

BurlingtonGreen's Input to Ontario's Long-Term Energy Plan

BurlingtonGreen Environmental Association thanks the Province for reaching out to the public for input into their Long-Term Energy Plan and we are pleased to submit our comments and recommendations. As the use of energy is tied directly to greenhouse gas emissions, we are eager to have our voice heard for not only our residents but also for those who cannot speak. By interfacing with the government, we fulfill our motto of "together we make a difference".

Established in 2007, we are a citizen-led, nonpartisan, not-for-profit environmental organization. Through awareness, advocacy and action initiatives we collaborate with all sectors of the community to protect the natural environment and to make Burlington a cleaner, greener, more environmentally responsible city.

To achieve our goal of protecting our planet against climate change we help citizens and local sectors lower their ecological footprint via awareness of energy conservation and clean energy solutions through practical, effective, results oriented programs and take action initiatives. Our staff and volunteers with relevant expertise provide input to all levels of government through participation in events and written submissions.

Summary of Recommendations.

Our overall recommendations to help meet Ontario climate change carbon reduction targets with a robust energy mix are:

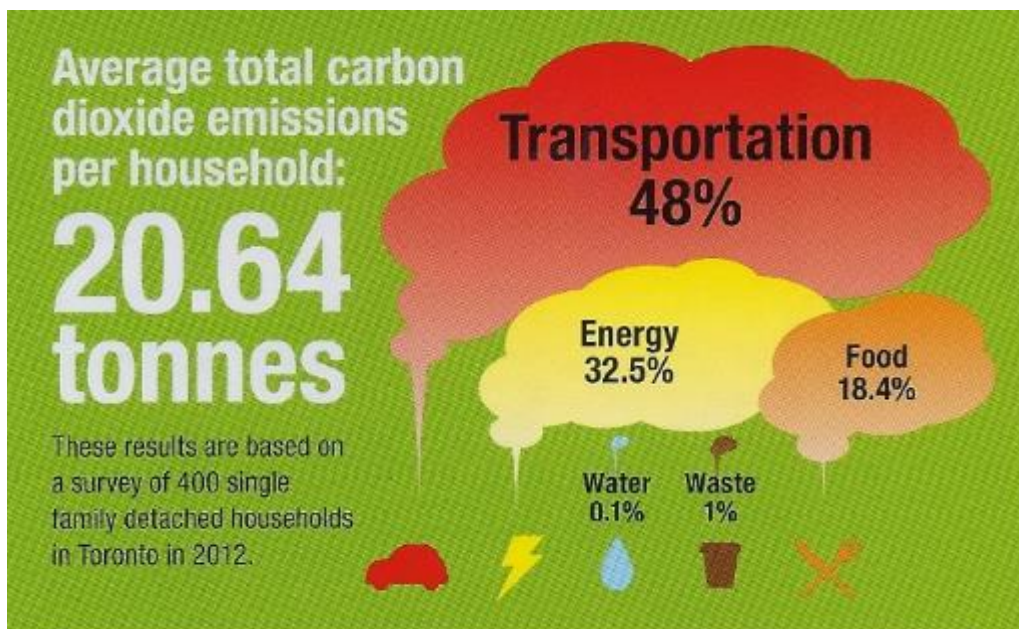
- **Promote better understanding of the benefits of heat pump technology to homeowners, contractors and installers**
- **Promote better understanding of the effective options to heat pump conversion that can be done in a staged process over time in a cost effective manner**
- **Provide financial assistance to encourage conversion of natural gas furnaces, water heaters and clothes dryers to heat pumps**
- **Promote increased understanding of electric/hybrid vehicles to consumers concerning GHG emissions and life cycle cost savings**
- **Increase the coverage of rebates on electric vehicles to include hybrid (non-plug-in) vehicles**

Detailed Response

BurlingtonGreen takes the position that we have to stop burning fossil fuels for energy. The fastest way to get significant greenhouse gas reductions is to have households switch to using electric/hybrid vehicles for transportation and heat pumps for heating and cooling homes.

Almost 60% of Ontario's energy use is by the residential (20%) and transportation (38%) sectors. Thus, making improvements in emissions from vehicles and homes can significantly fight climate change.

The Ontario Sustainable Energy Association presents the problem very well with their graphic shown below. The gasoline powered car and gas furnace/water heater are the source of about 70% of the average household's carbon emissions.



Ontario produces 92% of its emissions from fossil fuels and 8% from the electrical grid which is 54% cleaner than natural gas.

The solution is with electricity, both from our clean grid and cleaner renewables.

