The Green Party of Canada’s more assertive climate plan is called “Mission: Possible”³. It calls for CO₂ emissions from Canada to be cut 60% by 2030, and for carbon-dioxide neutrality by 2050.
6. The figures and tables attached show one path Canada could take to meet the Mission: Possible commitments
 - a. immediate and drastic reductions in fossil fuel production,
 - b. reductions in energy consumption across all sectors,
 - c. immediate and substantial investment in renewable energy production and distribution, and
 - d. significant reforestation and afforestation.
 - e.

These actions are required to meet the world’s constraints and Canada’s international commitments.

¹ <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

² <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>

³ <https://www.greenparty.ca/en/mission-possible>

7. The intention of this exercise is not to quantify costs or benefits, nor to describe policy instruments to achieve the necessary changes, nor to predict impacts on affected economic sectors. These projections are not set out as matters of fact. There will be major variations in all the numbers. The purpose is to demonstrate that there exists at least one feasible path to meet the constraints now placed on emissions. We invite discussion of any part of this scenario, and alternate full or partial scenarios that meet the goals.
8. Producing oil and gas generates more than 26% of Canada's total CO₂ emissions⁴. Of this, almost half (12%) comes from mining and processing bitumen. Notwithstanding the industry's successful efforts to improve efficiency, that figure is continuously rising as more and more energy is required to produce bitumen from ever-lower-quality deposits. Greenhouse Gas (GHG) emissions will rise even more dramatically when the massive emissions of methane from fracking for natural gas are included.
9. This scenario is designed to produce a 60% reduction in CO₂ emissions by 2030, and carbon-dioxide neutrality by 2050.
 - a. Production of bitumen and fracked natural gas is ceased by 2030. By 2050, output of conventional oil has been reduced to 13% of 2017 levels, and conventional natural gas reduced to 16% of 2017 levels.
 - b. Fully electric passenger vehicles and light trucks are about 50% of the market by 2030. By 2050 most transportation (with the exception of rail, aviation and marine) will be electrified.
 - c. Consumption of natural gas in buildings is reduced 50% by 2030, and to zero by 2050 through replacement of most natural gas by electricity. Mission: Possible calls also for retrofitting buildings nationwide for energy efficiency - the resulting reduction in demand is not included in this scenario.
 - d. Emissions from heavy industry, agriculture and waste management are reduced 17%, 18%, and 33% respectively by 2030, and 86%, 55% and 100% by 2050 through adoption of new technologies and practices.
 - e. Electrical power from solar photo-voltaics and wind grow 45% and 35% respectively by 2030. Provincial utilities nation-wide are connected with storage and load buffering on a national electrical grid.
 - f. 30,000 ha of coniferous trees are planted each year through 2050.
 - g. From 2025 to 2035, meeting domestic energy demands in Canada while winding down production of fossil fuels in Canada may require curtailing some electricity exports to the United States . After 2030, numerous options are open for further reducing overall energy consumption and for generating electricity from renewables.

⁴ <https://www.nrcan.gc.ca/science-and-data/data-and-analysis/energy-data-and-analysis/energy-facts/energy-and-greenhouse-gas-emissions-ghgs/20063 - L1>

10. Changes in the oil and gas sector will affect the economy. There will be a reduction in export revenues (now some \$4.7 billion per year from oil & gas, of which about 35% flows to non-Canadian owners), direct federal corporate taxes (now some \$2.2 billion) and royalties to the provinces (now some \$8.6 billion)⁵. There is substantial economic activity in construction of oil & gas infrastructure, estimated by NRCAN at half the impact of actual production. Most of this will cease by 2050, with or without this specific scenario. While some, like the construction of infrastructure, will be replaced by other activities, there will be a reduction in private sector and government revenues in the near term.
11. The climate crisis will cause a write-down of asset values of oil & gas companies in Canada and around the world. Mark Carney, Governor of the Bank of England, has warned that the recognition that most oil and gas reserve “assets” will never be exploited could result in a drop in world stock market valuations, with the potential for destabilization of financial markets overall⁶. Financial institutions, insurers and regulators around the world are increasingly insisting that companies disclose such risks in financial reporting – when such disclosure does appear, most institutional investors (banks, pension funds, Crown corporations, etc.) will no longer be able to hold investments in fossil fuel companies, now an average of 12-16% of their portfolios. There may not be other willing buyers when the institutional investors divest.
12. This transition will require significant financing. Building the western portion of the national electrical grid could require almost as much money as would be required for the Trans-Mountain (“TMX”) pipeline expansion. Financial uncertainties and decreased valuations and dividend flows from traditional energy might make investors and governments more likely to supply the necessary financing for renewable energy and retrofit projects. This will happen without the specific actions described here, but as a natural effect of the world’s coming off fossil fuels. It is unlikely that the necessary financing will all come from the private sector, contrary to the predictions of the “Final Report on Sustainable Finance” to the Minister of Environment and Climate Change and to the Minister of Finance.⁷

