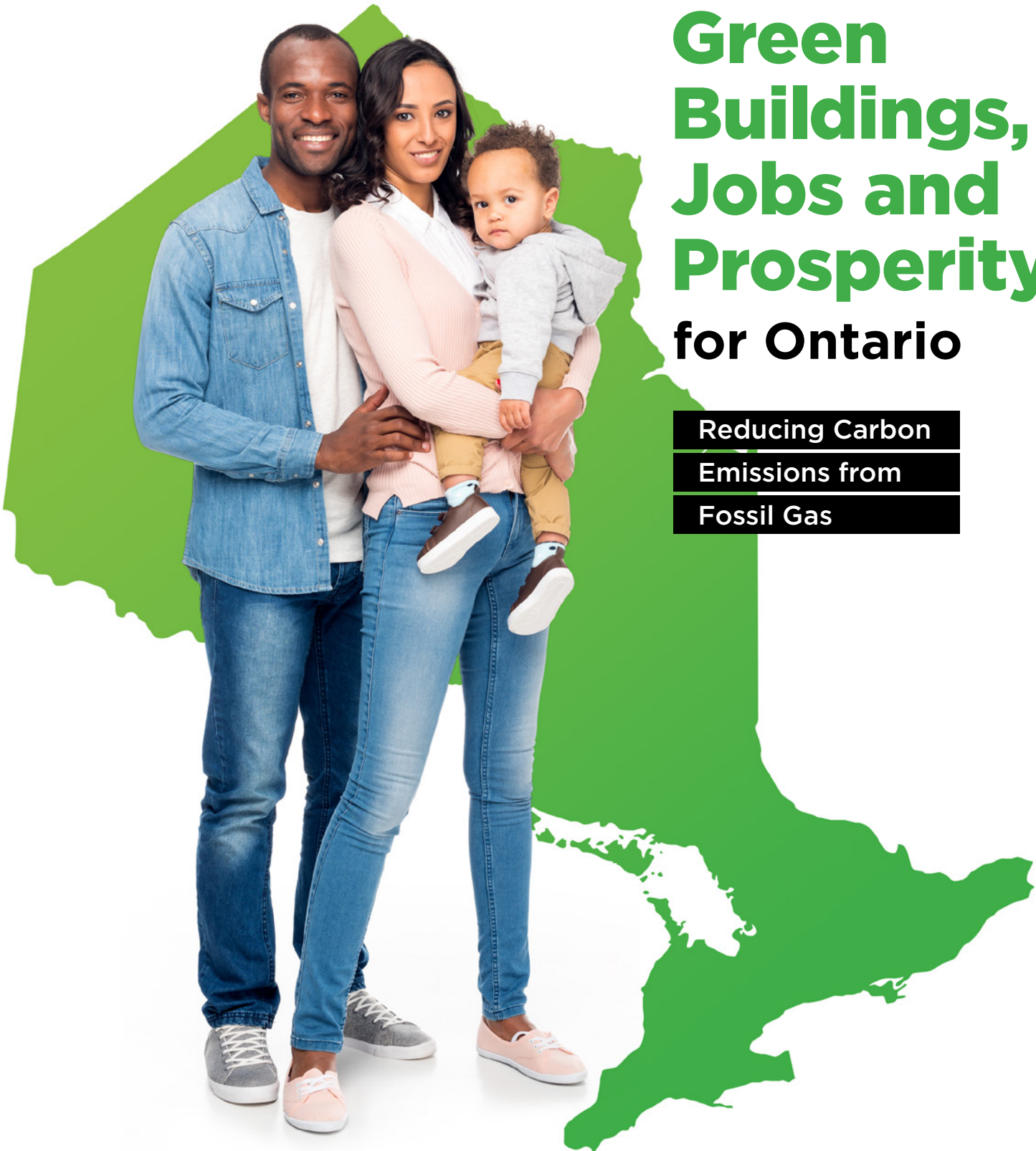


A Plan for Green Buildings, Jobs and Prosperity for Ontario

Reducing Carbon
Emissions from
Fossil Gas



Prepared by **Kent Elson**

September 15, 2021



environmental
defence



ONTARIO
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ALLIANCE

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Overview

This plan provides a pathway to reduce carbon emissions from fossil gas (aka “natural gas”) in a way that will create good green jobs, lower energy bills, and grow the economy. This may seem impossible, but it is very possible. For this to happen, the Ontario Government needs to:

- (a) Heavily invest in programs to help Ontarians make their buildings and heating equipment much more efficient and carbon-neutral (e.g. with insulation, better windows, high-efficiency electric heat pumps, etc.);
- (b) Finance these investments at low government interest rates;
- (c) Roll out people-centric programs made for all Ontarians, like subsidized no-money-down efficiency programs with zero interest; and
- (d) Decarbonize the electricity grid.

By making our buildings and equipment more efficient, we can use less energy and save money. Efficiency upgrades can pay for themselves with energy savings while also creating a vast quantity of high-quality green renovation and green energy jobs.

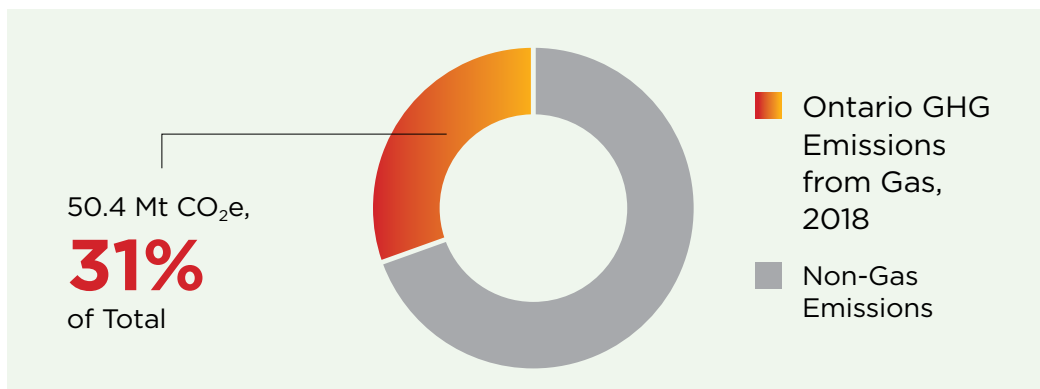
Carbon emissions from gas

Fossil gas is the largest source of carbon emissions in Ontario after the transportation sector. It is primarily used to heat the air and water in our homes and businesses. This fossil fuel is better described as “fossil gas” than “natural gas” because it is indeed a fossil fuel and it is no more “natural” than coal or petroleum.¹

By making our buildings and equipment more efficient, we can use less energy, save money, and create green jobs and green enterprises

“Natural” gas is no more natural than coal - it is a fossil fuel and a major contributor to the climate crisis

Carbon Emissions from Fossil Gas



1. The term fossil gas is also helpful to distinguish this fossil fuel from biogas created from things like food waste.

Approximately one-third of all carbon emissions in Ontario come from burning fossil gas. However, this only accounts for the emissions from burning the gas.² There are at least an additional 30% more emissions from extracting and transporting the gas (e.g. leakage from wells and pipes).³ The new and now dominant process of extracting this gas, hydraulic fracturing or “fracking”, is very damaging and may be causing even more carbon emissions.