Switching from gasoline to electric/hybrid vehicles reduces pollution by 60% (hybrid) to 90% (all electric) mainly due to the efficiency of electric motors (90% vs 25% for internal combustion engines). And they are cheaper to own and operate than their gasoline powered equivalents with current incentives. Fuel costs alone are about 80% less than for gasoline vehicles.

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Switching from gas furnace/water heater/clothes dryer to electric heat pumps reduces pollution by 50% to 90% due to the efficiency of using free heat from the ground, air or water. And they are almost as cheap to own and operate. With incentives, they can be cheaper than their fossil fuel powered equivalents. The annual operating cost including fuel, maintenance and repairs is lower with heat pump technology. For example, the cost of fuel for a natural gas furnace may be less than the heat pump electricity cost by a small margin but when cooling and domestic water heating is included, the annual overall operating costs are lower with heat pumps by a percent or two. With price mitigation, electricity wins out even more.

Price mitigation for both electricity and fuels will reduce the cost of electricity and carbon pricing will increase that of natural gas. The Province will reduce electricity prices by removing the 8% PST and the debt retirement charge. This will be a savings for the average customer of \$195 a year.

The carbon pricing will add \$80 per year to the average gas bill resulting in a net savings of \$115. These financial measures will not reduce carbon emissions directly but provide incentives for homeowners to switch to cleaner electricity. We support these price mitigation strategies. Other mitigation measures include rebates for building improvements and we support these as well.

BurlingtonGreen has proposed revised incentives for electric/hybrid vehicles based on carbon reduction. The current incentive is up to \$14,000 for a reduction in carbon of \$467/tonne as follows:

Electric cars save 3 tonnes/year (30 tonnes over 10 years)

Government incentive is \$14,000/car.

Government cost is $\$14000/30 = \467 per tonne

Our proposal includes hybrids to get more people making the change. The rebate would be about \$5000 for a 20 tonne reduction, or \$250/tonne as follows:

Hybrid cars save 2 tonnes/year (20 tonnes over 10 years)

Government incentive is \$5,000/car.

Government cost is $\$5000/20 = \250 per tonne

Heat pump technology includes “geothermal” which is technically from hot springs and the term ground source heat pump is more accurate. Air and water source heat pumps are also available. These devices take free heat with efficiencies of up to 500%. So the cost to run them, even with electricity is comparable to natural gas.

Providing incentives for heat pumps based on carbon reduction would give much better carbon reduction at similar returns on the investment. Current rebates for a high efficiency gas furnace and electric A/C of \$1150 saves 15% in carbon (4248 kg from

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5000 = 752 kg/yr.) with a return of \$77/tonne over 20 years. The current cost for a high efficiency gas furnace and Tier 2 A/C is approximately \$8500 for a 2000 square foot house in Southern Ontario. The net cost would be \$7,350.

High efficiency gas furnace and A/C upgrade save 0.75 tonnes/year (15 tonnes over 20 years)

Government incentive is \$1150

Government cost is $\$1150/15 = \77 per tonne

Replacing the mid efficiency gas furnace and A/C (5000 kg/yr.) with an air source heat pump (5000 to 1026 kg = 3974 kg/yr.) produces 76% less carbon. The rebate for the heat pump would be $3974/752 \times \$1150 = \6077 and cost \$77/tonne, the same as for the gas system. This would offset the purchase price of \$13,000 to \$6,923 and give the purchaser a level playing field.

Air source heat pump upgrade saves 3.9 tonnes/year (79 tonnes over 20 years)

Requested government incentive is \$6,077

Government cost would be $\$6,077/79 = \77 per tonne

Ground source heat pumps would save more carbon (87 tonnes) and show a rebate of about \$6,645 due to the higher efficiency but would not bring the \$22,700 capital cost down to equivalent to gas. For homes that are not on the natural gas grid, the rebate would still be helpful in bringing operating costs to lower than oil and propane.

Ground source heat pump upgrade saves 4.3 tonnes/year (86 tonnes over 20 years)

Requested government incentive is \$6,645

Government cost would be $\$6,645/86 = \77 per tonne

Due to the efficiency of heat pumps, the average home with air conditioning does not have to upgrade its electrical service.

For urban dwellers with natural gas availability, a “hybrid” approach could be used. Natural gas fired heat pumps are available but not very popular due to noise and low efficiency. This is an area that could be researched to provide a transition until the electrical grid is more robust. Also, when an air conditioner dies, installing a heat pump that may not provide 100% heating will permit the remaining gas furnace to cover the few cold days and last much longer. Lower cost incentives would be required to enable this.

The real beauty of the above approach is that it can be done by individuals with little or no discomfort. Families can reduce Ontario’s pollution significantly so that industry

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doesn't bear a disproportionate burden in re-tooling. They can implement changes over a realistic and cost effective time frame.