⁵ <https://www.nrcan.gc.ca/energy-and-economy/20062#L5>

⁶ <https://www.mainstreamingclimate.org/publication/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability/>

⁷ <https://www.canada.ca/en/environment-climate-change/services/climate-change/expert-panel-sustainable-finance.html>

13. Canadian resource companies have generally been able to avoid the costs of cleaning up after themselves. Notwithstanding the recent “Redwater”⁸ decision of the Supreme Court of Canada, which held that even in bankruptcy, a company’s agreed-upon environmental liabilities rank ahead of secured creditors and shareholders, history suggests that they may flee the field with their assets and go bankrupt before they pay much to remediate damage done by oil and bitumen extraction to land, water, living systems and First Nations communities. A regulator estimated that the environmental liabilities there are in the order of \$260 billion in Alberta alone. The Green Party believes that restoration work should begin immediately while the companies still have some cash and marketable assets. But in time, governments and the public must be prepared to assume responsibility for most.
14. The business model for regulated power utilities will be substantially changed. It already costs less to produce solar or wind power than it does to generate electricity from hydro dams or nuclear facilities. This scenario assumes that Site C and Muskrat Falls are the last major hydro projects in Canada, and that some required maintenance and upgrading of existing nuclear plants is performed⁹, but no new ones are built. With inexpensive local power generation, storage, distribution and load buffering, it is no longer good public policy to allow a monopoly on electricity generation¹⁰. The utilities will be needed only as power distributors and market makers. Utilities have accumulated billions of dollars of debt backed by expected cash flow from high-priced energy in a controlled market. It will be difficult for some to avoid defaulting on that debt. Where the utilities have sold to business interests, the investors will take the loss like those who are still invested in oil and gas. Where they remain public entities like Crown corporations, the debt will become the burden of citizens and governments.
15. The supply chain will be affected. Suppliers will have to shift their current businesses to new areas. Canadian companies have always adapted to disruption in the “staples” economy, like changes from fish to furs to timber to minerals, etc. They should be able to quickly shift to supplying new industries. The buildout of renewable energy is already providing business and employment for many suppliers and business is growing fast.
16. To meet global constraints on greenhouse gases, the oil and gas industry must be taken off life support and moved to palliative care. Most of the short-term adjustments and costs will be borne by bankers, institutional investors, pension plans and governments, and by management personnel in smaller Canadian companies. The vast majority of Canadian citizens are not likely to be affected.

⁸ <https://www.scc-csc.ca/case-dossier/info/sum-som-eng.aspx?cas=37627>

⁹ see [David Hughes - Canada's Energy Outlook](#)

¹⁰ For example, Nevada’s largest utility NVEnergy has announced a solar/battery power facility with a capacity of roughly 1200 megawatts, to be build out over 18 months at a cost of about \$1.2 billion USD. Compare with BC Hydro’s proposed Site C project, intended to produce about 1200 megawatts, to be built over 10-12 years at a cost now projected to be \$8-10 billion USD. <https://www.reuters.com/article/us-usa-nevada-solar/nevada-utility-announces-three-major-solar-projects-with-battery-storage-idUSKCN1TQ2H5>

