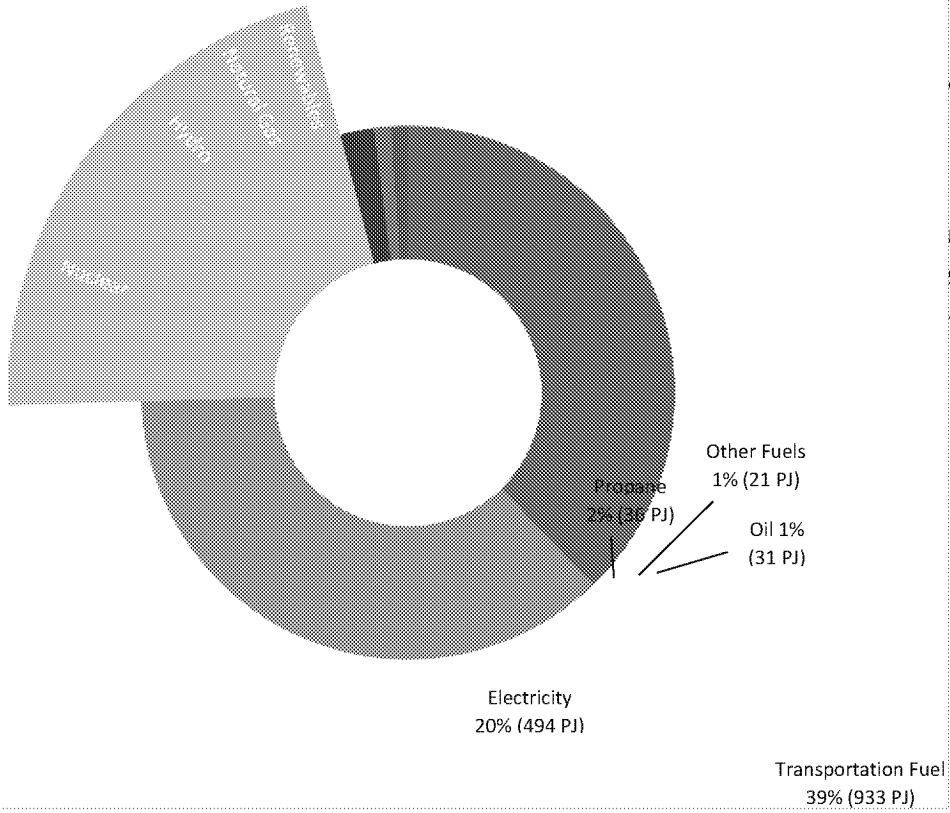
2.0 Ontario Energy Use in 2015

Contents

Abstract

This chapter provides a macro-level analysis of Ontario's energy use in 2015 and changes from previous years, in light of key factors. These factors include population and economic changes, as well as conservation programs. Overall Ontario's energy use did not change significantly from 2014, despite population and economic growth; in other words, Ontario continues to grow efficiently. Further improvements in energy efficiency are not only possible but necessary, if the province is to meet its greenhouse gas reduction targets. Thus, significant fuel switching to cleaner, non-carbon based fuels will also be needed.

A more detailed analysis of fuel-by-fuel use changes in Ontario in 2015 from 2014 was also conducted. Transportation fuel use increased slightly (possibly due to lower gas prices). Natural gas use was down (possibly due to a warmer winter). Electricity use has remained almost unchanged, though the supply mix has changed, with more generation from natural gas and small-scale renewable energy.



els[1] (39%), natural gas (37%),
se consists of propane (2%),
-fuelled.

Figure 2.1. Ontario's energy use by fuel type, non-fossil fuel sources highlighted (2015)

Note: 2015 energy use data is preliminary, meaning it is likely to be revised (typically by 1-2%) within a year by Statistic Canada. 'Other fuels' is missing data for coke and coke oven gas, and is therefore underreported anywhere from 0-120 PJ. Biofuels used for transportation or as natural gas are not shown as their use is negligible. [Numbers for electricity subsectors are placeholders only – Numbers will be revised]

Source: Statistics Canada, CANSIM table 128-0016; IESO, Generation Output by Fuel (monthly).

