ONTARIO'S ELECTRICITY SYSTEM

BACKGROUNDER
January 2017

environmental defence

QUICK FACTS:

1. **Renewables make up a small share of electricity bills**
2. **The costs of renewable energy have been dramatically overstated**
3. **Electricity rates in Ontario are high, but bills are on par with peers**
4. **The coal phase-out and clean energy transition has saved Ontario money overall**
5. **Costs for nuclear are going up. Costs for renewables are falling**

Electricity rates in Ontario have received a lot of attention because prices for power have risen significantly over the past decade. As other provinces, led by Alberta, now move to get coal out of their systems, all eyes have turned to Ontario for an indication of what to expect. The future of Ontario's electricity grid is also up for debate, as the province is reviewing its Long-Term Energy Plan.

A lot is at stake for our environment and our economy. This backgrounder aims to clarify a few key facts about Ontario's electricity system.

It presents original research done by Power Advisory LLC, commissioned by Environmental Defence. The research shows that although wind and solar power generation has grown significantly in Ontario over the last decade, renewable energy still comprises a relatively small share of total generation and, consequently, is responsible for a small share of electricity costs.

This backgrounder also addresses the misunderstanding about the Global Adjustment charge on electricity bills. The Global Adjustment includes costs for all forms of electricity generation, and not exclusively renewable energy, as has been mistakenly reported.

Additionally, this backgrounder looks at how Ontario's electricity prices and overall bills compare with other provinces, major U.S. cities and European countries. It then shows the health and cost benefits of Ontario's coal phase-out and concludes with a look at the rising cost of nuclear power compared to the falling cost of renewable energy.

1. RENEWABLES MAKE UP A SMALL SHARE OF ELECTRICITY BILLS

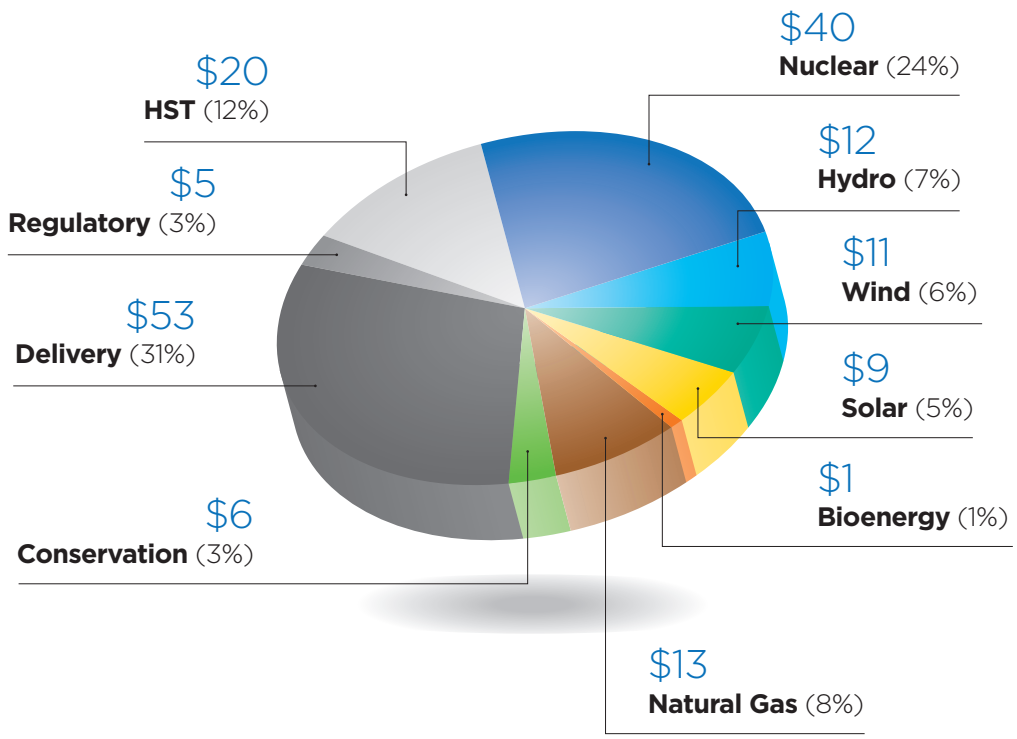
Electricity bills have gone up in Ontario over the course of the last decade. Renewable energy, like wind and solar, being an obvious new addition to the mix, have shouldered much of the blame. But renewable energy accounts for a relatively small portion of residential electricity bills.