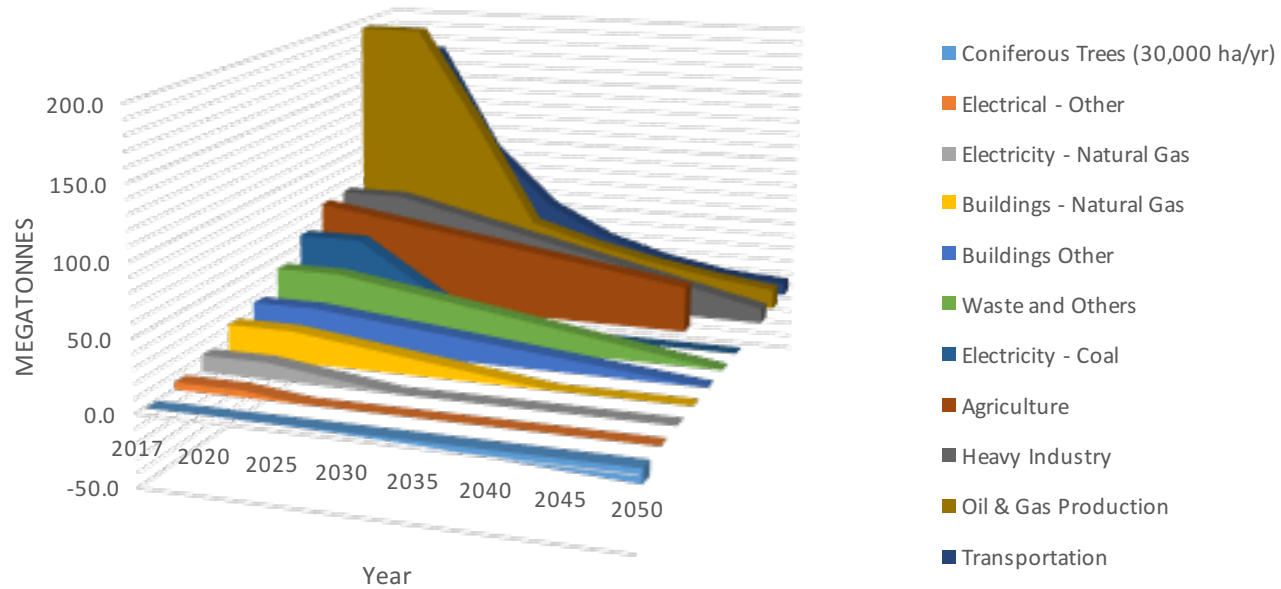
17. The transition will provide employment for thousands of people: decommissioning oil & gas production, restoring the oilpatch, building out the electrical grid, and generating and bringing renewable energy online. Workers in the oil & gas sector will not be displaced – decommissioning existing infrastructure and physical plant, plus efforts to remediate environmental damage, will provide jobs for all of and more the workers than are now employed in development and production. Employment in “clean tech” already exceeds that in oil & gas. More thousands will be needed to retrofit buildings. Demand for tradespeople will require education of a massive workforce – the Green Party recommends that “Red Seal” trades training be made widely available and free.
18. Energy will be abundant and inexpensive. The capital cost of solar PV is dropping 25% per year – the cost is thus cut in half every three years. Operating costs are only for maintenance and upgrading. New technologies continue to emerge with potential to make the conversion to renewables more rapid and less costly. Advances in battery and other forms of energy storage will make regional “micro-grids” more efficient and reduce the need for a nationwide electrical grid. The marginal cost of a unit of energy will be much lower, in many cases near-zero. This is a revolution as big as the Industrial Revolution, and much more rapid.
19. Any number of other factors may cause these projections to understate the speed of the transition. Passenger vehicles and light trucks may be converted to electricity faster than presumed here – disruption almost always happens more rapidly than expected. Smaller passenger aircraft may be converted to electric more quickly than supposed. Note the example of Harbour Air in British Columbia which has announced plans to convert its fleet of 30 seaplanes to all-electric propulsion. Retrofitting building stock is likely to be sped by ongoing advances in modular construction; and any number of other advances in building design and techniques will make the path easier. Industries will have more efficient, less maintenance-dependent and longer-lasting power equipment.
20. The cost of living for most Canadians will go down (Canadians now spend an average of 7% of household income on energy, much higher for lower-income households¹¹). The costs of heating and air conditioning will be significantly reduced. Vehicle owners will save on fuel, and maintenance costs will go almost to zero (except for wear on tires).
21. Home and building retrofits will require substantial investments. In addition to necessary public financing (see para. 13 above), required capital might be raised through innovative financing mechanisms. For example, municipal retrofit loans that are repaid through property tax bills over time, or loans from utilities that are repaid through utility bills. Where governments act as loan guarantors, such mechanisms may be attractive to the capital market. Citizens might react positively to a bond issue for such a national project.
22. Through and after the transition, Canada will have an improved economy, an expanded workforce, a low-cost energy system based on abundance instead of scarcity, industrial output at higher efficiency and lower costs, and lower costs of living for householders.

¹¹ <https://www.nrcan.gc.ca/energy-and-economy/20062#L5>

23. Canada can meet its international commitments to reduce greenhouse gas emissions, and can meet the Green Party's goals set out in "Mission: Possible."
24. The mission is possible.