We do not support the proposal to increase the natural gas infrastructure. This is meant to replace higher polluting fossil fuels (oil, diesel and propane) in rural areas and save money. The carbon reduction would be modest, in the order of 16% (propane) to 27% (diesel, gasoline and heating oil). Converting to heat pump technology would reduce carbon by 85%

In summary, we can get off oil, gasoline and gas by making simple changes that do not inconvenience ourselves or stress the electrical grid. It will give us time to create a stronger grid.

Item	Cost	Rebate	Carbon Reduction	Cost /tonne
EV	\$42,000	\$14,000	30 tonnes	\$467
Hybrid	\$28,000	\$5,000	20 tonnes	\$250
Air Source Heat pump	\$13,000	\$6,077	79 tonnes	\$77
Ground Source Heat Pump	\$22,700	\$6,645	86 tonnes	\$77
Hybrid Gas Furnace/HP	\$8,000	\$3,800	50 tonnes	\$77

Responses to Specific LTEP Questions

Our responses to the questions are given below:

What are the significant challenges facing utilities and what can government do to meet them?

Utilities are facing a future of reduced demand with a much more complex system of delivery and integration of supply and demand. A switch from revenue generation from sale of energy should be changed to charges for services rendered.

What are the most important benefits of a modern grid? Increased reliability? Greater information on your energy usage?

Efficiency is the greatest benefit by allowing the proper integration of energy source, storage and redeployment. This includes renewable energy sources, battery storage and microgrid systems.

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What additional policies should the government consider to expand access to natural gas?

The natural gas infrastructure should not be expanded. We support the forecasts based on maximum conversion from fossil fuels to electricity as this will give the greatest carbon reductions in the shortest time frame. Grid electricity should move to as great a renewable portion as possible.

What are the best uses of microgrids in Ontario?

Microgrids are best employed in rural areas in order to reduce fossil fuel consumption, mainly by reducing diesel fuel use by addition of solar, wind and biomass electricity production. In addition, space heating/cooling can take advantage of heat pump technology that is currently available as well as new development in hybrid systems that use natural and biogas powered heat pumps that take the cogeneration principle (combined heat and power) further by using the electricity to operate heat pumps which are up to 500% more efficient than electric resistance heating. But urban areas can benefit as well not only in efficiencies but in security against power outages and cost variations through the "island" effect.

Are there any barriers preventing the use of microgrids?

Yes, mainly regulatory as a result of new technology needing to be understood and embraced by forward thinking leaders. Defining the boundaries of an entity would also be a major challenge.

How can Ontario continue to strengthen reliability of the transmission system in all regions of the province?

More funding is needed for maintenance which typically is given a lower priority than generation and transmission. Revenue from carbon pricing should be directed into this area. Also, as we devolve to micro grids, there will be less dependence on the grid between communities.

Is the current "user pay" model an effective way to meet Ontario's needs? Does it appropriately balance the goals of economic development and protecting taxpayers?

No. With an increase in electricity use, generators should be encouraged to build plants and be assisted in connecting them to the grid with financing coming from carbon pricing.

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Will Ontario's pipeline principles protect the best interests of Ontarians and allow for informed participation in the National Energy Board's review of the Energy East project? What considerations should be taken into account?

Permitting fossil fuel pipelines and other transportation mechanisms will not help get us off fossil fuels. No consideration should be given for fossil fuel investments even if paid for by the proponent.

Would you be willing to participate in a program where your utility could use your home storage device from time to time to operate a more reliable electricity distribution system?

Yes. This should include storage in electric vehicles and hybrids as well as battery systems. This should not be limited to homes only. Businesses may have a key role to play as well, especially where shift work is involved. Storage devices could be supplied by the utility where quality control is maintained. Proper regulation of connecting to an electric vehicle would also be required.

What role do you foresee for natural gas to supplement and complement the province's existing electricity storage options?

We see no role for natural gas assisting the Province as it is the most expensive way to reducing carbon emissions.

How can Ontario further support innovative energy storage technologies that leverage our existing natural gas infrastructure assets and take advantage of our clean electricity system?

As an interim measure, natural gas fired heat pumps and hybrid gas/heat pump systems can result in significant carbon reductions at relatively low cost.

Which innovations offer the greatest benefit to your community and the energy system as a whole?

Those which result in energy conservation and use of electricity based technologies can create more jobs and achieve greater carbon reduction at lower investment than alternatives related to fossil fuels such as cogeneration of natural gas. Specifically, those that tackle issues of wasted energy such as idling and uncontrolled heat loss.