Any credible climate plan needs to squarely address the emissions from fossil gas in a concrete way.

Concrete targets

A credible climate plan needs concrete and specific targets, including interim targets for each decade and each sector or fuel type. It is not enough to promise to achieve net-zero emissions by 2050. As outlined below, the minimum credible 2030 target for emissions reductions from fossil gas is 30% (15 Mt CO₂e) and a more appropriate target would be 40% (20 Mt CO₂e).

Minimum target – 30% (15 Mt CO₂e)

Carbon emissions from burning fossil gas should be cut by at least 30% from current levels by 2030 (a decline of approximately 15 Mt CO₂e). This would be consistent with a steady decline in carbon emissions between now and 2050. The chart on the next page illustrates this kind of a decline for all Ontario emissions (the grey line) and for the portion from burning fossil gas (orange line).⁴

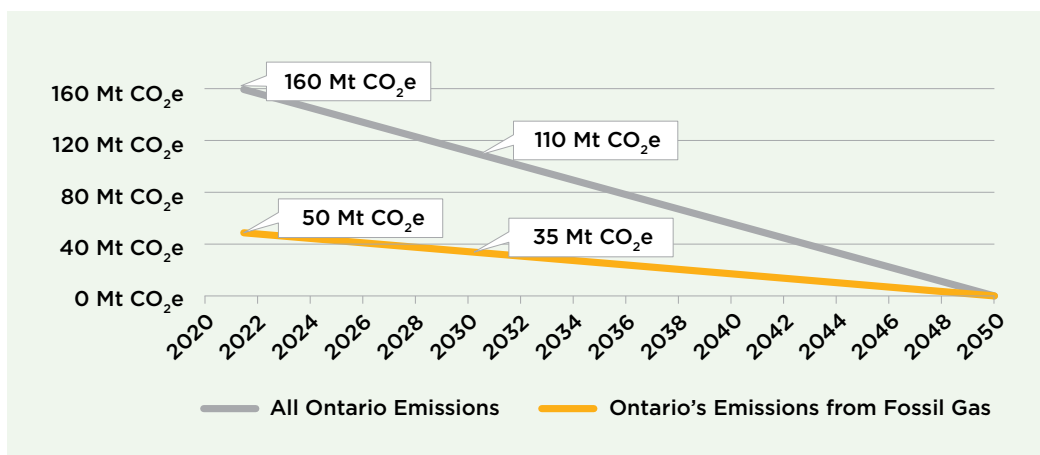
Approximately
one-third of all
carbon emissions
in Ontario come
from burning
fossil gas

2. EB-2020-0136, Exhibit I.ED.7 ([link](#), PDF p. 112).

3. Accounting for upstream emissions from extraction and other processes increases the amount by 30% see EB-2020-0066, Exhibit JT1.7 ([link](#), PDF p. 398). However, upstream emissions vary depending on the extraction method and some studies show that these emissions are much higher even than a 30% increase.

4. Ontario's GHG emissions were 163 Mt CO₂e in 2019 per Government of Canada, *National Inventory Report 1990 –2019: Greenhouse Gas Sources and Sinks in Canada Canada's Submission to the United Nations Framework Convention on Climate Change*, Part 3, p. 25 ([link](#)); Ontario's GHG emissions from gas combustion were 50.04 Mt in 2019 per Ontario Energy Board, *Yearbook of Natural Gas Distributors*, 2019/2020 p. 2 ([link](#)) [conversion rate of 0.001874 tonnes of CO₂e per cubic metre of gas].

Steady Emission Declines to 2050 | All Ontario and Fossil Gas



Ontario needs to
reduce its reliance
on fossil gas by at
least 30% by 2030

Although the declines do not need to happen in an exact straight line, Ontario cannot realistically plan to do much less now and hope to catch-up later. Ontario has been doing that for decades and it has failed. Also, that would end up costing Ontarians far more because of the missed opportunities to profit from green enterprises and to capture the cheapest carbon reductions.

Also, a lower decline in fossil gas emissions cannot be made up for by a greater decline in other areas, such as transportation.⁵ This is impossible because decarbonization is much harder in other sectors such as agriculture and aviation.⁶ Indeed, fossil gas emissions reductions will likely need to be higher to make up for these sectors. In addition, skimping on fossil gas decarbonization programs will cost Ontarians much more because the decarbonization of fossil gas can be done in ways that save money (with more efficient buildings and equipment) and create excellent business opportunities for Ontarians.

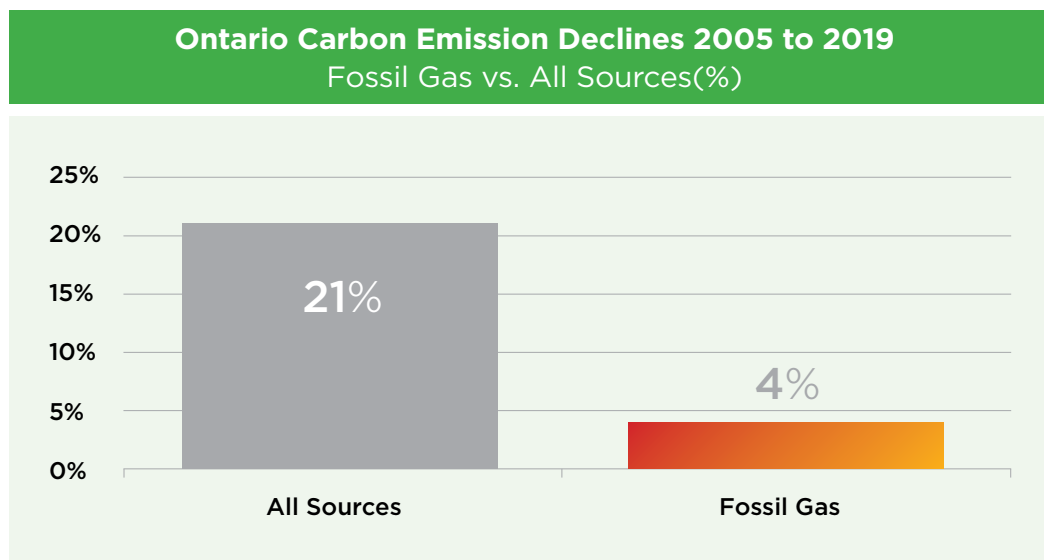
Better target - 40% decline by 2030 (20 Mt CO₂e)

A better and more ambitious target would be a 40% decline (20 Mt CO₂e) by 2030. This would capture more opportunities to achieve lower-cost carbon emissions and create more green jobs and green business opportunities.

⁵ The federal government is targeting 30% zero-emission vehicles by 2030 ([link](#)). However, this would only barely provide sufficient reductions in this sector alone and would not make up for a lower decline in fossil gas use. Also, we are currently trending to miss the zero-emission vehicle target. (see Environmental Defence, *A Progress Report On Ontario's Climate Change Actions, 2020* ([link](#)) p. 10; and [link](#)).

⁶ See also the footnote above.

It would also help emission reductions from fossil gas catch up with the reductions in other sectors. As shown in the figure below, emission reductions from fossil gas (in orange) have lagged far behind reductions in other sectors (in grey).⁷



Canada has committed to reduce carbon emissions by 40 to 45% by 2030 from 2005 levels.⁸ Achieving that target with respect to fossil gas would require a decline of approximately 40% from today's levels. That is because there has been so little progress in reducing fossil gas emissions since 2005, as shown in the table below.