This report will convert each fuel's traditional metric (e.g., metres cubed, litres, and watts) to the common metric of joules for comparison purposes. A conversion table is provided at the back of this report for reference.

[1] 'Transportation fuels' include: motor gasoline, diesel fuel oil, heavy fuel oil, aviation gasoline, and aviation turbo fuel.
[2] 'Other fuels' include: coal, crude oil, petroleum coke, steam, coke and coke oven gas.

Ontario energy use has remained relatively consistent from 2007 to 2015 due to energy efficiency improvements.[1] Energy use did not increase despite an 8% growth in population and 17% economic growth (as measured by real gross domestic product) (see Figure 2.2).[2] Thus, energy use per person has decreased by 7% and per dollar of gross domestic product has decreased by 15%.

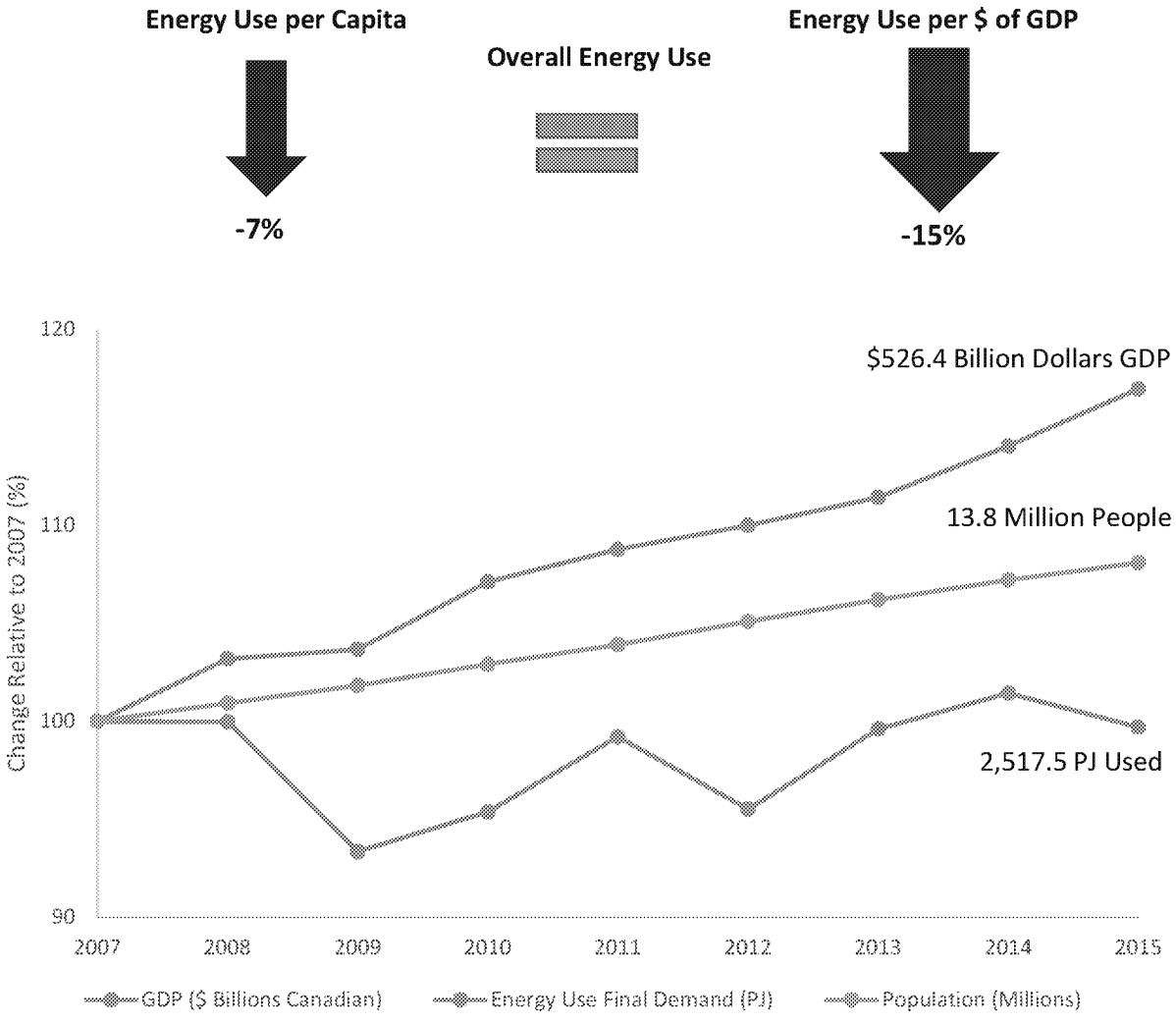


Figure 2.2. Ontario's overall energy use, population and GDP (2007-2015)

Note: 2015 energy use data is preliminary; it is likely to be revised (typically about 1-2%). Historical energy use (pre-2015) is periodically revised by Statistics Canada, so will differ slightly from what the ECO has reported in previous years.

Source: Statistics Canada, CANSIM tables 128-0016, 384-0038, and 051-0001

Note to Reader: Statistics Canada reports the province's energy use on a sector-by-sector and on a fuel-by-fuel basis; however, the data is less comprehensive on a fuel-by-fuel basis as some data is hidden for commercial confidentiality reasons.[3] Throughout this chapter, when discussing overall energy use for Ontario, the more comprehensive sector-by-sector data is used.

The potential for improved energy efficiency in Ontario is substantial. A reduction of over 25% in electricity and natural gas use is deemed economically achievable by 2030,[4] and by 2025 new vehicles sold in Canada will be 50% more efficient than they were in 2008.[5] However, as we discussed in our recent report *Developing the 2017 Long-Term Energy Plan,* current energy planning outlooks that include these energy efficiency assumptions will not enable the province to meet its 2030 greenhouse gas reduction target (37% below 1990 levels), substantial fuel switching to non-fossil fuelled sources will also need to take place.[6]

2.2 Fuel-by-Fuel Use Changes