Wind power accounts for **6 per cent** of the average residential electricity bill. Solar power is responsible for **5 per cent**. All told, non-hydro renewables (wind, solar, and bioenergy) account for **$21 per month or about 12 per cent** of the average residential electricity bill.

According to independent analysis commissioned by Environmental Defence from Power Advisory LLC, a typical residential customer pays about $11 per month for wind power, and $9 for solar power.[1]

The electricity delivery charge is the largest contributor to bills. Nuclear power is the second largest.

Breakdown of Average Ontario Residential Electricity Bill in 2016



2. THE COSTS OF RENEWABLE ENERGY HAVE BEEN DRAMATICALLY OVERSTATED

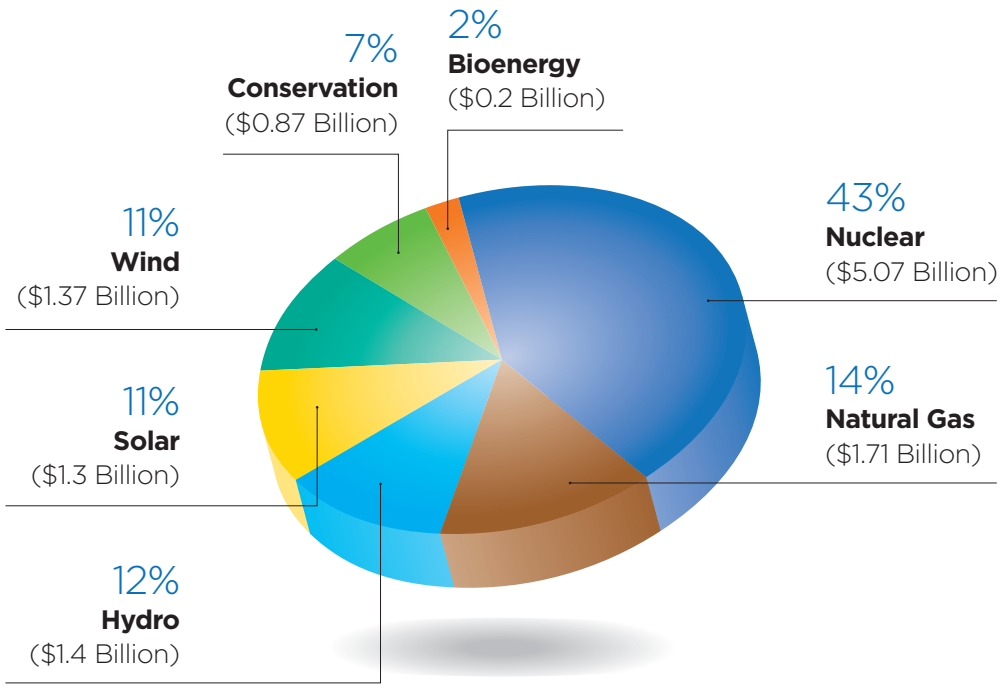
When talking about Ontario's coal phase-out, or the *Green Energy and Green Economy Act*, media reports regularly cite the Ontario Auditor General's (AG) 2015 report[2] on the electricity sector and the AG's assertion that Ontarians have overpaid by $37 billion for the cost of electricity through the Global Adjustment (GA). Often, stories on this topic imply or state outright that this $37 billion can be attributed to green energy costs. This is incorrect on a number of counts.

The $37 billion figure was the AG's assessment of the costs of what's called the Global Adjustment, which is the difference between fixed, contracted prices the province pays to electricity producers and the market price.

The Global Adjustment includes costs for all forms of generation: solar, wind, hydro, nuclear and gas.

Nuclear power is the largest component of the Global Adjustment.[3] In 2016, the Global Adjustment broke down as follows:

Breakdown of Global Adjustment 2016



In the eyes of the AG, the global adjustment is overpayment, but that's not completely accurate. Some of it may be overpayment, but it's impractical and risky for Ontario to try to meet all of its demand for electricity from the spot market. This risk to security of supply – and resultant potential for brown or blackouts – is why jurisdictions regularly sign fixed-price contracts with electricity generators to ensure a reliable supply. In addition, as Ontario phased out coal, the province needed to add new reliable supply relatively quickly. Ontario used fixed-price contracts to entice private power generators to build power plants and meet the demand.