Ontario Emission Declines Consistent with Canada's 2030 Target (42.5%)

	2005	2019	2030
All Sources	206 Mt CO ₂ e	163 Mt CO ₂ e	117 Mt CO ₂ e
Fossil Gas	52 Mt CO ₂ e	50 Mt CO ₂ e	30 Mt CO ₂ e

A 40% decline in fossil gas by 2030 would be consistent with Canada's climate commitments and would get the sector back on track

⁷ Ontario's total emissions 2005 to 2019: 206 CO₂e to 162 CO₂e; Ontario's emissions from fossil gas: 52.18 CO₂e to 50.04 CO₂e per Government of Canada, *National Inventory Report 1990 -2019: Greenhouse Gas Sources and Sinks in Canada* Canada's Submission to the United Nations Framework Convention on Climate Change, Part 3, p. 25 ([link](#)); Ontario Energy Board, *Yearbook of Natural Gas Distributors*, 2019/2020 p. 2 ([link](#)) [conversion rate of 0.001874 tonnes of CO₂e per cubic metre of gas]; Government of Ontario, *Fuels Technical Report*, 2016, Appendix A, Figure 3 ([link](#)).

⁸ Government of Canada, *News Release*, July 21, 2021 ([link](#)).

Concrete plans

A credible climate plan needs concrete actions to meet targets in a way that is both realistic and affordable. The concrete actions needed for fossil gas emissions reductions are as follows:

- (a) Heavily invest in programs to help Ontarians make their buildings and heating equipment much more efficient, cheaper to operate, and carbon-neutral (e.g. with insulation, better windows, better heaters, etc.)
- (b) Offer grants coupled with zero-money-down and zero-interest programs that are easy to access and allow repayment on energy or property tax bills
- (c) Phase out fossil fuel power generation by 2030
- (d) Implement net-zero building standards
- (e) Stop subsidizing fossil fuel pipelines and direct those subsidies to lower-cost zero-carbon heating alternatives
- (f) Reserve hydrogen and renewable fuels for the hardest-to-decarbonize sectors like aviation and heavy industry (not space/water heating or power generation)

The same steps are needed whether the target is a 30% (15 Mt) or a 40% (20 Mt) reduction, but a 40% target will require greater incentives and very quick action, as discussed below.

Efficiency programs

Efficiency programs are the best and cheapest way to reduce carbon emissions because they lower energy costs and carbon emissions. One dollar invested in these programs generates much more than \$1 in avoided energy costs. For the current suite of programs, every \$1 of investment creates \$3.32 in benefits.⁹ For the most effective programs, \$1 creates \$17.28 in benefits.¹⁰ The programs planned for 2022 will generate \$535 million in benefits, primarily by letting customers heat their buildings and run their equipment with less energy.¹¹ These programs also create

**A credible climate
plan needs
concrete actions**

**Efficiency
programs lower
energy costs and
carbon emissions
at the same time**

⁹ EB-2021-0002, Exhibit D, Tab 1, Schedule 4, Page 2 ([link](#)). This includes all costs, including customer and utility contributions to the efficiency upgrades. It is also discounted for free riders and the future benefits are discounted to reflect inflation.

¹⁰ *Ibid.*

¹¹ *Ibid.*

good jobs (think insulation and window installers), grow the economy, and save money in comparison to other decarbonization options. These programs alone would create 18,500 good jobs for Ontarians.¹² Ontario should clearly be doing more of this.

Efficiency programs could be used to meet the above targets simply by greatly increasing the amount invested in existing programs. However, this can be done far more effectively by improving those programs and making them easy to access for all Ontarians. The following actions are needed to do that:

1. Finance the additional investments in efficiency programs at low-cost government interest rates
2. Deliver all energy efficiency programs, gas and electric, through one agency (ideally the the Independent Electricity System Operator [IESO]), creating a one-stop-shop
3. Include high-efficiency zero-carbon heating equipment (i.e. electric heat pumps) in these grant and loan programs
4. Combine grants with no-money-down programs that offer zero-interest financing for efficiency upgrades and zero-carbon heating equipment
5. Let homeowners repay the interest-free loans on their energy bill or property tax bill, which would stay with the property if they decide to move

This set of actions would provide the greatest energy savings and the greatest carbon reductions at the lowest cost. The rationale and benefits of each action are described below:

1. Finance investments in efficiency programs at low-cost government interest rates because:
 - Financing will allow for greater investment levels
 - Efficiency programs create savings for many years, often decades
 - It is wise to spread the costs over time (just like we do for energy infrastructure)
 - Government borrowing is incredibly cheap
 - Costs can be repaid over time in whole or in part in energy rates using the savings accruing from the programs
 - Economic growth will create government revenues which can offset costs that are not recouped in energy rates

Efficiency programs can be financed at low-cost government interest rates as an investment in our future

¹² Dunsy Energy Consulting, *The Economic Impact of Improved Energy Efficiency in Canada*, April 3, 2018, p. 33 (These programs would create 259,801 job-years over 14 years, which amounts to 18,557 jobs per year on average) ([link](#)).

2. Deliver all energy efficiency programs, gas and electric, through one agency (ideally the IESO) because:

- A one-stop-shop will increase accessibility and simplicity for customers
- It is more efficient and effective for one entity to deliver gas and electric programs
- Financing costs will be dramatically lower via a government agency versus a private utility (e.g. 1% vs. 5%)
- The pipeline companies that currently deliver these programs have an irreconcilable conflict of interest because they earn profit from building fossil fuel pipelines
- Gas and electric programs have a large degree of overlap

3. Include high-efficiency zero-carbon heating equipment (i.e. electric heat pumps)

- Electric heat pumps eliminate carbon emissions from fossil gas through electrification, just like electric cars
- Electric heat pumps have the added benefit of being highly efficient – they are roughly 2 to 5 times more efficient than traditional gas and electric heating equipment (to understand why, see this explanation from National Resources Canada)¹³
- Electric heat pumps transfer thermal energy from the outside to the inside using compression (like a fridge or air-conditioner), which allows them to provide up to 5 kWh of heat with 1 kWh of energy¹⁴
- Electric heat pumps can result in energy bill savings because they are so incredibly efficient
- Ground-source and water-source heat pumps (geothermal) are the most efficient but air-source heat pumps can still be 200% to 400% efficient and cost less to install¹⁵
- Electric heat pumps are attractive to homeowners because they also provide high-efficiency cooling in the same unit¹⁶
- Air-source heat pumps are now viable in cold climates and can still provide over 200% efficiency at -20°C¹⁷

Ontario needs a
one-stop-shop
for all efficiency
programming, gas
and electric

Electric heat
pumps are 2 to
5 times more
efficient than
traditional gas and
electric equipment

13 Standard gas-fired furnaces and water heaters are approximately 95% and 67% efficient respectively (see ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. A-3, [link](#)). Ground-source heat pumps are up to 500% efficient (see National Resources Canada, *Heating and Cooling With a Heat Pump*, [link](#)). Standard air-source heat pumps are approximately 210% efficient for space heating and 234% efficient for water heating (see ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. A-3, [link](#)). Cold-climate air-source heat pumps are more efficient (see e.g. Mitsubishi MSZ-FS06NA ([link](#)) with an efficiency of 468% at 8°C and 202% at -20°C).