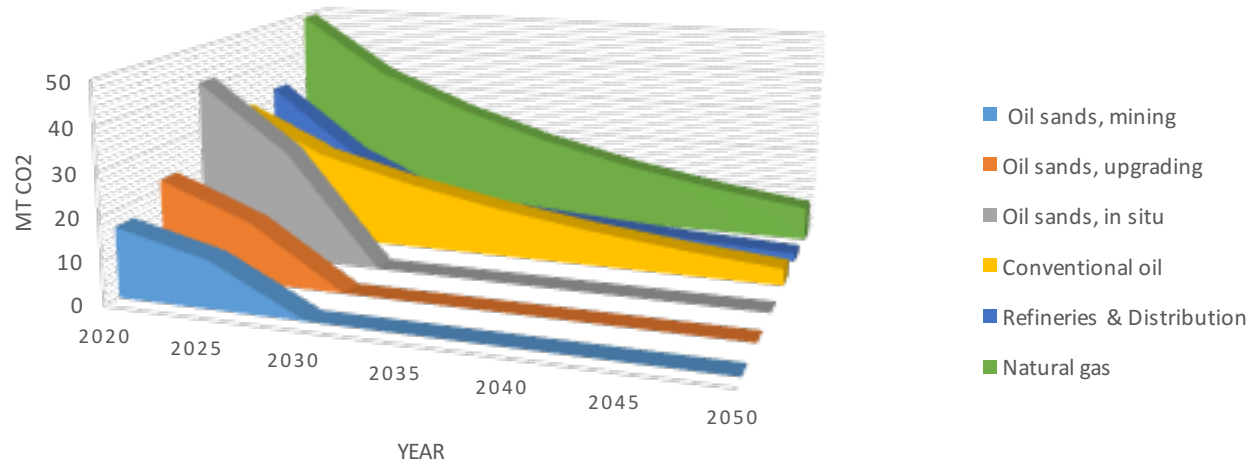
Climate Caucus, Shadow Cabinet, Green Party of Canada
Contact: John.kidder@greenparty.ca

Summary - CO2 Emissions 2017-2050



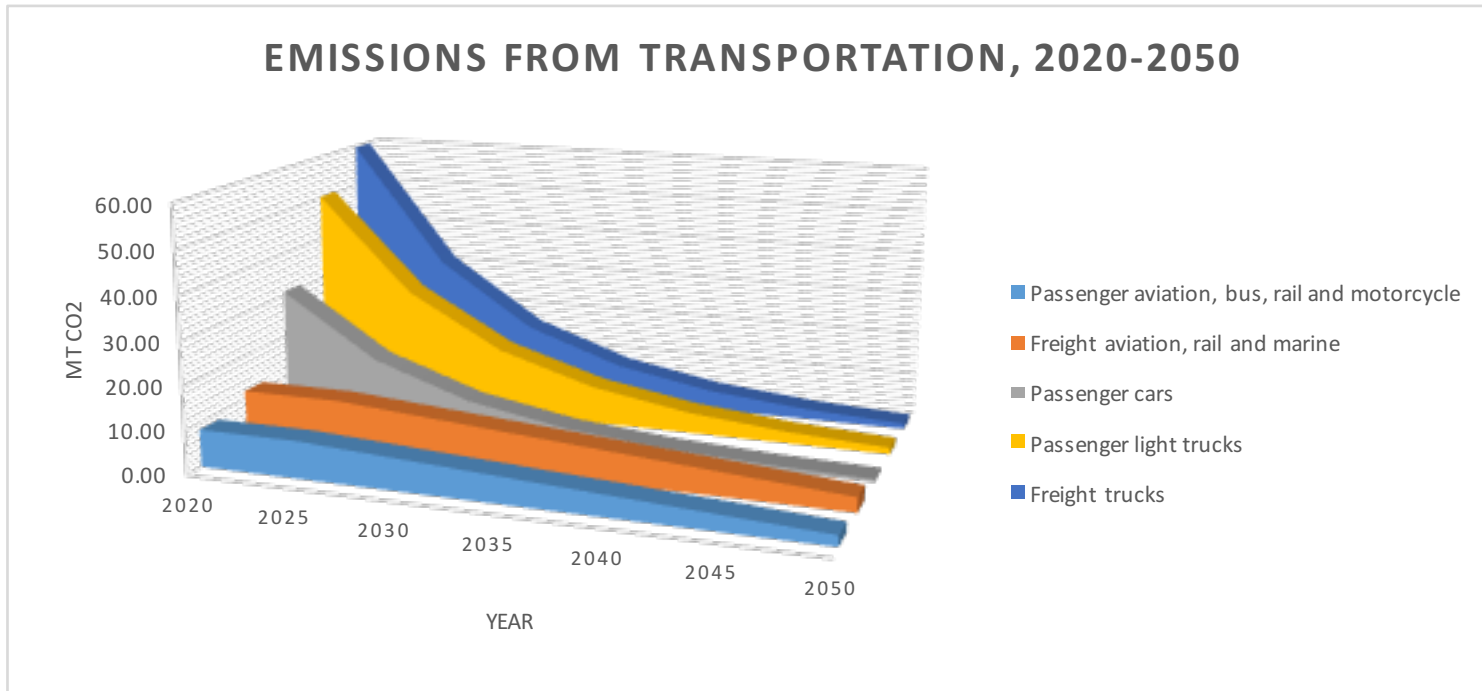
	2017	2020	2025	2030	2035	2040	2045	2050	cumulative % reduction
Coniferous Trees (30,000 ha/yr)		0.00	-0.51	-1.53	-3.05	-5.09	-7.64	-10.18	
Electrical - Other	5.1	5.1	0.0	0.0	0.0	0.0	0.0	0.0	-100%
Electricity - Natural Gas	11.8	11.8	5.9	0.0	0.0	0.0	0.0	0.0	-100%
Buildings - Natural Gas	22.2	22.2	16.6	11.1	5.5	0.0	0.0	0.0	-100%
Buildings Other	27.3	27.3	22.8	18.2	13.7	9.1	4.6	0.0	-100%
Waste and Others	42.0	42.0	35.0	28.0	21.0	14.0	7.0	0.0	-100%
Electricity - Coal	57.4	57.4	28.7	0.0	0.0	0.0	0.0	0.0	-100%
Agriculture	72.0	72.0	65.5	58.9	52.4	45.8	39.3	32.7	-55%
Heavy Industry	73.0	73.0	62.6	52.1	41.7	31.3	20.9	10.4	-86%
Oil & Gas Production	194.5	194.5	125.5	50.5	37.7	27.8	20.0	14.0	-93%
Transportation	174.7	174.0	97.4	56.2	33.3	20.1	12.3	9.1	-95%
Total	680.0	679.3	459.4	273.6	202.2	143.0	96.3	56.0	
Cumulative % Reduction	0%	0%	-32%	-60%	-70%	-79%	-86%	-92%	