As discussed above, overall energy use in the province are affected by macro factors, like population and GDP. Individual fuel use changes lend themselves to a slightly more granular analysis, based on changes in five key factors[7]:

- **Building codes and appliance/vehicle standards** are set and occasionally updated by the provincial and federal governments with increasingly stringent energy efficiency requirements. These help drive technological innovation. For example, compared to 1990, clothes washers use about 6 times less electricity.[8] However, due to challenges in calculating the resulting energy savings for electricity and natural gas use, they will only be discussed in relation to transportation fuel use.

- **Pricing** can also influence how much and which type of fuel a customer uses, depending on how sensitive a customer's level of consumption is to a change in price. Pricing can be affected by market forces (supply and demand), government policy, taxes, and --in the case of Ontario's natural gas and electricity-- the Ontario Energy Board (OEB). Ontario's recently established cap and trade system will also add additional costs to fossil fuel-based energy sources.

- **Weather** extremes can also drive increases in energy use, particularly natural gas use in the winter (Ontario's primary space heating fuel source, see Figure 2.4), and electricity in the summer (Ontario's main air-conditioning source).

- The **makeup of Ontario's economy** can influence the type and amount of fuels used. For example, coke and coke oven gas (categorized under "other fuels") are used almost exclusively in heavy industry, like steel manufacturing.

- ***Publicly-funded conservation programs for natural gas and electricity*** form a core part of the ECO's reporting mandate, and are assessed in detail in chapters 5 and 6 respectively. These programs provide

a financial incentive for electricity and natural gas distributors to do something for which they would otherwise have no business case: reduce how much fuel their customers purchase from them.

In 2015, the ECO estimates that the electric and gas conservation programs offered since 2006 (by the Independent Electricity System Operator and electric and gas utilities) have resulted in overall energy use in 2015 being 3% lower than it would have been in the absence of conservation programs (see Figure 2.3).