14 *Ibid.*

15 The savings are greatest for (a) customers with oil, propane, or electric heating; (b) new construction; (c) customers with more efficient homes who switch off gas entirely; and (d) situations where new gas pipeline construction is involved. Heather McDiarmid, *Analysis of the Residential Electrification Potential for the Waterloo Region*, October 2020 ([link](#)); Office of the Auditor General of Ontario, *Reducing Greenhouse Gas Emissions from Energy Use in Buildings*, November 2020, page 18 ([link](#)).

16 See e.g. Mitsubishi MSZ-FS06NA ([link](#)) with a COP of 4.68 at 8°C and 2.02 at -20°C.

17 See e.g. Mitsubishi MSZ-FS06NA ([link](#)) with a COP of 2.02 at -20°C; see also Rocky Mountain Institute, *Heat Pumps: A Practical Solution for Cold Climates*, December 10, 2020 ([link](#)).

- Conversions from fossil fuel heating can fully eliminate greenhouse gas (GHG) emissions
 - Counterintuitively, converting a portion of gas heating to electric heating will lower provincial electricity rates in 2030 because the fixed electricity costs (wires, poles, and power plants) will be spread among more consumption outside the times of summer peak demand¹⁸
4. Combine grants with “no-money-down” programs that offer zero-interest financing for efficiency upgrades and zero-carbon heating equipment because:
- Customers like government grants to help pay for efficiency upgrades, but grant cheques take too long to arrive and many Ontarians need help with up-front costs
 - No-money-down zero-interest programs will help families and businesses who cannot afford up-front costs
 - This will tip the scales in favour of carbon-free equipment for most customers weighing their options
 - The cost of underwriting this financing will be low in comparison to the benefits because the government can borrow at extremely low rates to finance this
 - This will be popular
5. Let homeowners repay the interest-free loans on their energy bill or property tax bill, which would stay with the property if they decide to move because:
- Many Ontarians do not invest in efficiency because they might sell their building soon, but this can be fixed by letting customers finance the costs over time on energy or property tax bills that stay with the property if it is sold
 - This makes administration easier for customers
 - This reduces default risks, lowering the financing costs

To see how this works, imagine these scenarios:

- You are an Ontarian who wants to lower your energy bills. You call a contractor, who offers to increase your insulation and replace all your windows. This will make your home more comfortable and increase its value. The cost will be repaid over 10 years by a small charge on your monthly energy bill, but your energy bill will be lower overall because you will need less energy to heat your home. You pay nothing up front

Ontario needs no-money-down zero-interest efficiency programs that are accessible to all Ontarians

Interest-free green loans should be conveniently repayable on energy bills or property tax bills that are tied to the property if it is sold

18 Expert Testimony of Chris Neme, Hearing Transcript, Vol. 4, March 4, 2021, p. 99 ([link](#)).

and get more comfort, lower energy bills, and a nicer home. You will take that offer.

- You are a cash-strapped business and your boiler goes out. You would normally choose the least expensive replacement. But now you can pay \$0 now, interest-free, for a high-efficiency heat pump versus thousands for a replacement fossil fuel boiler. You will pick the carbon-free option.
- You just bought your first house. The rooms upstairs get too cold in the winter but you do not want to invest too much in your home because you might need to move for work. You decide to finance the cost of better insulation and new windows on your gas bill so you can save on energy and live more comfortably, but pass on the costs later if you move.

Fossil fuel power generation phase out

Ontario's carbon emissions from power generation are slated to increase by more than 300% by 2030 and by 500% or more by 2040 (from 2.5 Mt in 2017 to 16 Mt in 2040).¹⁹ Ontario needs to reverse course and end fossil fuel generation by 2030. The Ontario Government cannot credibly say it is serious about climate change when it is continuing to burn fossil fuels to generate electricity. Municipalities understand this – 30 of them have endorsed a fossil gas power phase-out, including Kitchener, Hamilton, Burlington, Waterloo, Kingston, Mississauga, Brampton, Toronto, Peel, and more.

Decarbonizing power generation will also create great jobs and business opportunities. Power made from fossil fuels drains money from our pockets to buy fossil gas from the United States and elsewhere. Instead, Ontario should direct that money toward made-in-Ontario solutions, such as energy efficiency programs and renewable generation. If we wait too long, the renewable energy market will be dominated by foreign firms and we will have missed the opportunity to be leaders in North America.

In addition, there are cost-effective alternatives to fossil fuels.²⁰ For example, energy efficiency is much cheaper per kilowatt hour than gas power.²¹ The major benefit of fossil fuel power is that it can be turned on and off quickly to provide power at “peak” times. But this could be done at considerably lower cost by using the discharge capacity of electric

Ontario must finally phase out fossil fuel power generation

Carbon emissions from electricity generation are slated to increase by at least 500% under Ontario's current plans

¹⁹ IESO, 2020 *Annual Planning Outlook*, 2020, p. 68 ([link](#)).

²⁰ Ontario Clean Air Alliance Research, *Phasing-Out Ontario's Gas-Fired Power Plants: A Road Map*, April 9, 2020 Updated January 29, 2021 ([link](#)).

²¹ *Ibid.*

vehicles to offset the power demands from our buildings. If we plan now, this alone could replace all or almost all the output of gas plants by 2030.²²

Net-zero building standards

All new buildings should be carbon neutral. This is no longer a challenge. When a building is first being built, it is relatively inexpensive to seal it, insulate it, and install high-efficiency electric heat pumps. This can even be less expensive than traditional fossil fuel equipment because it avoids the cost of a gas pipeline and provides heating and cooling in one unit.

While we can reach 2030 targets without a net-zero building code, it will be much more expensive in the long run to build bad buildings now and to retrofit them with carbon neutral upgrades and equipment later.²³ Everyone benefits the sooner we implement net-zero building standards.

Stop subsidizing fossil fuel pipelines

Ontario's Natural Gas Expansion Program is providing a \$234 million subsidy to build more fossil fuel pipelines.²⁴ That amounts to over \$26,000 per customer.²⁵ This money could provide far greater immediate and long-term savings to more than two times the customers if it was used for high-efficiency electric heat pumps instead.²⁶

It is counterproductive to subsidize fossil fuel pipelines during a climate crisis, especially when that will result in higher costs for customers in comparison to the zero-carbon alternative.

Ontario needs to stop subsidizing fossil fuel pipelines and direct those subsidies to provide lower-cost zero-carbon heating alternatives.

New buildings should be net-zero; we should not build bad buildings now that we know we will need to pay to retrofit tomorrow

Ontarians could get far lower energy bills if fossil fuel pipeline subsidies could be spent on high-efficiency electric heat pumps instead

22 Ontario Clean Air Alliance, *Vehicle-to-Building/Grid Integration*, August 3, 2021 ([link](#)).

23 Toronto Atmospheric Fund, *Net zero buildings* ([link](#)).

24 Ontario Government, *Ontario Expands Access to Natural Gas in Rural, Northern and Indigenous Communities*, June 9, 2021 ([link](#)).

