



Canada's 2030 *Emissions Reduction Plan :* the IET Proposal

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About the Institut de l'énergie Trottier (IET)

The IET was created in 2013 thanks to a generous donation from the Trottier Family Foundation. Its mission is to train a new generation of engineers and scientists with a systemic and trans-disciplinary understanding of energy issues, to support the search for sustainable solutions to help achieve the necessary transition, to disseminate knowledge, and to contribute to discussions of energy issues. Based at Polytechnique Montréal, the IET team includes professor-researchers from HEC, Polytechnique and Université de Montréal. This diversity of expertise allows IET to assemble work teams that are trans-disciplinary, an aspect that is vital to a systemic understanding of energy issues in the context of combating climate change.

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Why this plan

The *Canadian Net-Zero Emissions Accountability Act*, adopted on June 29, 2021, requires the Minister of Environment and Climate Change to *publish a high level description, similar to Canada's nationally determined contribution communicated under the Paris Agreement, of the key greenhouse gas emissions reduction measures the Government of Canada intends to take to achieve that target and the latest projections of the annual greenhouse gas emissions, taking into account the combined impact of those measures in the period between the publication of the description and the milestone year in question.*¹

The *2030 Emissions Reduction Plan*, detailing actions to 2030 along with a midpoint greenhouse gas objective for 2026, must be submitted by the Minister at the end of March 2022 at the latest. To support this plan, the *Institut de l'énergie Trottier*, building on two recent modelling and analysis reports it published in the Fall of 2021², offers its own analysis of what must be done on a sector-by-sector basis on the 2026 and 2030 horizons.

Given the short time to 2026 and 2030, technological, technical and human constraints, as well as the lack of drive to transform prevalent in most governments and institutions across the country, **we estimate that Canada can at best reduce its overall emissions by 25 to 35% over the next eight years.**

Irrespective of this evaluation, it is high time to stop debating targets and to start moving on an efficient and significant reduction path compatible with the net-zero by 2050 objective.

We believe that this IET proposal is a good starting point, as implementing it would ensure that Canada is on that path, which would already be a major success.

Details matter

This Emissions Reduction Plan proposition points at broad, yet specific actions that are essential first steps if Canada is to start on the path to net-zero.

While we do not see how Canada could reach its 2030 targets, with the current degree of unpreparedness, the path highlighted here could still deliver a 25 % reduction with respect to 2005, if implemented decisively and efficiently – and considering the high probability that not all sectors will deliver fully.

For that, details matter. The *Healthy Environment and a Healthy Economy* plan announced by the Federal government in December 2020³ is a perfect example of disconnect between the general objectives and the specific programs and expenses put forward to support it, as many of those do not include any **measurable indicators** of progress in reducing emissions.

¹ Canadian Net-Zero Emissions Accountability Act. https://laws-lois.justice.gc.ca/eng/annualstatutes/2021_22/page-1.html?wbdisable=false

² See : Langlois-Bertrand, S., Vaillancourt, K., Beaumier, L., Pied, M., Bahn, O., Mousseau, N. (2021). *Canadian Energy Outlook 2021 – Horizon 2060*, with the contribution of Baggio, G., Joanis, M., Stringer, T. Institut de l'énergie Trottier and e3c Hub <http://iet.polymtl.ca/energy-outlook/> and Langlois-Bertrand, S., Mousseau, N., Beaumier, L. (2021). *On the way to net-zero: the*

2030 milestone, Institut de l'énergie Trottier, Polytechnique Montréal. <https://iet.polymtl.ca/en/publication-en/on-the-way-to-net-zero-the-2030-milestone/>
³ *A Healthy Environment and a Healthy Economy*. Environment and Climate Change Canada (2020). <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html>

It is essential that the Federal Emissions Reduction Plan ensures a better alignment between ambitions and actions, and focuses on the most important areas.

Guiding principles for the plan

As part of the 2030 Emissions Reduction Plan it is essential to remember that to achieve the 2030 GHG reduction target, Canadians must focus on sectors where deep emissions reductions are possible in the shorter term, while initiating changes in other sectors where short-term reductions are more challenging.