However, it is possible that the government could have contracted electricity for prices below the prices they negotiated.

Furthermore, the AG rightfully did not suggest that all the Global Adjustment was due to renewable energy contracts. Despite media reports routinely citing the $37 billion figure, she did not suggest that Ontarians had overpaid by $37 billion for renewables. The AG's report argued that Ontarians will pay **$9.2 billion**[4] more for renewable energy over the term of the 20-year contracts than they would have under the former program's guaranteed prices.

The report also acknowledges that according to the Independent Electricity System Operator (IESO), the amount is closer to **$5.3 billion**, in order to reflect the time value of money, where money to be spent in the future has less value than that spent today.[5]

Using the AG's numbers, the premium paid for renewable energy contracts is **$460 million per year**.

Using the IESO's numbers, as referenced in the AG's report, the premium paid for renewable energy contracts is **$265 million per year**.

In comparison, it's estimated that Ontario avoids **$4.4 billion per year** in health and environmental costs as a result of the coal plant closures.[6] (see section 4)

3. ELECTRICITY RATES IN ONTARIO ARE HIGH BUT BILLS ARE ON PAR WITH PEERS

Electricity rates in Ontario have risen significantly, but the average electricity bill in Ontario is on par with those in other Canadian provinces. Although rates are high, Ontarians on average consume less electricity than residents in neighbouring jurisdictions and costs are a function of price per unit and number of units consumed.

In large part, this is due to a lower overall use of electricity for space heating compared to other jurisdictions. However, people who use baseboard heaters for space heating face higher than average monthly bills.

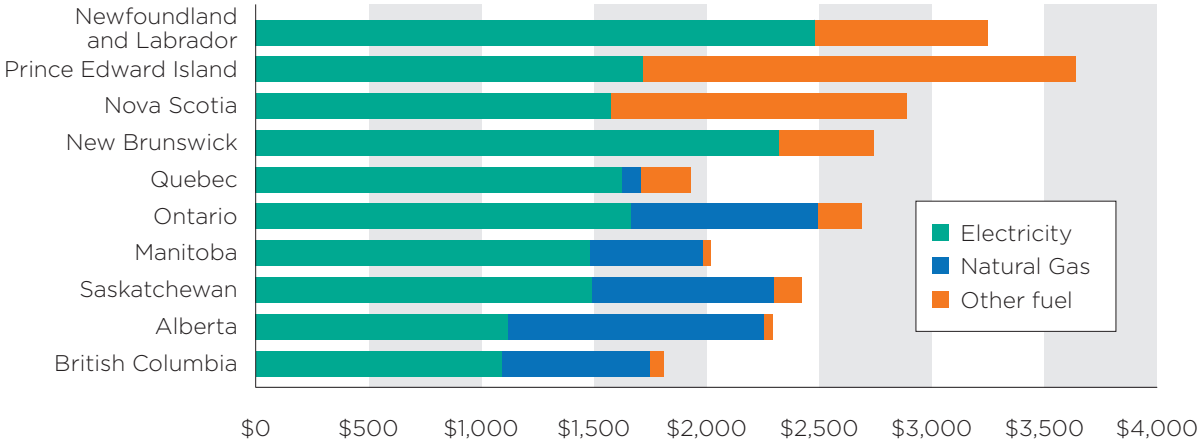
2014 and 2016 Costs of electricity bills

	2014 (actual)	2016 (estimated)
Newfoundland and Labrador	$ 2,352	$ 2,481
New Brunswick	$ 2,239	$ 2,321
Prince Edward Island	$ 1,636	$ 1,720
Ontario	**$ 1,336**	**$ 1,666**
Quebec	$ 1,588	$ 1,626
Nova Scotia	$ 1,589	$ 1,574
Saskatchewan	$ 1,420	$ 1,491
Manitoba	$ 1,388	$ 1,483
Alberta	$ 1,362	$ 1,119
British Columbia	$ 989	$ 1,090
Canada	$ 1,405	N/A

Source: Financial Accountability Office of Ontario and Hydro Quebec[7]

For overall energy costs, Ontarians pay less than Maritime provinces, but more than the western provinces and Quebec.