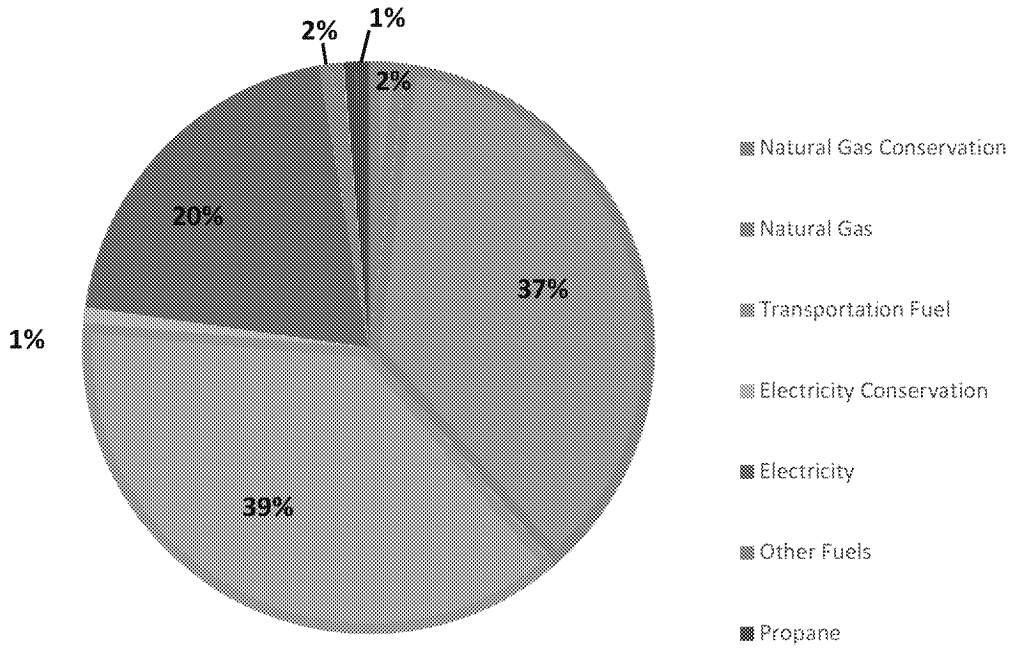


Figure 2.3. Share of overall fuel demand in Ontario, by fuel type and including demand reduced by utility-run conservation programs (2015).

Note: The percentages total 103 in order to include the 3% demand reduction due to electricity and natural conservation programs. Conservation savings are the sum of annual savings from 2006 through 2015. 2015 data is preliminary, meaning it is likely to be revised (typically about 1-2%) within a year by Statistics Canada. "Other Fuels" includes coal, crude oil, steam, petroleum coke, coke and coke oven gas. For the years 2013-2015, no data is available for coke use in Ontario, and for the year 2015, there is no data available for coke oven gas use.

Source: Statistics Canada, CANSIM table 128-0016; Enbridge and Union Gas' draft 2015 DSM reports, tables 3-8; IESO.

Below is a high-level analysis of Ontario's fuel-by-fuel use changes in 2015, taking into consideration the five factors outlined above (where practical).