25 *Ibid.*

26 Office of the Auditor General of Ontario, *Reducing Greenhouse Gas Emissions from Energy Use in Buildings*, November 2020, page 18 ([link](#)); Globe and Mail, *Ontario increasing reliance on natural gas as others move away from fossil fuels*, June 11, 2021 ([link](#)); High-efficiency electric heat pumps are cheaper than a fossil gas furnace to operate in these expansion communities (see the Auditor General report). Also, the subsidy will pay for the pipeline expansion but not the cost to convert from oil, gas, or baseboard heating to a gas furnace. If the subsidy was used for electric heat pumps it would pay for the conversion too and could cover at least twice the customers. So, twice as many customers could obtain lower gas bills and save thousands on the upfront costs.

Reserve hydrogen and biogas for the hardest-to-decarbonize sectors

Hydrogen and renewable natural gas should be reserved for the hardest-to-decarbonize sectors, like aviation and heavy industry. They should not be used for heating our buildings because there are better and cheaper ways to do that. Also, the supply of affordable zero-carbon fuels is very limited and needs to be reserved for uses that cannot be served with carbon-free electricity.²⁷

Hydrogen and biogas must be reserved for the hardest to decarbonize sectors

Emission reduction numbers and details

The measures outlined in this document are realistic and doable if they are implemented quickly and decisively. A target of 30% (15 Mt) can be met with the following measures:

2030 Carbon Reduction Sources: A Potential Pathway for 15 Mt Reductions	
Source	Reductions Mt CO ₂ e
Fossil fuel heating energy efficiency	6 Mt ²⁸
Fossil fuel power generation phase out	4 Mt ²⁹
Zero-emission heating equipment conversions	5 Mt ³⁰ (plus 1.4 Mt from converting oil/propane to electricity) ³¹
Total	15 Mt

27 See below for details.

28 Navigant, 2019 *Integrated Ontario Electricity and Natural Gas Achievable Potential Study*, September 13, 2019, prepared for the IESO and OEB, p. vii [The reductions at existing budget levels would be 3.014 Mt CO₂e. The potential for all achievable cost-effective programs is 7.106. The difference is 4.092 Mt CO₂e. However, the economic potential is a further 70% higher (5 Mt). A large portion of this can be obtained with zero-money-down, zero-interest programs that allow costs to be paid back on property bills. Also, the planned \$170/tonne carbon price will increase uptake and cost-effectiveness and was not included in the study.].

29 Current emissions from fossil fuel power generation are approximately 4 Mt CO₂e. See IESO, *2020 Annual Planning Outlook*, 2020, p. 68 ([link](#)). The IESO is forecasting an increase to 10.9 to 12.2 Mt by 2030 and avoiding this increase is an additional benefit of phasing out fossil fuel generation.

30 The number of customers who switch will be dependent on the incentives provided. Sufficient incentives will be required such that (a) electric heat pumps are the least expensive option for any customer looking to replace their equipment and (b) electric heat pumps can be purchased for zero-money-down and zero-interest.

31 Natural Resources Canada: National Energy Use Database – Residential Sector, Ontario, Table 2 (2017) ([link](#)).

The more ambitious target would require stronger incentives for Ontarians to implement efficiency upgrades and to install zero-emission equipment. One pathway could be the following:

2030 Carbon Reduction Sources: A Potential Pathway for 20 Mt Reductions	
Source	Reductions Mt CO ₂ e
Fossil fuel heating energy efficiency	8 Mt ³²
Fossil fuel power generation phase out	4 Mt ³³
Zero-emission heating equipment conversions	8 Mt ³⁴ (plus 1.4 Mt from converting oil/propane to electricity) ³⁵
Total	20 Mt

Efficiency programs would create over 18,500 good green jobs

Summary of benefits

If it is done the right way, the transition away from gas will bring about major benefits. The steps outlined in this plan will achieve the following:

Jobs: These actions will replace spending on out-of-province fossil fuels with spending in Ontario that will create good jobs in the green renovation and green energy sectors. The energy efficiency programs alone would create over 18,500 good jobs for Ontarians.³⁶ The green energy and zero-carbon heating programs would create even more.

Lower energy bills: Greater efficiency lets us heat homes with less energy and save money.³⁷ Zero-carbon heating is often less expensive than fossil fuel heating.³⁸

32 Navigant, *2019 Integrated Ontario Electricity and Natural Gas Achievable Potential Study*, September 13, 2019, prepared for the IESO and OEB, p. vii [The reductions at existing budget levels would be 3,014 Mt CO₂e. The potential for all achievable cost-effective programs is 7,106. The difference is 4,092 Mt CO₂e. However, the economic potential is a further 70% higher (5 Mt). A large portion of this can be obtained with zero-money-down, zero-interest programs that allow costs to be paid back on property bills. Also, the planned \$170/tonne carbon price will increase uptake and cost-effectiveness and was not included in the study.].

33 Current emissions from fossil fuel power generation are approximately 4 Mt CO₂e. See IESO, *2020 Annual Planning Outlook, 2020*, p. 68 ([link](#)). The IESO is forecasting an increase to 10.9 to 12.2 Mt by 2030 and avoiding this increase is an additional benefit of phasing out fossil fuel generation.

34 The number of customers who switch will be dependent on the incentives provided. Sufficient incentives will be required such that (a) electric heat pumps are the least expensive option for any customer looking to replace their equipment and (b) electric heat pumps can be purchased for zero-money-down and zero-interest.

35 Natural Resources Canada: National Energy Use Database - Residential Sector, Ontario, Table 2 (2017) ([link](#)).

36 Dunsy Energy Consulting, *The Economic Impact of Improved Energy Efficiency in Canada*, April 3, 2018, p. 33, ([link](#)) (These programs would create 259,801 job-years over 14 years, which amounts to 18,557 jobs per year on average).

37 Ontario's 2022 energy efficiency programs for fossil gas are forecast by Enbridge to generate **\$535 million** in benefits, primarily in avoided energy costs. One dollar invested will generate \$3.32 in benefits (net of free riders and discounted to present value). For the most effective programs, \$1 will generate \$17.28 in benefits. See EB-2021-0002, Exhibit D, Tab 1, Schedule 4, Page 2 ([link](#)).

38 Office of the Auditor General of Ontario, *Reducing Greenhouse Gas Emissions from Energy Use in Buildings*, November 2020, page 18 ([link](#)).

Economic growth: Green energy and renovation projects will create prosperity. The energy efficiency programs alone would generate \$77 billion in increased GDP over 14 years.³⁹

No-money-down programs: Current efficiency programs require up-front contributions from customers that are repaid in the future. New no-money-down zero-interest programs would create an opportunity for many more Ontarians to lower their energy costs.

Reduce energy poverty: No-money-down programs will particularly benefit lower-income Ontarians.

Public affordability: Public investments can be financed at current rock-bottom interest rates.

Save lives: Climate change is killing Canadians in fires and floods. Investments now will save lives.

Save money: Climate change will cause trillions of dollars in damage with extreme weather like floods, droughts, and fires. The sooner we act, the more we can avoid this.

Contrast with the current Ontario Government approach

This plan is in total contrast with the current approach of the Ontario Government. If Ontario continues with the current approach, the province will switch from being a leader to a foot-dragger and will fail to meet international and national targets. In recent years the Ontario Government:

- **Has cut all funding for zero-carbon heating grants (i.e. for heat pumps)⁴⁰**
- **Has slashed funding for electricity efficiency programs⁴¹**
- **Has broken promises to increase gas efficiency programs⁴²**
- **Has instead caused a decline in gas energy efficiency programs⁴³**

39 Dunsky Energy Consulting, *The Economic Impact of Improved Energy Efficiency in Canada*, April 3, 2018, p. 33 ([link](#)).