EMISSIONS FROM OIL & GAS PRODUCTION, 2020-2050



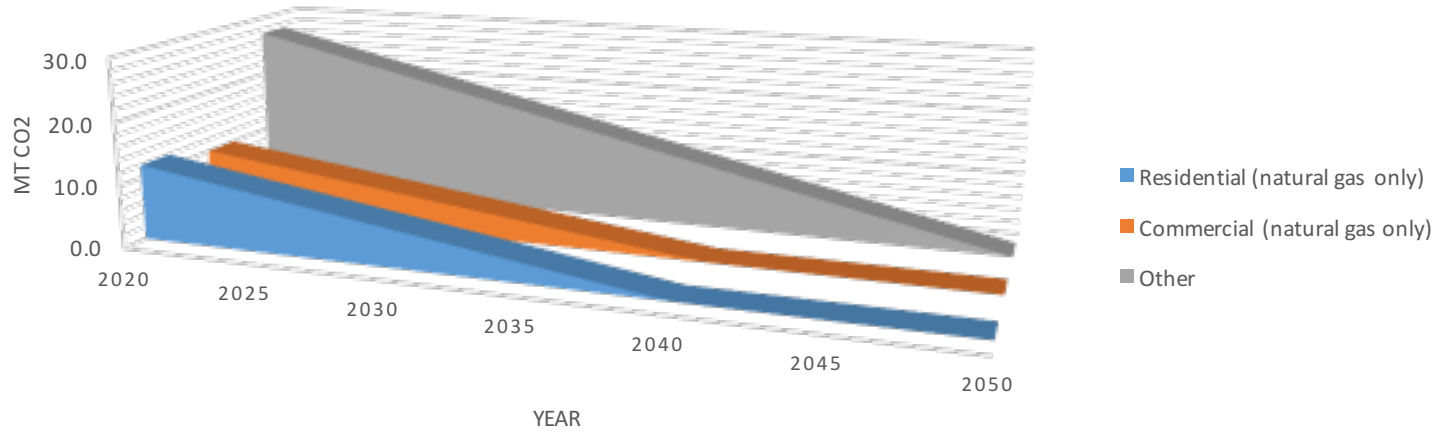
	2020	2025	2030	2035	2040	2045	2050	cumulative % increase
Oil sands, mining	16.4	11.100	0.000					-100%
Oil sands, upgrading	22.4	14.100	0.000					-100%
Oil sands, in situ	41.7	26.000	0.000					-100%
Conventional oil	31.3	21.376	15.984	11.785	8.515	5.968	3.984	-87%
Refineries & Distribution	33.20	17.37	7.54	5.58	4.05	2.87	1.94	-94%
Natural gas	49.5	35.55	27.02	20.38	15.21	11.18	8.04	-84%
Total	194.5	125.5	50.5	37.7	27.8	20.0	14.0	
Cumulative % Reduction	0%	-35%	-74%	-81%	-86%	-90%	-93%	