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How should the public and private sectors cooperate to encourage innovation in the energy section?

With clear direction through policy and regulation, collaboration of educational institutions with local businesses should be encouraged. Examples of innovation centres, think tanks and incubators already exist in Ontario. Intellectual property issues, regulatory restrictions, and slow funding are major obstacles. Providing a tax credit is a good driver where industry takes the risk to develop the solution, government provides inspectors/verifiers and industry receives a tax credit based on more than the carbon savings.

What actions could the government take to support the adoption of alternative fuels?

Alternative fuels include renewable and low-carbon fuels like biomass and biofuels. Reducing timelines for approval of technologies that exist today is more important than financial incentives because industry will respond if they know they can bring their projects on line. A streamlined system such as used for water and waste water plants under the Municipal Class EA process is needed.

Should Ontario set provincial conservation targets for other fuel types such as natural gas, oil and propane?

No. The emphasis should be on conversion from these fuels to alternatives and electricity.

To meet the province's climate change objectives, how can existing or new conservation and energy efficiency programs be enhanced in the near and longer term?

Provide incentives for heat pump technologies based on carbon reduction. Heat pumps are not only up to 5 times more efficient than burning natural gas, they are not limited to distribution of heat and cold through ducted systems resulting in lower building costs.

How can we continue to inform and engage energy consumers?

Local municipalities, utilities, environmental groups such as BurlingtonGreen, schools, local media and service clubs all have a role to play in educating both children and adults through events that are fun with an element of competition. Information and engagement opportunities could be promoted through utility billing mechanisms both on websites and in mailings. People need data in a friendly form. Heat pumps are a great example where the technology can be

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explained along with the energy saving benefits and cost savings through rebates so that the reaction is to do it for financial reasons as well as environmental.

What role should distributed renewable energy generation play in the ongoing modernization and transformation of Ontario's electricity system?

Care should be taken in administering programs. Solar and wind energy are not suitable everywhere due to shade and noise. Preservation of our tree canopy is also important. Other local power sources can be encouraged such as micro hydro turbines and biomass plants.

What strategies should Ontario pursue to harness the potential of its nuclear sector to meet its future energy needs?

Make a gradual shift away from nuclear as other clean energy generation technologies are promoted over a reasonable time frame.

What factors should Ontario focus on as it pursues opportunities for electricity trade agreements with nearby provinces and states?

The focus should be on carbon reduction and not only costs. When negotiating costs with providers, Ontario could use revenue available from carbon pricing to offset the cost in order to determine the desirability of the proposed deal, rather than just evaluating the price charged by the supplying jurisdiction.

In areas expected to undergo a transformation from rural to suburban, through intense development, how could the province help to ensure that corridor lands are reserved/set-aside before development occurs to minimize the potential costs and inconvenience of acquiring and clearing developed lands in the future?

Legislation needs to support preservation of rural lands and green space by permitting intensification in a controlled manner as is being done in places such as Burlington.

What are the best tools to support Indigenous community engagement and leadership in Ontario's energy sector?

Adequate shelter, education and nutrition are prerequisites to a viable economy with clean low-cost energy that is reliable and simple. Cleanup of environmental

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contamination of indigenous communities such as Grassy Narrows will encourage a higher level of trust and cooperative engagement.

To meet a higher demand, what mix of new electricity resources would best balance the principles of cost-effectiveness, reliability, clean energy, community engagement, and an emphasis on *Conservation First*?

Microgrids associated with distributed district central systems using innovative technologies should be employed.

What policies will Ontario need to adapt to a transformation in the fuels sector?

Policies to provide better education, stricter building standards and incentives to significantly reduce the use of fossil fuels.

BurlingtonGreen's Review of Ontario's LTEP Discussion Paper

The Government of Ontario is requesting input on its Long-term Energy Plan that sets out direction for the period from 2017 to 2035. Outlooks are presented for electricity and fossil fuel demand that show different mixes of these two energy sources. Climate change is examined but does not go into detail beyond 2020. Monies spent to reduce greenhouse gas emissions are recognized as continuing to save emissions over the life of the device, e.g. vehicles and heating/cooling systems.