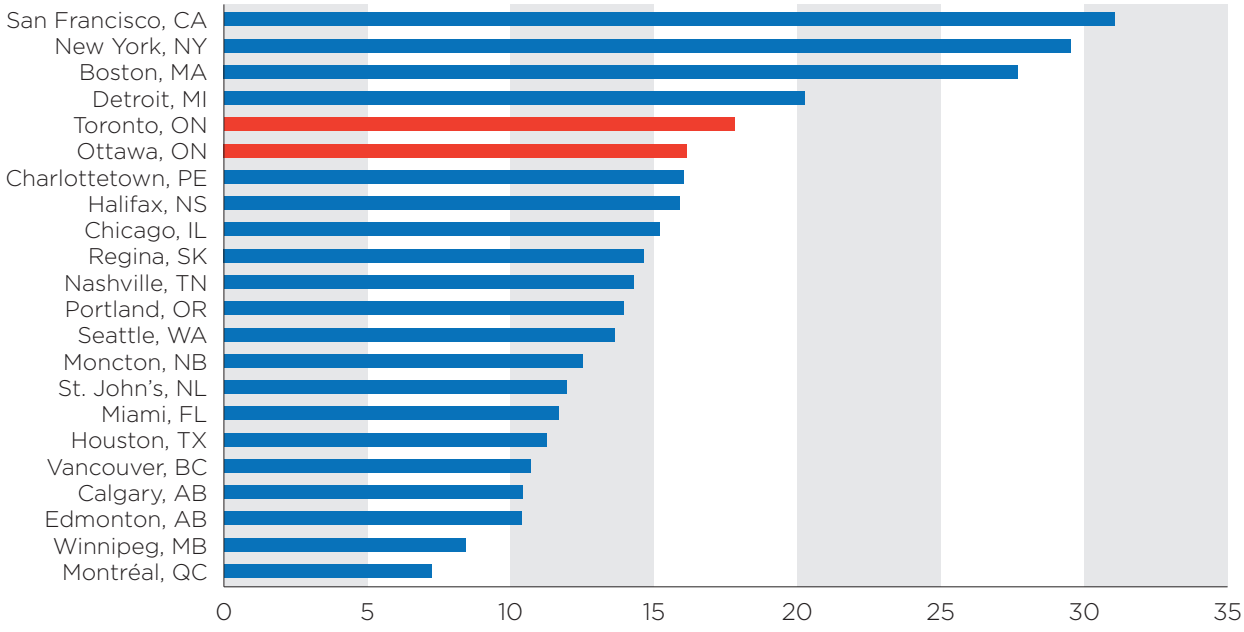
Annual Energy Costs by province (estimated 2016)



Source: Financial Accountability Office of Ontario and Hydro Quebec[8]

As a result of increased costs for generation and distribution, Ontario's residential electricity costs are the highest in Canada on a per unit basis but lower than some U.S. jurisdictions. Costs in Ontario are very low by European Standards.

Comparison of Electricity Prices in Major North American Cities (cents per kWh)



Source: generated from Hydro Quebec: Comparison of Electricity Prices in Major North American Cities[9]

Comparison of Electricity Prices in Major European Countries and Toronto (cents per kWh)

Source: Hydro Quebec: Comparison of Electricity Prices in Major North American Cities and Eurostat: Statistics Explained[10]

New electricity conservation efforts in Ontario will help people use even less power and drive down overall bills. Electricity conservation costs on average 3 cents per kwh, lower than any form of electricity generation.[11]

There remain abundant opportunities for more conservation in the future. A recent report for the IESO found that there is the potential to reduce electricity use by 35 per cent across the Ontario economy at zero cost.[12] This is called the economic potential. In reality, the full economic potential will not be achieved, but significant additional electricity and financial savings can be realized.

The Ontario government does want to increase people's use of electricity and reduce natural gas use, but the intent is not for people to switch to inefficient and expensive baseboard heaters. Highly efficient air source and ground source (geothermal) heat pumps can comfortably heat homes for costs on par with natural gas, but with a much lower emissions profile. To make the transition to heat pumps more affordable, the government will be offering a variety of incentives through the Climate Change Action Plan.[13] Ontario should introduce a program specifically designed to assist people with baseboard heaters move to more efficient and cost-effective electric heat pumps.