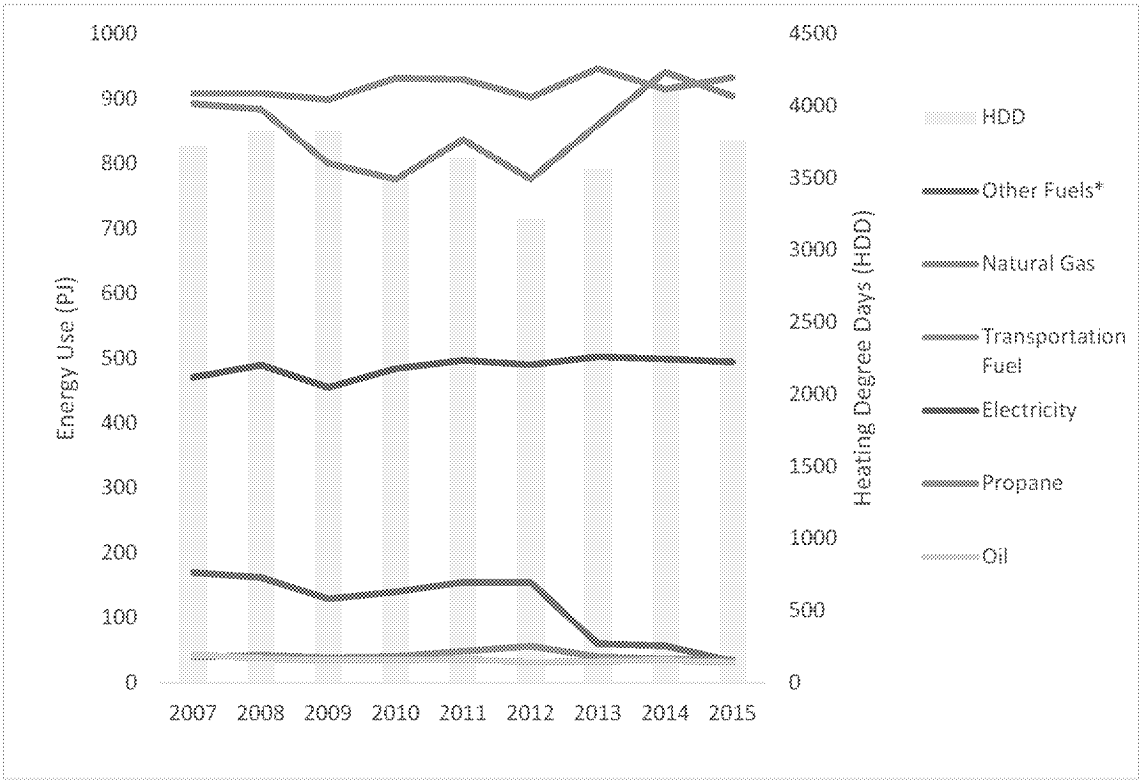


Figure 2.4. Ontario's energy use by fuel type in petajoules, and southern Ontario heating degree days (HDD) (2007-2015).

Note: 2015 data is preliminary, meaning it is likely to be revised (typically about 1-2%) within a year by Statistics Canada.

***"Other Fuels"** includes coal, crude oil, steam, petroleum coke, coke and coke oven gas. For the years 2013-2015, no data is available for coke use in Ontario, and for the year 2015, there is no data available for coke oven gas use.

Source: Statistics Canada, CANSIM table #128-0016 (see table in endnote 1 for detailed fuel use data); Environment Canada, Monthly Climate Summaries (heating degree days sourced from the Toronto International Airport weather station).

2.2.1 Transportation Fuel

In 2015 transportation fuel made up the largest share of Ontario's energy use at 39%. Its use increased by 2% over 2014 fuel use (from 915 PJ to 933 PJ). This was despite increasingly stringent fuel efficiency standards for new vehicles. In 2015, personal vehicles (including cars and light trucks) driven on Ontario roads had become almost 20% more fuel efficient on average than they were in 1990.[9]

The increase in transportation fuel use may be explained by lower gasoline prices. Gasoline prices were down 16% across Ontario in 2015 from the previous year.[10] Lower gasoline prices may influence transportation fuel use in several ways, for example individuals may choose to drive more and/or purchase less fuel efficient vehicles. Diesel use is also increasing with freight truck use as Ontario's economy continues to grow and depend more on just-in-time delivery.[11]

2.2.2 Natural Gas

Natural gas use was down by 4% in 2015 (from 941 PJ in 2014 to 904 PJ in 2015). The decrease may have been a result of temperature changes and continued government-funded conservation programs.