EMISSIONS FROM TRANSPORTATION, 2020-2050



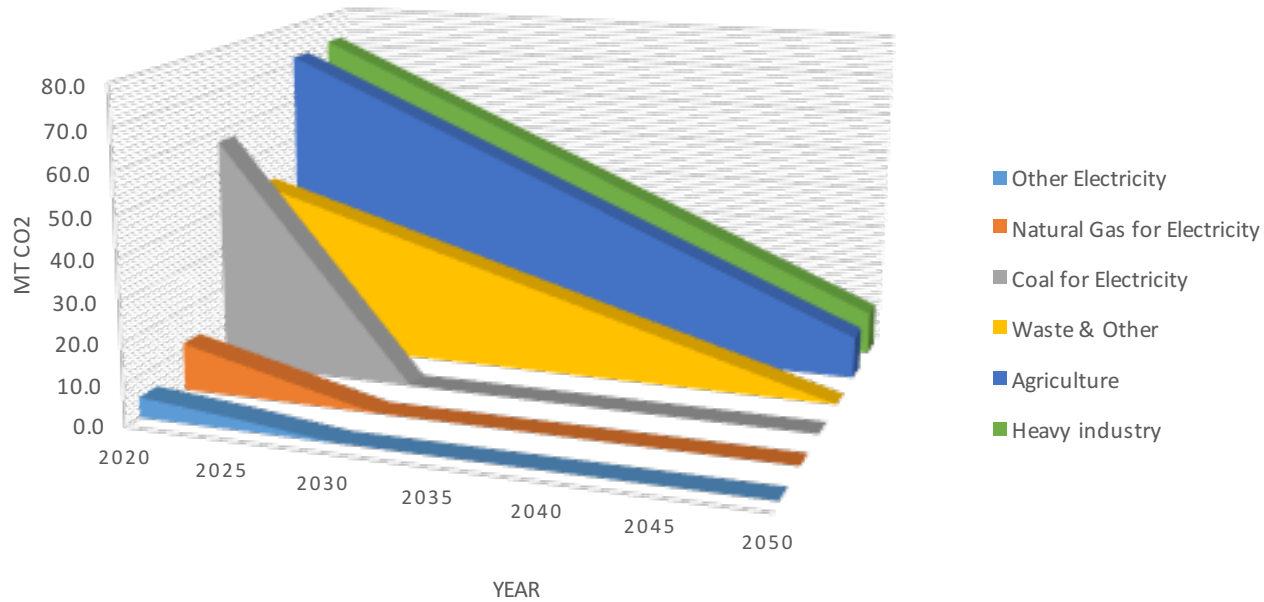
	2020	2025	2030	2035	2040	2045	Cumulative 2050	% reduction
Passenger aviation, bus, rail and motorcycle	8.60	8.60	7.37	6.14	4.91	3.69	2.46	71%
Freight aviation, rail and marine	11.9	11.9	10.20	8.50	6.80	5.10	3.40	71%
Passenger cars	30.89	16.30	8.60	4.54	2.40	1.26	0.67	98%
Passenger light trucks	50.50	28.20	15.75	8.79	4.91	2.74	1.53	97%
Freight trucks	59.90	31.61	16.68	8.80	4.65	2.45	1.29	98%
Other Transport	8.90	4.70	2.48	1.31	0.69	0.36	0.19	98%
Total	170.69	101.31	61.08	38.09	24.36	15.61	9.54	
Cumulative % Reduction	0.00	-41%	-64%	-78%	-86%	-91%	-94%	