While a price on carbon is essential, it cannot deliver the depth of changes needed to meet 2030 targets; regulations and well-targeted programs must be at the centre of government action on GHG reductions.

Finally, if the government is serious about meeting its 2030 targets, then it must focus on sectors that can transform deeply in less than a decade, but at the same time it cannot delay starting the broader changes needed for 2050 net-zero goals in sectors that will move more slowly. It must also send a very clear signal that it is serious about achieving these goals in order to convince the other actors in Canada to act accordingly. Two years of work on the ground has shown us that, at the moment, most actors across sectors are in a wait-and-see position, doubtful that the transition will take place and, at best, ready to follow but reluctant to lead.

With this in mind, all measures in the Emissions Reduction Plan must be designed and implemented following three guiding principles:

1. All measures and policies, even those focused on short-term decarbonization, **should be geared towards the**

transformation of the energy sector and the broader economy to be compatible with a net-zero world.

2. Not all sectors of the economy can decarbonize as cheaply or as quickly to meet Canada's 2030 target. **Choosing not to pursue more stringent reduction measures in some sectors necessarily implies more work to reduce emissions in others,** at much higher cost for the economy.
3. Since periodic policy assessments and adjustments are essential to keep track and correct course very rapidly, **all measures must include a binding mechanism to keep track and adjust.**

Below are proposals for *new sector specific measures* and the results they should help to achieve. We assume that current efforts – such as carbon pricing, financing energy efficiency improvements in residential buildings, phasing out coal in electricity production by 2030, EV mandates and clean electricity by 2035 – remain in place.

Note on the reduction percentages: All sectorial reductions are projected with respect to Canada's latest GHG emission inventory (2019) to better understand the efforts needed. Since 2019 global Canadian emissions (730 Mt.CO₂e) are only 1 % below those of the 2005 reference year (739 Mt.CO₂e), the projected global reduction is the same measured for either 2005 or 2019.

1. Electricity

Results to be achieved

by 2026

Investments plans compatible with 2030 decarbonization targets have been developed and are being deployed, in line to support: (i) 90 % reduction in GHG emissions from electricity production; (ii) 45% reduction in GHG emissions from the building sector by 2030; and (iii) 45% GHG reduction from the industry sector by 2030.

by 2030

75% overall reduction in emissions from electricity sector achieved; grid upgrade achieved to meet the country-wide 2030 GHG reduction target; investments plans compatible with 2035 and 2040 targets, including significant increase in electricity production (low carbon), to support projected demand in transport, building and industry.

All scenarios leading to either net-zero on the longer term or large GHG reductions on the shorter term, or both, include a broad electrification of all sectors. This implies that electricity networks must be adapted to provide this demand. This demand simultaneously will be much larger, come from new drivers, and present new profiles. The decarbonization of the electricity sector must therefore occur alongside this transformation.

A review of the investments plans shows that most utilities across the country are not readying their grid or their low-carbon electricity production to meet 2030 climate objectives, constituting a major stumbling block for Canada's ambitions.

Measures proposed

- 1.1. Finance infrastructure upgrades to allow for the expected changing patterns in demand, both for transmission and for distribution: many demand drivers that are expected to emerge in the coming years, most of which will be the result of other government measures like the push for electric vehicles and decarbonizing building heating, will transform infrastructure needs. Aging infrastructure must thus be replaced by new material that accounts for these changes to avoid misplaced investments.*
- 1.2. Incentivize increased interprovincial trade, which in many cases is the cheapest way to temper the pressure on baseload production resulting from the rapid increase in the share of variable renewable electricity production (from emission-free wind and solar), at least in the short term.*
- 1.3. The Clean Electricity Standard, or any measure currently in development to regulate how provinces will meet the net-zero 2035 target for this sector, must **avoid allowing for remaining emissions from electricity production in provinces where other options are economically viable**. Even if negative emission technologies like bioenergy with carbon capture and storage were used in the sector, they would be needed primarily to compensate for unavoidable remaining emissions in other sectors (like agriculture or industrial processes). Accordingly, negative emissions in the electricity sector should not be used to compensate for fossil-fuel-based electricity generation.*

2. Buildings

Results to be achieved

by 2026

Net-zero, high-efficiency building codes defined and adopted across Canada; no new buildings using fossil fuels from 2024; peak demand management code developed and adopted for all buildings across Canada; emissions from the building sector down 15% from 2020 levels.

by 2030

45% GHG emission reduction in buildings achieved; national roadmap developed to fully decarbonize buildings by 2040.