Ontario's main energy source for space heating is natural gas. This means warmer winters can reduce natural gas use and vice versa. Heating degree days[12] in 2015 were down by about 8% in Ontario compared to 2014, which had a particularly cold winter.[13]

Conservation programs are offered by Ontario's major natural gas distributors, Enbridge and Union Gas. Since 2006, these have resulted in a reduction in overall natural gas demand in 2015 of about 6%. This is an average of less than 1% per year of program-related savings.[14]

The above factors may have been offset to some degree by declining natural gas prices (see Figure 2.5). On average across the province residential natural gas rates in 2015 decreased by about 23% from 2014 rates (from \$18.29/m³ to \$14.12m³). Compared to residential electricity prices (the most common alternative fuel source for home heating), the cost savings from using natural gas was increased from 84% in 2014 and 89% in 2015.[15] As we discussed in our 2017 special report, *Developing Ontario's Long Term Energy Plan*, this price differential will need to be addressed if Ontario is to achieve the reduction in natural gas use necessary to achieve its GHG reduction targets.[16]

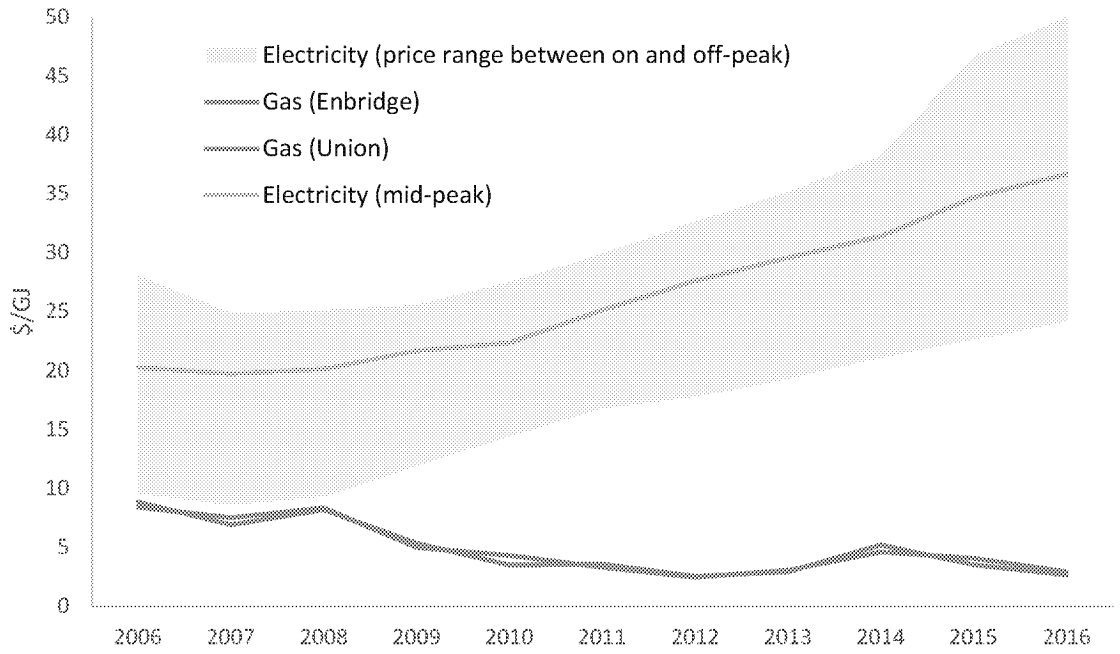


Figure 2.5. Ontario's annual residential time of use electricity prices compared to natural gas prices, per joule (2006-2016).

Note: Does not include cost of delivery to end user.

Source: Ontario Energy Board.[17]

2.2.3 Electricity

Electricity use remained steady in 2015 (from 499 PJ in 2014, to 494 PJ in 2015).[18]

Electricity conservation programs run by local electricity distribution companies (LDCs) and the IESO between 2006 and 2015 resulted in 20.75 PJ of electricity savings in 2015 (4% of electricity use in 2015).[19] For a more detailed discussion of LDC-run electricity conservation programs, see chapter 6. If we also consider codes and standards, pricing policies, and federal conservation programs, conservation savings totalled an estimated 48.7 PJ or 9.5% of electricity use in 2015.[20] For more details on progress towards province-wide electricity conservation targets, see chapter 3.