40 Heat Pumps were funded through the GreenON program cut by the current government. See Ottawa Citizen, *With GreenON rebate cancellation, 'unbelievable window of opportunity' closes for Ottawa business*, July 2, 2018 ([link](#)).

41 Funding was cut by approximately 50%. See Efficiency Canada, *Ontario Government Breaks Election Promise to Support Electricity Conservation* ([link](#)) and the Government's own [news release](#).

42 The current government's *Environment Plan* called for large increases in gas efficiency program investments. Instead, investments have declined significantly (see these [submissions by Environmental Defence](#) for details). The government declined to mandate the Environment Targets in its directions to the Ontario Energy Board (see this [Letter from the Minister of Energy](#)).

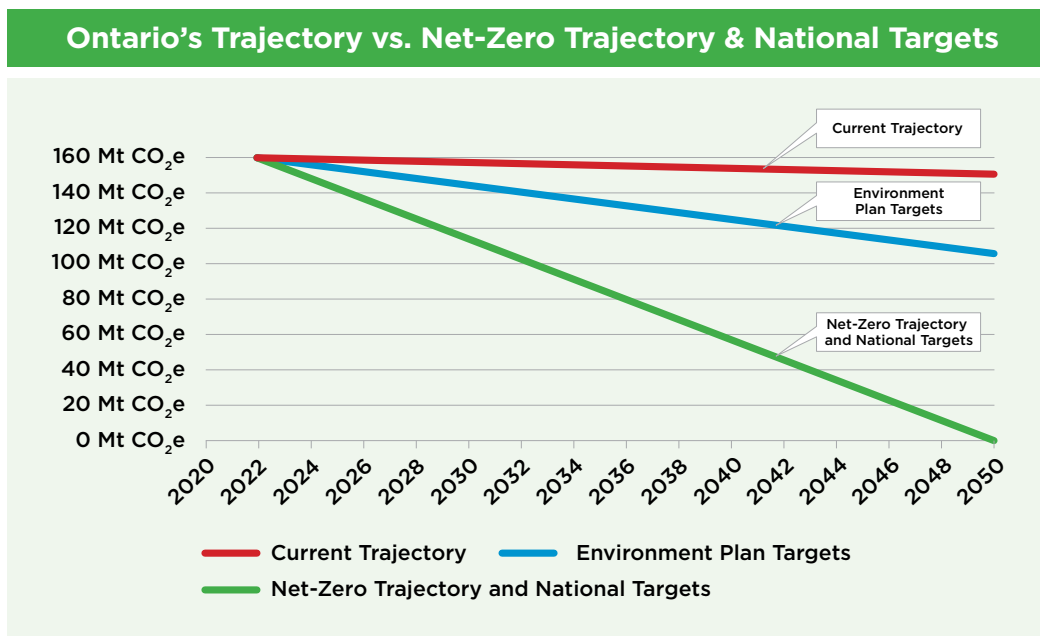
43 Environmental Defence, *Submissions re 2022 DSM Plan*, July 6, 2021 p. 3-4 ([link](#)).

Efficiency
programs would
create \$77 billion
in economic
growth

- Plans to increase fossil fuel power generation carbon emissions by more than 300% by 2030 and by 500% or more by 2040⁴⁴
- Is subsidizing fossil fuel pipeline expansion to the tune of \$234 million (\$26,000 per customer), locking Ontarians into a more expensive legacy technology⁴⁵
- Has let fossil gas carbon emissions increase under their watch⁴⁶
- Is FAR off track from meeting Canada’s 2030 and 2050 carbon targets, the Paris Accord targets, and even their own low Environment Plan targets⁴⁷

Ontario is way off track and falling behind

The below figure illustrates just how far off track Ontario currently is. Based on the current trajectory (the red line) we will not come close to meeting Ontario’s own targets (the blue line) let alone reach net-zero in 2050 (the green line).⁴⁸



44 IESO, 2020 Annual Planning Outlook (link).

45 Globe and Mail (Adam Radwanski), Ontario increasing reliance on natural gas as others move away from fossil fuels, June 11, 2021 (link).

46 Environmental Defence, Yours to Recover: A Progress Report on Ontario’s Climate Actions, December 2020 (link).

47 Auditor General, 2019 Annual Report, Volume 2, Chapter 3, Climate Change: Ontario’s Plan to Reduce Greenhouse Gas Emissions, p. 123 (link).

48 The net-zero trajectory shows current emissions steadily declining to 2050. The Environment Plan shows emissions declining at the rate targeted by Ontario’s Environment Plan (which targets 143 Mt CO₂e by 2030). The current trajectory shows the forecast by the Auditor General (153.95 Mt CO₂e by 2030, which is the mid-point of the high and low estimates of 157.3 Mt CO₂e and 150.6 Mt CO₂e, see Auditor General, 2019 Annual Report, Volume 2, Chapter 3, Climate Change: Ontario’s Plan to Reduce Greenhouse Gas Emissions, p. 123, link) with the 3.2 Mt CO₂e in targeted reductions from fossil gas efficiency programs factored out as that target was abandoned following the Auditor General’s report (see these submissions by Environmental Defence and this Letter from the Minister of Energy for details).

Responses to the fossil fuel lobby

Fossil fuel and pipeline companies are lobbying hard against electrification because it threatens their business models. Unlike car companies, which can pivot to electric vehicles, pipeline companies cannot as easily pivot because pipelines are not needed in an electrified economy. This section debunks myths about electrification promoted by the oil, gas, and pipeline lobby.

Fact: Electrification will lower electricity prices, not raise them

The fossil fuel lobby (e.g. the Canadian Gas Association) argues that electrification will cause huge electricity price increases.⁴⁹ This is false. Electrification of a portion of building heating will actually cause electricity prices to *decrease* in 2030. That is because Ontario's electricity demand peaks in the summer. Therefore, increased winter demand will allow fixed costs of generation, transmission, and distribution costs to be spread over more customers and more kilowatt hours.⁵⁰ The amount of electrification achievable in the range of 2030 will likely result in *lower* electricity costs per kWh.

This effect has been studied in California in relation to electric vehicles. The electrification of transportation has actually reduced net electricity distribution costs there by \$534 million.⁵¹ This is for the same reason as described above – additional electricity demand outside of peak times (i.e. beyond hot summer afternoons) actually reduces the cost of electricity per kilowatt hour.

Greater amounts of electrification beyond 2030 may or may not impact electricity prices per kWh. Although they will eventually require additional electricity infrastructure, this will not necessarily result in higher prices (i.e. \$/kWh) because costs will be spread over greater consumption.⁵² The impact on prices would depend on the difference between the long-term marginal cost of new electricity relative to current average rates.⁵³

Electrification is a huge opportunity

Ontarians spend billions of dollars each year on imported fossil fuels, which can be diverted to made-in-Ontario green energy and efficiency enterprises and jobs

Electrification will lower electricity prices by smoothing out peaks and diverting fossil fuel spending into the electricity system investments

49 Canadian Gas Association, *Implications of Policy-Driven Electrification in Canada*, October 2019 ([link](#)); Enbridge Gas has also promoted this falsehood in social media advertising.