EMISSIONS FROM BUILDINGS, 2020-2050



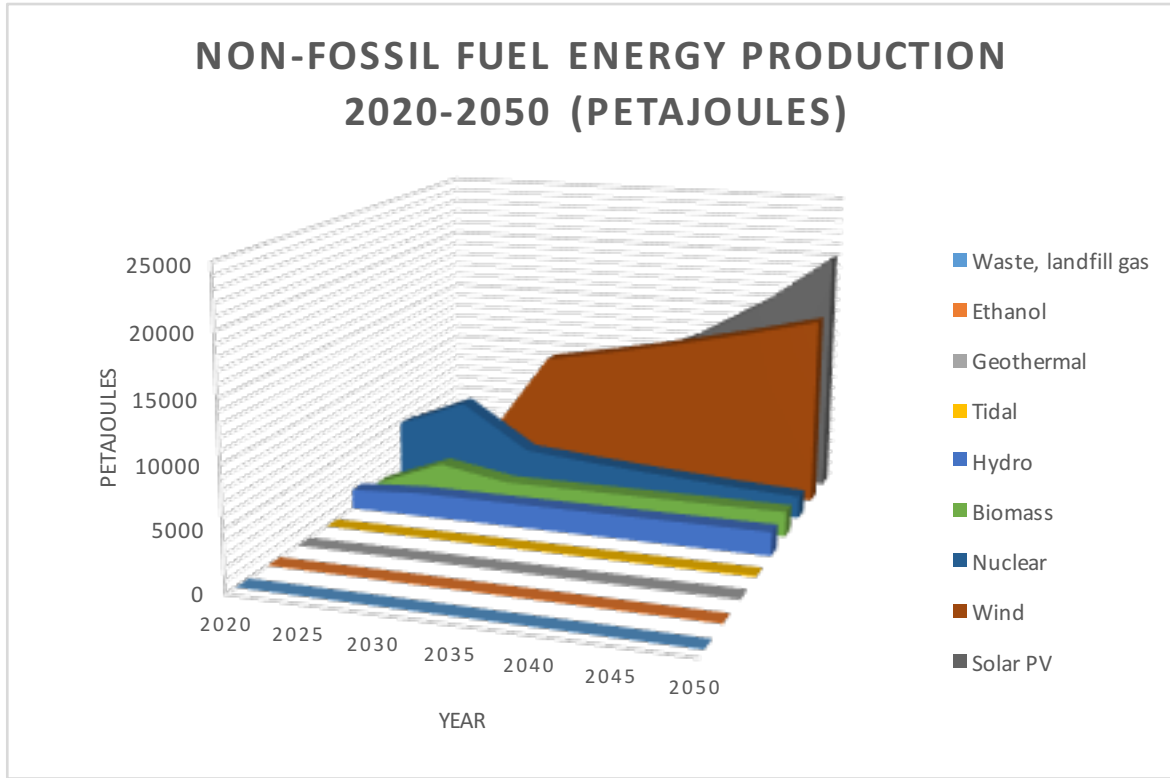
	2020	2025	2030	2035	2040	2045	2050	cumulative % reduction
Residential (natural gas only)	12.1	9.1	6.0	3.0	0.0	0.0	0.0	-100%
Commercial (natural gas only)	10.1	7.6	5.0	2.5	0.0	0.0	0.0	-100%
Other	27.3	22.8	18.2	13.7	9.1	4.6	0.0	-100%
Total	49.5	39.4	29.3	19.2	9.1	4.6	0.0	-100%
Cumulative % Reduction	0%	-20%	-41%	-61%	-82%	-91%	-100%	

EMISSIONS FROM OTHER SOURCES, 2020-2050



	2020	2025	2030	2035	2040	2045	2050	cumulative % reduction
Other Electricity	5.1	2.8	0.0	0.0	0.0	0.0	0.0	-100%
Natural Gas for Electricity	11.8	5.9	0.0	0.0	0.0	0.0	0.0	-100%
Coal for Electricity	57.4	28.7	0.0	0.0	0.0	0.0	0.0	-100%
Waste & Other	42.0	35.0	28.0	21.0	14.0	7.0	0.0	-100%
Agriculture	72.0	61.7	51.4	41.1	30.9	20.6	10.3	-86%
Heavy industry	73.0	62.6	52.1	41.7	31.3	20.9	10.4	-86%
Total	261.3	196.7	131.6	103.9	76.1	48.4	20.7	-92%
Cumulative % Reduction	0%	-25%	-50%	-60%	-71%	-81%	-92%	

NON-FOSSIL FUEL ENERGY PRODUCTION 2020-2050 (PETAJOULES)



	2020	2025	2030	2035	2040	2045	2050	cumulative % increase
Waste, landfi	28	35	45	45	45	45	45	63%
Ethanol	44	57	72	72	72	72	72	63%
Geothermal	15	25	40	51	65	83	106	588%
Tidal	15	16	40	51	65	83	106	588%
Hydro	1636	1990	1994	1994	1994	1994	1994	22%
Biomass	800	3076	2075	2075	2075	2075	2075	159%
Nuclear	4858	7246	3510	2983	2536	2155	1832	-62%
Wind	526	2360	10581	11682	12898	14241	15723	2888%
Solar PV	264	676	7623	9729	12417	15847	20226	7575%
Total	8186	15480	25980	28683	32168	36596	42179	
Cumulative % Increase	0%	89%	217%	250%	293%	347%	415%	

Sources:

[David Hughes - Canada's Energy Outlook](#)

[Natural Resources Canada - Energy and Economy](#)

[Natural Resources Canada - Energy and Greenhouse Gas Emissions](#)

[Department of Environment and Climate Change - GHG Emissions](#)

[Narwhal Magazine - Handy Facts About Canadian Energy](#)

[Bloomberg News - Oil Sands Production](#)

[Pembina Institute - Takeaways from Canada's Latest Greenhouse Gas Emissions](#)

[Mission: Possible - Green Party of Canada](#)

[Forestry Research and Engineering Journal: Carbon sequestration: how much can forestry sequester CO2?](#)

Assumptions:

Light truck emissions/fuel economy regulations made equivalent to passenger cars in 2020

Average passenger vehicle lifetime assumed 15 years, light truck 10 years, freight truck 12 years