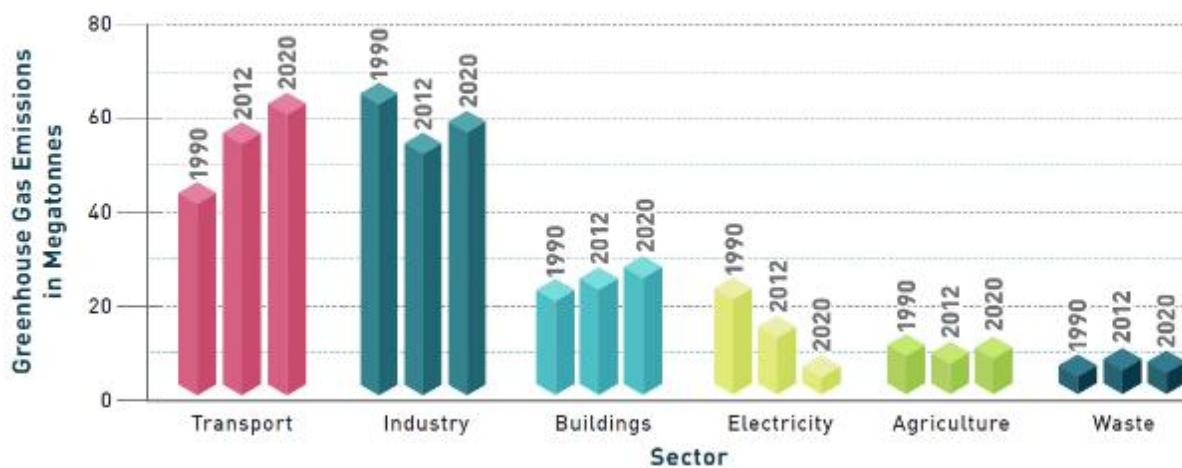
Conservation is stressed as being the first objective. For electricity, this is mainly energy efficiency and habits which reduce demand. For fossil fuels, which represent 81% of our current energy use, conservation must include load reduction as well as efficiency. Particularly for buildings, improving the building envelope to reduce heat loss and cooling load is probably more important than efficiency. As transportation represents 33% of the energy use and 35% of the pollution, reduction in consumption is critical.

The Long-Term Energy Plan is generally in compliance with the Climate Change Action Plan and makes specific reference to it. There appear to be no major contradictions but details of how the targets will be achieved are not clear.

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Emission Trends 1990 - 2020 (Forecast)



Note: 2020 forecasts are based on Ontario's Climate Change Update Report 2014 and the 2014 National Inventory Report

The major ways to reduce greenhouse gas emissions are through transportation, buildings and industry. The plan focuses on emissions for the year 2020, recognizing that money spent to achieve these reductions will have ongoing reductions in future years. For example, giving incentives for purchasing electric vehicles can reduce emissions for the life of the vehicle of typically 10 years. The estimate for reductions from 2013 to 2020 is 18.7 Mt.

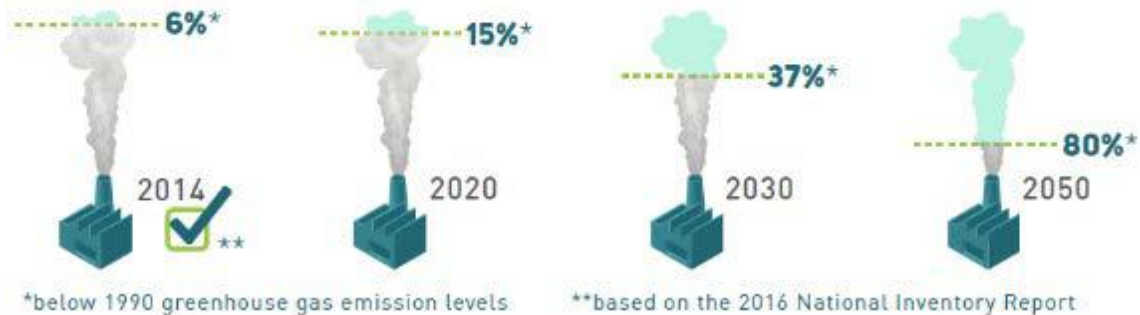
The reduction targets are:

Year	Period Reduction	Cumulative Reduction	Net Amount	Net %age
1990			179	
2013			171	
2014	11	11	168	6%
2020	15	26	153	15%
2030	31	57	122	37%
2050	40	97	82	80%

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Ontario's greenhouse gas reduction targets



We have trouble correlating the relative reductions from electricity and those from fossil fuels. Details are given below but in essence there appears to be a shortfall in the accounting of these two sectors. 2015 levels of ghg in Mega tonnes are reported as:

Electricity: 6 Mt (page 4, Ontario Planning Outlook)
 Fossil Fuels: 122 Mt (page 42, Fuels Technical Report)
 Total: 128 Mt

The reported level for 2013 on page 6 of the Climate Change Action Plan is 171 Mt. A discrepancy of 43 Mt in two years seems unusual.

The plan does not propose to force change but provide choices that will encourage change with some exceptions such as requiring stricter building energy efficiency for new construction.