50 Expert Testimony of Chris Neme, Hearing Transcript, Vol. 4, March 4, 2021, p. 98 ([link](#)).

51 Synapse Energy, *Electric Vehicles Are Driving Electric Rates Down*, June 2019 ([link](#)).

52 Expert Testimony of Chris Neme, Hearing Transcript, Vol. 4, March 4, 2021, p. 99 ([link](#)).

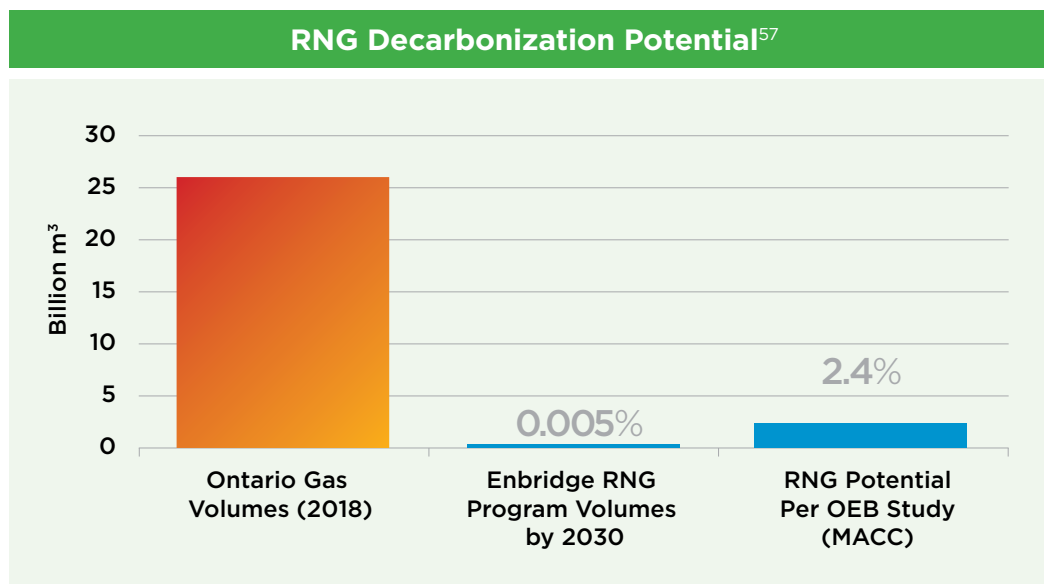
53 *Ibid.*

In other words, if newer electricity sources are cheaper than the existing mix (e.g. because of economies of scale or continuing decreases in the prices of renewables), the increased demand from electrification will actually cause electricity prices to drop. The average wholesale price of electricity in 2020 was over 13 ¢/kWh.⁵⁴ Current prices for green energy are well below that figure.⁵⁵

Fact: Renewable natural gas cannot decarbonize heating in buildings

The fossil fuel industry touts renewable natural gas (RNG) as the way to decarbonize the fossil gas system and as a reason not to pursue more efficiency and electrification.⁵⁶ They like RNG because it flows in pipelines, not in wires, and they earn profits from building and maintaining pipelines. However, the RNG potential is greatly limited by available feedstocks and high costs. There is not nearly enough RNG potential to decarbonize heating in our buildings. This is illustrated below.

Because of limited feedstocks, biogas cannot displace fossil gas and must be reserved for the hardest to decarbonize sectors



In addition:

- RNG is much more expensive than running high-efficiency electric heat pumps
- RNG needs to be reserved for the uses that truly require energy-dense gas fuels, like aviation

54 IESO, *Wholesale Market Electricity Charges*, ([link](#)).

55 Lazard, *Lazard's Levelized Cost of Energy Analysis - Version 14.0* (October 2020) ([link](#)).

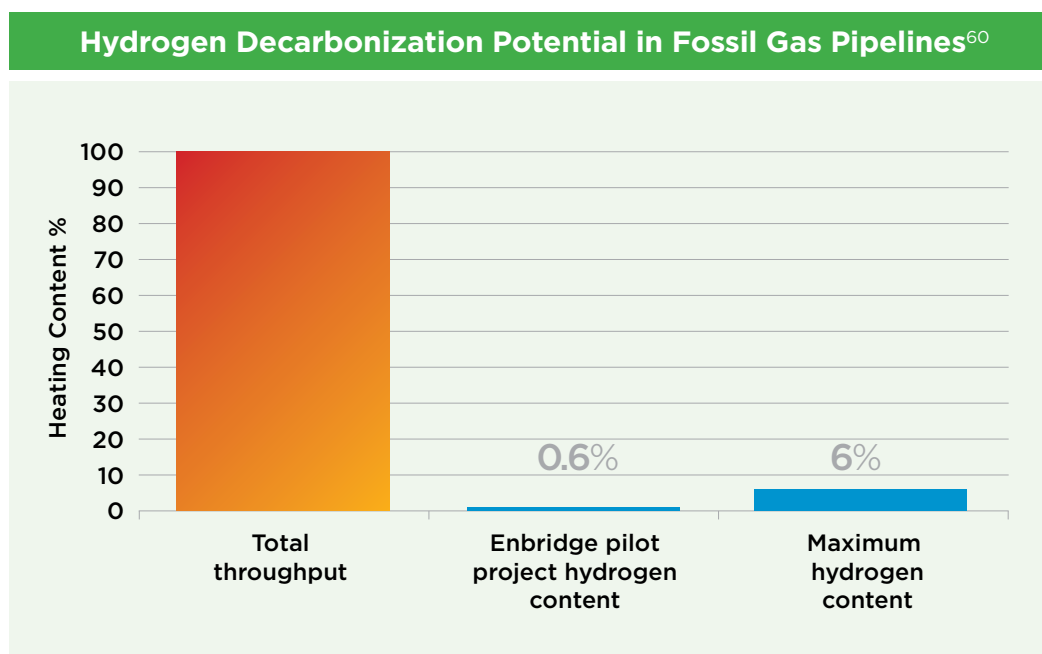
56 E.g. Enbridge LinkedIn Advertising ([link](#), page 67); Enbridge Letter, February 1, 2021 ([link](#))

57 EB-2020-0066, Exhibit I.STAFF.8, Page 2 ([link](#), PDF p. 21); EB-2016-0359, ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. 47 ([link](#), pdf p. 47).

Fact: Hydrogen cannot decarbonize gas heating

The fossil fuel industry also touts hydrogen as the way to decarbonize the fossil gas system and as a reason not to pursue electrification. They like hydrogen because it too flows in pipelines, not in wires, and they earn profits from building and maintaining pipelines. However, hydrogen can only replace up to a maximum of 6% of the fossil gas in existing pipelines before it is unsafe.⁵⁸ Above that amount it will cause leaks, explosions, and fires because hydrogen is a smaller molecule and burns very differently.⁵⁹ Hydrogen decarbonization would require replacing all pipelines and all gas burning equipment at an extraordinary expense. Also, the newer pipelines would need to be much larger because hydrogen is much less energy dense.