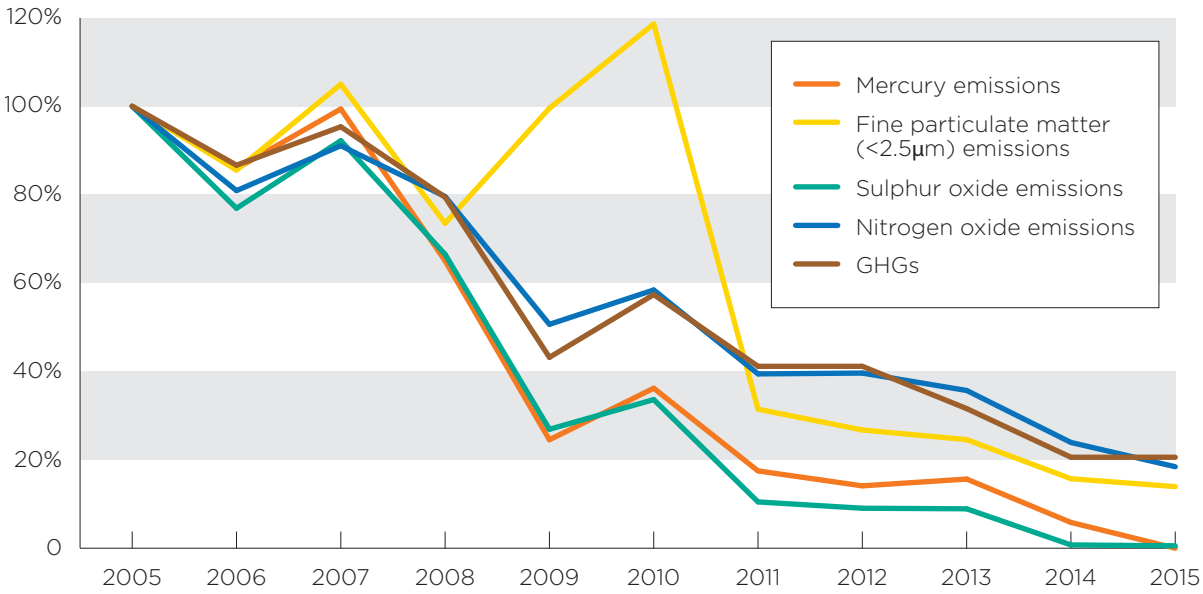
4. THE COAL PHASE-OUT AND CLEAN ENERGY TRANSITION HAS SAVED ONTARIO MONEY OVERALL

Ontario's phase-out of coal-fired electricity is still the single largest carbon pollution reduction success in North America.[14]

The coal phase-out reduced GHG emissions by approximately 34 megatonnes,[15] the equivalent of taking **7 million cars off the road**.[16] The coal phase-out also caused a dramatic reduction of nitrous oxides, sulphur dioxide, mercury and particulate matter, all of which are serious air pollutants that have adverse effects on health and the environment.

One of the most visible impacts of the coal closure is the impact on air quality in Ontario. In 2005, there were 15 smog advisories and 53 smog days in Ontario. In 2015, there were no smog advisories and only 1 in 2016.[17]

Emissions in Ontario's Energy Sector (per cent relative to 2005)



Source: IESO 2016. MODULE 1: State of the Electricity System: 10-Year Review[18]

These emissions reductions are estimated to have lead to $4.4 billion in avoided health and environmental costs annually.[19]

The annual avoided costs are an order of magnitude greater than the Auditor General's worst case assessment of the premium for renewables.