The target for 2020 is to reduce 1990 ghg emission levels by 15%. The previous target of a 6% reduction by 2014 was achieved. The 1990 level was 179 Mt (mega tonnes of carbon dioxide equivalent) and the 2020 target is 16 Mt less than 2014 or 153 Mt.

The projection for not making change (the do nothing alternative) is to increase emissions above 1990 levels by 4.5%. The estimated reduction for various scenarios is 12.7 to 18.7 Mt although a tabulation of actual reductions by sector only adds up to 6.7 Mt with a total given as 9.8 Mt.

Various costs are projected depending on the route taken. Up to \$8 Billion can be spent with an average reduction cost of \$427/tonne.

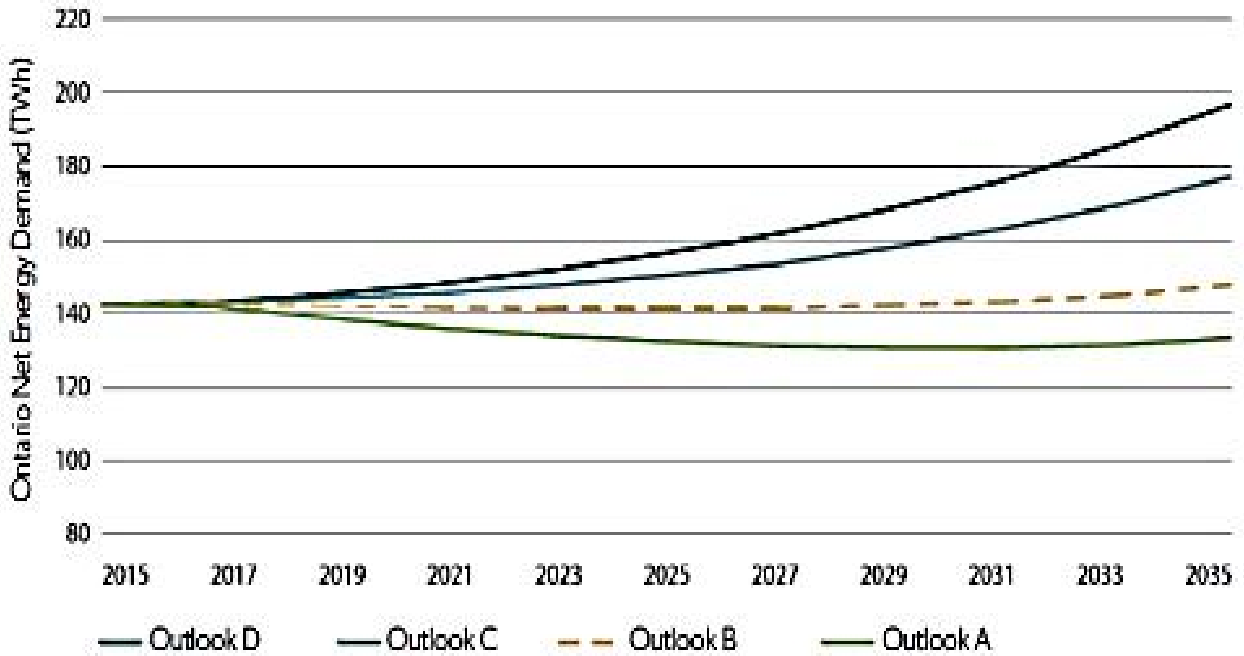
A key element is revenue from cap and trade to fund the rebates and incentives. The range in carbon price is \$18 to \$157 (presumably per tonne) with incomes of \$1.8 to

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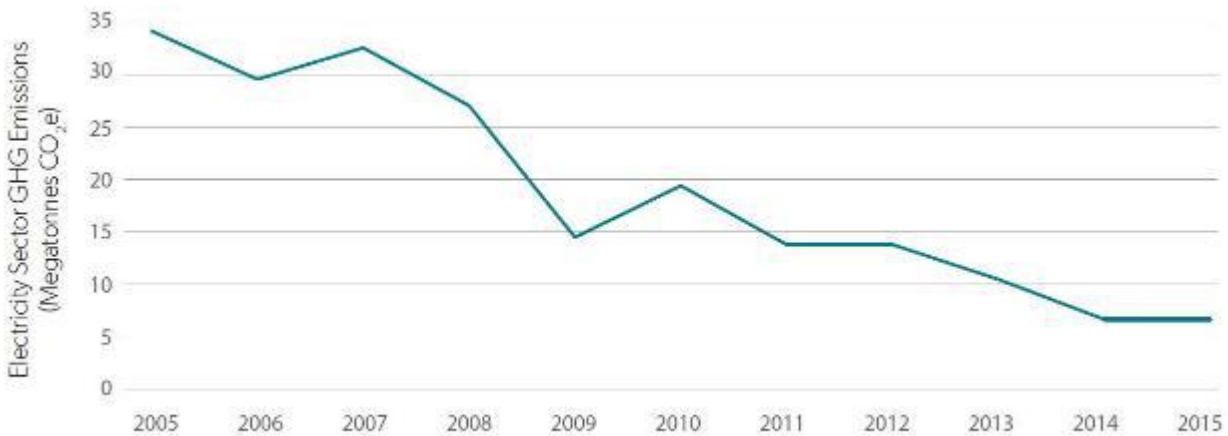
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\$1.9 billion annually. An average price of \$100/tonne would permit 18 Mt of carbon to be released, approximately the same amount as the reduction for the year 2020.