All scenario modelling for net-zero trajectories point to an overwhelmingly electric mix for buildings. Costs for heat pumps are relatively low for the residential sector, but scale is a challenge and both scale and cost make a broad and rapid transformation of commercial buildings before 2030 more difficult. Moreover, although electric space heating is much more energy efficient than other options, the increase in electricity demand following any rapid electrification of buildings, especially the additional load to respond to winter demand, must be tempered by efficiency improvements to ease the pressure on electricity grids.

Measures proposed

- 2.1. *Regulate and finance commercial building transformations toward low emissions and high energy efficiency, while ensuring that this does not incentivize changing heating systems to natural gas.*
- 2.2. *Ban high-emission energy options like natural gas for space heating, both those for new buildings and those requiring an expansion of gas distribution networks for existing buildings, starting January 1, 2024, as was done in many provinces for heating oil; plan a schedule for the phase-out of these sources over the longer term.*
- 2.3. *Impose zero-carbon winter peak demand management for upgraded buildings to decrease the cost of electrifying heat.*
- 2.4. *Determine the precise role that district heating could play in some regions of the country where it is applicable, which could help reduce the pressure on electricity grids as the sector electrifies.*

3. Industry (outside of oil and gas)

Results to be achieved

by 2026

Zero-emission heat code for low and medium heat industrial usage; deployment of low-carbon solutions in 10% of industries; clearly targeted roadmap for the decarbonization of all major industrial processes with defined reductions horizons; 10% GHG emission reduction achieved (for heat).

by 2030

No new fossil fuel industrial use in low/medium heat context from 2030; 40% GHG emission reduction achieved (heat); 30% GHG emission reduction achieved (industrial processes).

Designing measures for the industrial sector requires taking the following into account: (1) the very different heat needs for various subsectors, both in overall quantity and in the required rate of delivery, directly influencing the potential for alternative energy sources for given applications; and (2) the fact that industry as a whole is more reactive to price signals through carbon pricing or subsidies than most other sectors.

Measures proposed

For heat production:

- 3.1. Increase the stringency of the output-based pricing system currently in place.*
- 3.2. Assess the potential for waste heat recovery in heavy industry and the different options for its use (district heating, re-use in local industry hubs, etc.).*
- 3.3. Design and implement programs for assembly/building of industrial heat pumps.*

For industrial processes:

- 3.4. Develop roadmaps for technological transformations in key industrial processes, with tight and clear pathways, and an efficiency subsidy program.*
- 3.5. Identify industrial processes where carbon capture and storage solutions are unavoidable and plan for its deployment.*

4. Transport

Results to be achieved

by 2026

Investment plans for heavy transport developed and adopted; electricity infrastructure is able to accommodate new EVs everywhere across Canada; zero-emission vehicles mandate designed for all vehicles; GHG emissions in the transport sector have plateaued; first-generation biofuels are banned.

by 2030

First commercial-scale infrastructures in place for heavy transport; 10% GHG emissions reduction achieved in the transport sector.

The transport sector cannot be decarbonized quickly due to a slow turnover, a lack of appropriate technologies (for freight in particular), and the challenge of ensuring supply as the sector decarbonizes. This is true for personal vehicles and, even more so, for all other subsectors. Short-term measures must recognize the limits of GHG reduction potential in this sector for the 2022-2026 horizon (or even for the 2030 target), while significantly improving the conditions for a later transformation to occur.