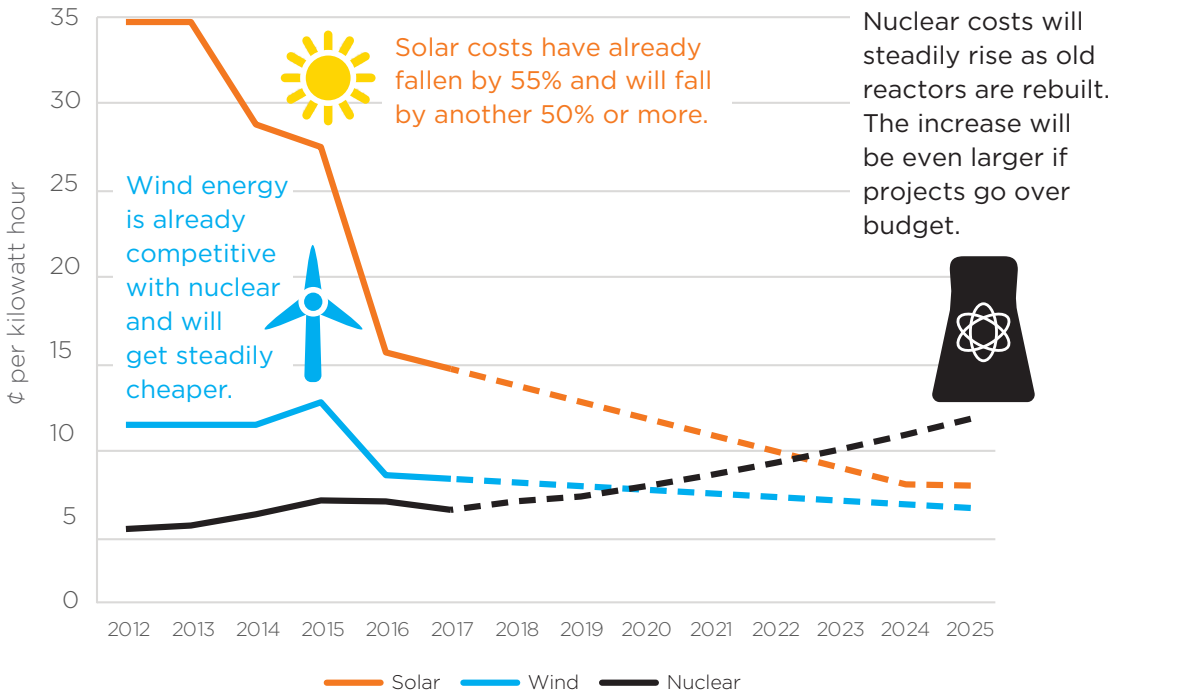
Coal closure saves **$4.4 billion per year**
Renewables premium = **$460 million per year** (according to the AG)

5. COSTS FOR NUCLEAR ARE GOING UP. COSTS FOR RENEWABLES ARE FALLING

Ontario Power Generation (OPG) has applied to increase the price they charge for nuclear power by 180 per cent to pay for the rebuilding of the Darlington nuclear reactors. According to OPG's own numbers, prices will peak at 16.8 cents per kWh.[20] These prices also assume the project will come in on budget. However, nuclear power plants in Ontario have gone over budget by 150 per cent on average which could lead to even higher prices.[21]

In contrast, in the most recent Ontario government procurement of wind and solar power, the average price for wind power was 8.6 cents per kWh and the average for solar was 15.7 cents.[22] At the low end, the province received bids for wind power as low as 6.5 cents per kWh.[23] Prices for the next procurement were widely expected to come in even lower.

Renewables vs. nuclear: Which path should Ontario follow?



Courtesy of 100REOntario.org

Solar and **wind** energy costs reflect prices paid through Ontario's FIT program and bids received in its Large Renewable Procurement program. Projected costs are averaged from NREL and IRENA forecasts for costs in 2025.

Nuclear costs are based on regulated prices paid to Ontario Power Generation (Bruce Power may receive higher prices for its power). They do not include the cost of paying off the $20 billion debt built up largely by previous over-budget nuclear projects. Costs post-2016 are based on OPG's most recent rate increase request.

All figures adjusted to 2015 CAD.

CONCLUSION

Renewable energy remains very popular in Ontario. Recent polling from EKOS shows that 74 per cent of Ontarians agree that Ontario's efforts to get off of coal and increase renewable energy was the right strategy. And 81 per cent would like to see more renewables in Ontario's future.[24]

Based on the facts presented here, it's understandable why Ontarians feel this way. While renewable energy has contributed to rising electricity costs, it is not the main driver. And, even accounting for these costs, when we also account for the benefits to air quality and environmental health, and the new jobs and economic activity created by green energy in Ontario, renewables have been a net benefit to the province.

Going forward, in light of the trends of falling costs for wind and solar power and rising costs for nuclear energy and gas, more renewable energy is the right course of action for Ontario.

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