The Province proposes forecasts for both electricity and fossil fuel demand out to 2035 and asks for comments on varying scenarios. Electricity is forecast to go from slightly less than current to about 40% more by the year 2035 under an aggressive switch to electrification of transportation and buildings (Outlook D).



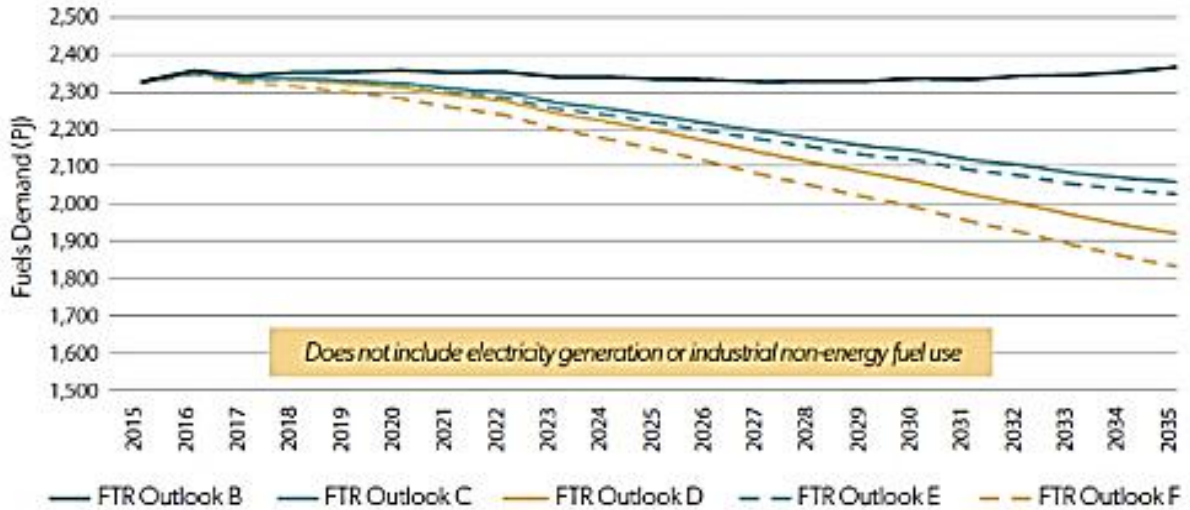
Emissions have dropped.



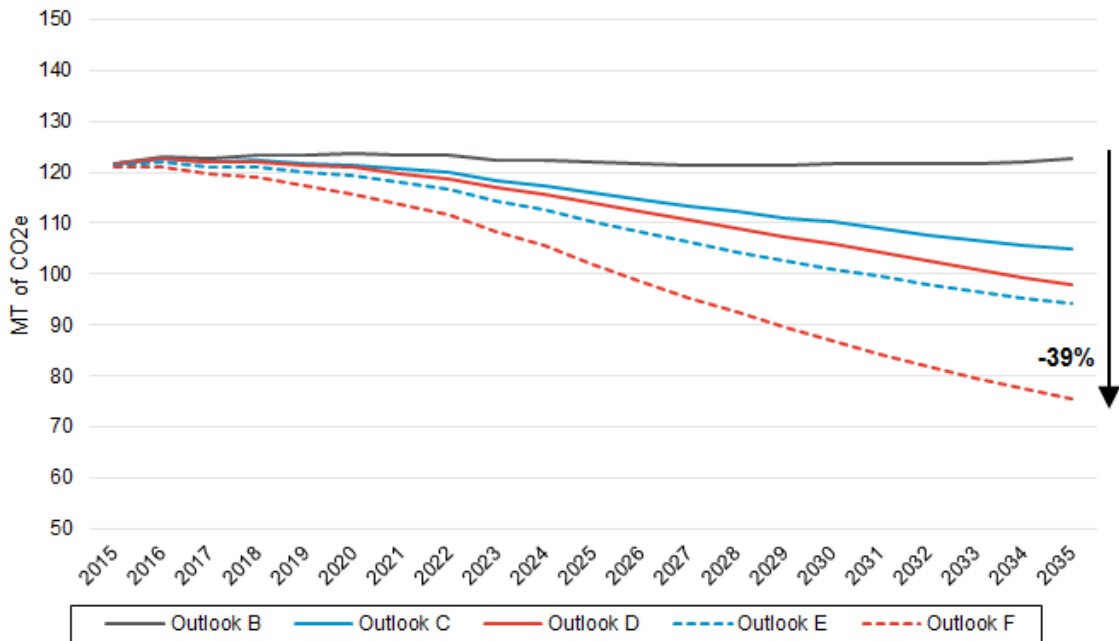
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Fossil fuel projections range from slightly more to about 22% less under the aggressive electricity scenario (Outlook F).