Measures proposed

- 4.1. Finance and incentivize the rapid installation of EV charging infrastructure, especially in locations outside of homes where vehicles are likely to stay idle on stable schedules (such as workplaces). Crucially, priority must be given to expanding this infrastructure while maximizing the potential use of battery charges to reduce demand from the grid (for instance, using personal or commercial vehicles to provide the electricity needed at end-of-day peak).*
- 4.2. Regulate the expansion of natural gas distribution networks for heavy or medium commercial transport to avoid locking in its use for several decades. Given the relatively rapid turnover rates for these fleets, reducing emissions in the short term through a shift to natural gas may remain compatible with net-zero trajectories in some specific subsectors, but only if this does not result in the expansion of distribution infrastructure that would later become stranded assets.*
- 4.3. Revision of the clean-fuel standard to protect the agri-food sector and negative emissions technologies.*

5. Oil and gas

Results to be achieved

by 2026

Third auction for cap-and-trade system concluded or in progress; 30% GHG emissions reduction achieved for the sector.

by 2030

60% emission reduction achieved for the sector.

If oil and gas resources are to have a long-term economic future, existing operations will have to decarbonize and move the focus to the production of net-zero emission products rather than simply reducing the emission intensity of production. Given the prime importance of emissions from the sector in Canada's GHG profile, very large reductions in its emissions are both easiest and cheapest from an energy system perspective and those that require the most attention to carefully manage the economic disruption in populations impacted by this change.

Measures proposed

- 5.1. *Implement the hard cap on emissions from the sector announced by the federal government last fall through a cap-and-trade mechanism specific to the oil and gas sector. Permits to emit greenhouse gases would be auctioned off and the intra-sector trade of permits would be permitted.*
- 5.2. *Provide support to offset any negative economic impacts from decarbonization on communities and workers, proportional to the economic disruption caused by meeting specific targets.*

6. LULUCF⁴, biomass, CCS⁵

Results to be achieved

by 2026

National plan for biomass allocation and resource management in place; pilot deployment of CCS infrastructures for negative emissions electricity production and where direct GHG reduction solutions are not available.

by 2030

Commercially viable negative emission CCS plants contributing to 10-25 MtCO₂e in operation outside the oil and gas sector.

Given the importance of biomass in providing the opportunity for negative emissions production (through the use of biomass with carbon capture and storage), essential to reaching net-zero on the longer term, better knowledge and management of this resource across the country is crucial.

Additional thoughts

With a net-zero focus on a 28-year horizon, it makes no sense to deploy technological solutions, such as CCS in sectors where it is not essential, that will have to be replaced in 15 or 20 years. Moreover, a diversion to transition solutions reduces investments needed for net-zero solutions, increasing their cost and further delaying the transformation. This must be recognized in the short-term measures section of the 2030 Emissions Reduction Plan.

Measures proposed

- 6.1. Design and implement a national plan including guiding principles for managing biomass allocation and resources in a context where it becomes essential for negative emissions energy production, while cohabiting with needs for agriculture and food production, construction materials, other uses, and the impact of climate change on this sector.*
- 6.2. Support research on LULUCF in a changing climate.*
- 6.3. Support CCS development for negative emission activities and where direct GHG reduction solutions are not available, in cement and steel production for instance.*

⁴ Land use, land-use change, and forestry

⁵ Carbon capture and storage

7. Governance

Results to be achieved

by 2023

National and provincial GHG emissions available every six months to follow impact of measures; mechanism of a yearly independent assessment of progress and projected impact of measures in place; creation of a federal agency supporting GHG reductions and adaptation across departments.

Structures matter. For example, the *Canadian Net-Zero Emissions Accountability Act* established the Net-Zero Advisory Body to support the Minister of Environment and Climate Change.

However, more must be done. There are two essential measures that must be rapidly deployed to improve the odds that Canada will manage to reach its GHG emission targets.

Measures proposed

- 7.1. *Provide up-to-date information on national and provincial GHG emissions.* At the moment, the national GHG emission inventory is produced yearly with a two-year delay. Some provinces require an additional year to complete the provincial portrait. This delay prevents a close evaluation of measures, trends and transformations. It is therefore essential that data be available more rapidly and on a more frequent schedule.
- 7.2. *Fill the expertise gap for the development of efficient measures targeting GHG emissions.* Short of reshuffling responsibilities across ministries, it would be best to create an agency responsible for supporting this task across the government and possibly provide much needed technical support to other levels of government.

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