The electricity supply mix (i.e., the type of generation from which electricity was produced) changed substantially year over year. This despite total energy use remaining relatively stable. In 2015, there was an increase of more than 15% of electricity produced from embedded generation (i.e., distributed energy, connected to local distribution systems instead of the high-voltage transmission grid), from 5.1 TWh in 2014 to 6 TWh in 2015, the biggest increase being solar (see figures 2.8 and 2.9). Coal finally went down to 0% of electricity production in 2015 (from 84 GWh, 0.1% of production, in 2014), bringing to a completion the province's coal-phase out that began in 2005. And, natural gas use for electricity generation went up about 4%, despite a milder winter in 2015, which would be expected to reduce the use of gas-fired generation.[21] This increase in natural gas may be partially explained by several nuclear shutdowns in September (see Figure 2.10).[22]

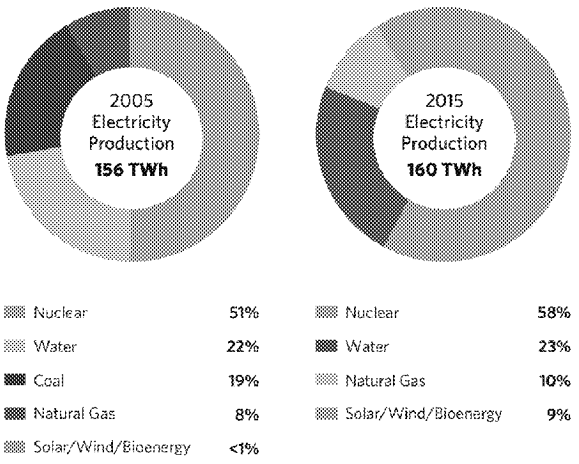


Figure 2.6. Ontario's electricity production by fuel source (2005 vs. 2015)

Note: Includes both electricity produced to meet Ontario demand (143 TWh in 2015, including embedded generation), and net exports (17 TWh in 2015).[23]

Source: IESO, Ontario Planning Outlook 2016, Figure 2.

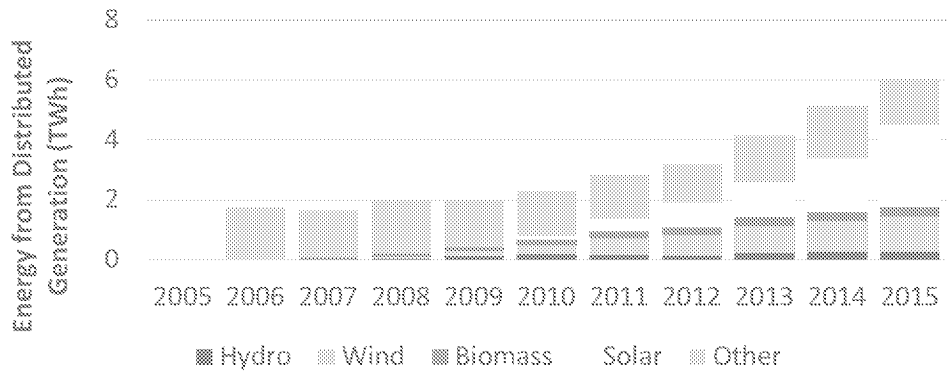


Figure 2.7. Annual distribution-connected (i.e. embedded) energy production (2005-2015)

Note: Includes resources that are distributed but not under an IESO contract or standard offer program. These are mostly distribution connected hydropower resources and some gas-fired generation (e.g. CHP).

Source: IESO.