Hydrogen can only replace 6% of the fossil gas in pipelines without risking dangerous leaks, fires, and explosions



Decarbonization via hydrogen would require all fossil gas pipelines and equipment to be replaced and upsized at an enormous cost

In addition, like RNG:

- Hydrogen is much more expensive than running high-efficiency electric heat pumps
- Hydrogen needs to be reserved for the uses that truly require energy-dense gas fuels, like aviation

⁵⁸ See footnote 61 below.

⁵⁹ EB-2019-0294, Exhibit B, Tab 1, Schedule 1, Attachment 1, p. 14 ([link](#), p. 40); Evidence of the Technical Standards and Safety Authority, July 8, 2020 ([link](#)).

⁶⁰ Enbridge’s hydrogen pilot project will blend 2% hydrogen by volume. Because hydrogen is less energy dense, this amounts to 0.6% by energy content. See Exhibit I.ED.12, p 14-15 (h)&(i) ([link](#), PDF p. 15-16). No studies are considering blending beyond 20% by volume (per Exhibit I.ED.7, [link](#), PDF p. 177), which equates to 6% by energy content. Hydrogen has 1/3rd the heating value of fossil gas per EB-2019-0294, Exhibit B, Tab 1, Schedule 1, Page 3, [link](#)).

Fact: Hydrogen and RNG are needed for other sectors

Hydrogen and RNG should not be used in pipelines for heating buildings.

First, they are far more expensive than electric heat pumps for this purpose (see below).

Second, green hydrogen is inherently far less efficient than electric heat pumps because energy is lost during electrolysis and because heat pumps are two to three times more efficient than gas furnaces.

Third, RNG and hydrogen must be reserved for the hardest-to-decarbonize sectors like certain industrial uses and aviation where there are no good alternatives.

Efficiency and electric heat pumps are the best and only feasible way to decarbonize the fossil gas sector

Comparing Fossil Gas System Decarbonization Options		
	Cost-effectiveness (\$/tCO ₂ e, combustion only)	Decarbonization potential (% of Ontario gas demand)
Cost-effective energy efficiency	\$0 to -\$140 ⁶³ (i.e. savings)	25% ⁶⁴
Heat pumps	\$130 to \$200 ⁶⁵ (commodity & capital cost)	Near 100% ⁶⁶
RNG	\$338 ⁶⁷	2.5% ⁶⁸
Hydrogen	>\$900 (commodity cost) + ~\$4,000 (capital cost) ⁶¹	6% ⁶²

61 Exhibit I.ED.11(a)&(b), p. 2-3 ([link](#), PDF p. 197-198); Per Exhibit JT1.7 in EB-2020-0066 ([link](#), PDF p. 398), if upstream emissions are accounted for, the cost is over \$700/tCO₂e for commodity costs and over \$3,000 for capital costs.

62 Enbridge is proposing to blend 2% hydrogen by volume. Because hydrogen is less energy dense, this amounts to 0.6% by energy content. See Exhibit I.ED.12, p 14-15 (h)&(i), [link](#), PDF p. 15-16. No studies are testing blending beyond 20% by volume (per Exhibit I.ED.7, [link](#), PDF p. 177), which equates to 6% by energy content.

63 EB-2016-0359, ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. 14 ([link](#)); Per Exhibit JT1.7 in EB-2020-0066 ([link](#), PDF p. 398), if upstream emissions are accounted for, the cost is \$0 to -\$108/tCO₂e.

64 Navigant, *2019 Integrated Ontario Electricity and Natural Gas Achievable Potential Study*, prepared for the IESO and OEB, December 18, 2019, p. ix ([link](#)).

65 EB-2016-0359, ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. A-4 to A-5 14 ([link](#)) (heat pumps are \$130/tCO₂e for new homes and \$200/tCO₂e for existing homes according to this study, but prices are declining significantly as cold climate heat pumps become more commonplace); Per Exhibit JT1.7 in EB-2020-0066 ([link](#)), if upstream emissions are accounted for, the cost is \$101 to \$155/tCO₂e.

66 EB-2016-0359, ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. 25 ([link](#)).

67 EB-2020-0066, Exhibit I.SEC.15 ([link](#)); Per Exhibit JT1.7 in EB-2020-0066 ([link](#), PDF p. 398), if upstream emissions are accounted for, the cost is \$262/tCO₂e.

68 EB-2016-0359, ICF, *Marginal Abatement Cost Curve*, July 20, 2017, prepared for the OEB, p. 47 ([link](#)); This report estimates a potential of 627 million m³/yr, which is 2.41% of Ontario's consumption of 26 billion m³/yr. This potential was considered achievable by 2028 based on a study conducted in 2013. In Exhibit JT1.5 ([link](#)), Enbridge estimates the potential as 402 million m³/yr by 2025, which is 1.55% of Ontario's gas consumption of 26 billion m³/yr.

Fact: A costly abandonment of fossil fuel pipelines and equipment is not necessary

The fossil fuel lobby argues that electrification will cause a costly abandonment of fossil gas equipment and pipelines. With proper planning today, this need not be the case.

In the 30 years between now and 2050, all furnaces in Ontario will need to be replaced. Instead of getting a new gas furnace, customers can buy high-efficiency heat pumps. If conversions occur at the end of the life of the existing equipment, the cost is far less and can be repaid through efficiency gains.

It is unclear whether or when fossil gas pipelines might become unnecessary. However, that need not be an expensive outcome. Most pipelines have already been paid for. To prepare for future possibilities, Ontario needs to stop investing in new pipelines. By repairing old pipelines instead of replacing them, reducing operating pressures, and cutting costs, a transition away from these pipelines can happen if they become redundant. Shutting down an unnecessary pipeline is not a problem if it has already been paid for and is no longer needed. Other jurisdictions are beginning to plan for a possible transition away from these pipelines.⁶⁹ Regardless, Ontario should invest less in fossil fuel pipelines, not more.

Ontario needs to invest in the clean, green electricity infrastructure of the future, not in fossil fuel pipelines

⁶⁹ Utility Dive, *California launches rulemaking to manage transition away from natural gas*, January 17, 2020 ([link](#)); Smart Cities Dive, *San Jose, Oakland join growing list of California cities to ban natural gas construction*, December 4, 2020 ([link](#)); Utility Dive, *Massachusetts attorney general urges state examine shift from natural gas heating*, June 5, 2020 ([link](#)).

Conclusion

Carbon emissions from fossil gas have been ignored for too long. There is nothing more “natural” about so-called natural gas than there is with coal or petroleum. It is a fossil fuel and a major contributor to the climate crisis. The combustion of fossil gas is responsible for over 30% of Ontario’s carbon emissions.

Ontario needs a credible and concrete plan to reduce our reliance on this fossil fuel. Luckily, reducing carbon emissions from fossil gas will be good for Ontarians and for the environment. It is an incredible opportunity. With a combination of people-centric policies, Ontario could see a boom in green jobs and green prosperity, while lowering overall energy bills.

The alternatives are far worse. If we continue with the status quo we will miss the opportunity to create green enterprises and we will have to spend more money down the road to buy the solutions from others. We will become shirkers and will shamefully miss our national and international climate commitments. That is not what Ontario stands for.

By making our buildings and equipment more efficient, we can use less energy and save money. This is the key to a green and prosperous future.

Reducing carbon emissions from fossil gas will be good for Ontarians and for the environment, creating a boom in green jobs and green prosperity, while lowering overall energy bills



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