The associated carbon reductions reported would result in a 39% reduction of carbon from 2014 to 2035 with 46 MT of annual reductions. Combined with about 6 Mt of electricity based emissions, the net level would be 52 Mt less than 2014 levels of 168 Mt or 116 Mt which is 6 Mt better than the 2030 target.



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Thus, we support the combination of increased use of electricity and decreased use of fossil fuels.

Spending to encourage Ontarians to comply comprises electricity price reductions, carbon pricing on fossil fuels and incentives and rebates for retrofits and fuel switching. Reducing electricity rates at a cost of \$195 (\$130 from PST elimination and \$65 from elimination of debt retirement) for 5 million homes or almost \$1 billion will result in no carbon reduction and may encourage people to use more electricity. Also, carbon pricing on its own will not reduce greenhouse gases but bring in a revenue of almost \$2 billion.

Of the \$1 billion left over, money will be given for building retrofits including \$100 million, mainly for higher efficiency gas furnaces and water heaters, resulting in a carbon reduction of 1.6 Mt/year or 0.9% of the target. Not addressed specifically is the alternative of converting from gas to electric heat pump technology that would give 5 times the carbon reduction. Mention is made of switching to heat pumps for oil furnaces, electric baseboard heating and electric water heaters. The current Enbridge/Union natural gas and Save on Energy rebates cost approximately \$76/tonne while rebates for air source heat pumps would cost the same but reduce the purchase price to be equivalent to a gas furnace and electric A/C thus providing a level playing field. Compare this to rebates for electric vehicles of up to \$467/t for half the useful life of the product.

Here, we encourage incentives for heat pump technology to replace gas fired devices as the most cost effective solution for the greatest carbon reduction.

The next \$230 million will go towards natural gas infrastructure expansion to reduce users' costs compared to other fossil fuels (oil, diesel and propane). It will save about 1 Mt/year of carbon or 0.6% of the target.

Mention is made of replacing natural gas with carbon neutral gas from sources such as landfills, compost and agricultural waste. Called RNG, it is stated by the Province as being carbon neutral. We assume this is because the emissions from burning the products are offset by the carbon sequestration early in their lifetime. Also, we are not adding any fossil fuel carbon. This carbon is essentially locked in the ground and is not part of the atmospheric carbon cycle. Various forms of RNG is considered to be neutral because it doesn't change the net carbon in the cycle but still produces energy.

This is understandable for food waste but we fail to see where garbage sucks up carbon from its start as a raw product through processing, packaging and transportation. The economics (as pointed out) and volumes involved are questionable as well. *"At present, limited renewable natural gas facilities exist in Ontario, and production capacity at these facilities would be insufficient to satisfy the requirements of either Outlook E or Outlook*

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F. “ In any event, the conversion away from natural gas will be some time away and giving people a cheap alternative may encourage greater use and less conservation.

Our position here is to move towards this solution as soon as possible to prevent any increase in the use of natural gas.

What we do not see in the plan is a paradigm shift in thinking and acting in a sustainable manner. Oddly, this concept is embraced in the graphics which indicate what Ontario will look like in 2050. Does this mean we will have to wait to change our attitudes? Getting people out of cars and on to the streets, bicycles and then transit can make substantial reductions in emissions both directly and indirectly through health care costs.



The City of Burlington Community Energy Plan released in January 2014 set behavioral change as its first order of business. Following that, Burlington passed its Strategic Plan looking out to 2040 and set carbon neutrality as a goal along with a sincere desire to have a healthy, sustainable and viable city. The City believes it can do this through intensification within its urban boundary.

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