Electric light trucks assumed available by 2020, freight trucks by 2025

4% of conventional natural gas production maintained to 2050 for legacy users

18% of conventional oil production maintained to 2050 for legacy users

Electricity production from nuclear sources reduced by 39% by 2040 due to reactor aging (source: David Hughes)

30,000 ha of coniferous trees planted each year from 2020

CO2 absorption by coniferous trees assumed to grow linearly from 0 at planting to maximum 53 T/ha at year 25

METHODOLOGY

Emissions all in MegaTonnes (MT) of CO₂. CO₂ is used here as an imperfect but convenient proxy for all greenhouse gases (“GHGs”). In particular, no accounting is made here for the large amounts of methane emitted in fracking for natural gas, or for other non-CO₂ GHGs emitted in agriculture.

Production all in PetaJoules (PJ)

All base data on production, emissions from NRCAN or Environment and Climate Change Canada

Emissions targets from Mission: Possible - 60 % reduction from 2005 levels by 2030, 100% reduction by 2050

Base emissions for all projections from 2017, total 716MT, overall reduction of 2% from 2005 730MT

Oil sands mining, in situ and upgrading eliminated by 2030

Fracked natural gas production eliminated by 2030

Residential and commercial buildings assumed free of natural gas by 2040, retrofits yield net zero emissions by 2050

Electricity production from coal and natural gas eliminated by 2030

Heavy Industry emissions assumed 15% legacy emissions by 2050

Agriculture emissions assumed 14% legacy emissions by 2050

Waste and other emissions assumed 0 by 2050

For each sector, base year set at 2017 for emissions and production

Conventional oil and gas production/emissions declines exponential from 2020 start to 0 by 2060

Oil sands, fracked natural gas production/emissions decline exponential from start 2020 to 0 by 2030

All other sectors emission declines assumed linear from 2020 to specified end year

Wind energy production rises at 35% per year until 2030, 2% per year thereafter

Solar PV energy production rises at 40% per year until 2030, 5% per year thereafter

Geothermal, tidal energy production rises at 10% per year until 2030, 5% per year thereafter

Biomass energy production rises at 10% per year until 2030, 0% per year thereafter

Ethanol, waste landfill gas energy production rises at 5% per year until 2030, 0% per year thereafter

Hydroelectric energy production rises at 2% per year until 2030, 0% per year thereafter

Electricity exports to the United States of 3,120 PJ diverted to domestic uses for years 2025-2030

Notes:

These projections show only one possible path of many that could lead to the same goals. The choices made to arrive at these results are the responsibility of the writers. Other options must also be explored. The Green Party of Canada looks forward to discussing other suggested pathways and combinations of actions, and to agreement among all parties on the optimal way forward.

One constraint binds all other choices. The only way to achieve a 60% reduction in CO₂ emission by 2030 is to begin immediately to cut production of fracked natural gas and bitumen for fuel with the clear and explicit goal of ending it entirely by 2030.

This scenario shows a rapid deployment of solar PV and wind power. Wind power now has a larger installed base and has experienced rates of growth exceeding that of solar for the last few year. The levelized cost of energy delivered by wind and solar are now close to par, but the costs of solar are dropping more rapidly. The choice to favour solar in the long term in this model was made because available evidence indicates that the costs of solar PV continue to decline at a rate of about 20% per year, while future decreases in the cost of wind power may well level out.

Likewise, the model shows only a small contribution to renewable energy from biomass, geothermal and tidal sources. Biomass in particular may have larger potential, especially because in Canada energy from biomass is mainly derived from combustion of wood industry waste, not from purpose-grown material. Geothermal also may have excellent potential through low-cost development of abandoned oil wells for thermal power potential. This is so far shown only at demonstration levels, and its potential is not included here. Tidal power is similarly not yet commercially established, but may have great potential.

Past 2030, there are clearly many attractive choices for generation of clean electrical energy. As time passes, capital costs will continue to decline and efficiencies will continue to rise over time, resulting in an energy economy based on abundance and very low marginal cost, rather than today's economy based on scarcity and continuously rising financial and environmental cost.

In the period from 2025 to 2030, this model shows substantial decline in energy production from fossil fuels, before renewable energy can ramp up to meet the demand, and before retrofitting buildings yields substantial demand reductions. That deficit may be met by temporarily showing restrictions of exports of electricity to the United States. As renewable energy and fossil fuel production increases in the US, US demand for imported Canadian energy will likely continue to be reduced anyway.

Finally, the annual rates of increase shown here in both wind and solar PV (40% and 35% respectively until 2030) are large, even given a small installed base. In addition to the actual generation of the electricity, a functioning national electrical grid is required. The demand for supplies and for labour to meet such rates of increase will be substantial and shortages may delay implementation.