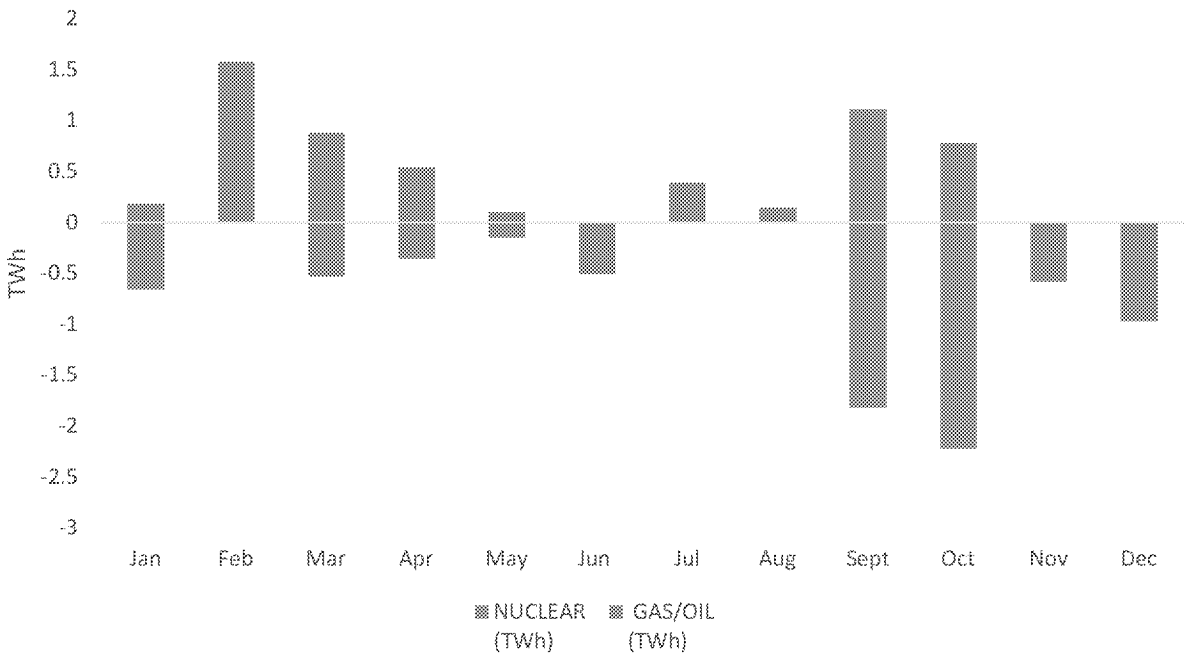


Figure 2.8. Monthly change in electricity production from nuclear and natural gas/oil in terawatt-hours (Ontario, 2014 - 2015).

Source: IESO.[24]

2.1.5 Why Ontario Electricity Prices are on the Rise

Ontario electricity prices have been climbing steadily since 2008 (as shown in Figure 2.11). The main reason for this increase can be explained by the largest portion of customer electricity rates: the global adjustment.

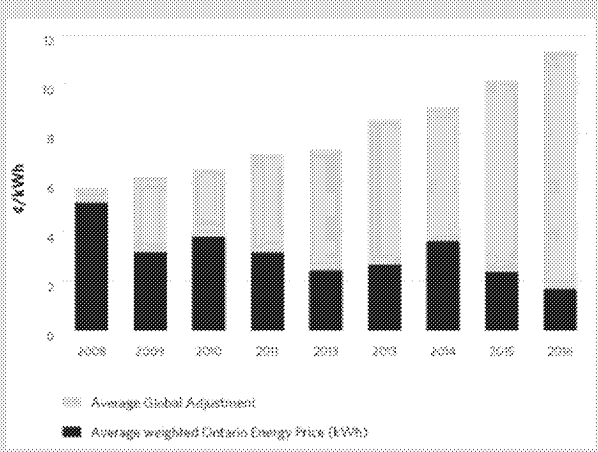


Figure 2.9. Ontario electricity pricing trends (2008-2016)

Source: IESO

The global adjustment is an Ontario-specific electricity term. It captures contractual costs that are not recovered by the wholesale market price for electricity (because of the dominance of fixed contracts, the wholesale market price in Ontario now generally recovers only the fuel and operating costs associated with electricity generation). These contractual costs include the capital costs of electricity production and to a smaller degree the cost to avoid building new electricity infrastructure (i.e., conservation programs).

The global adjustment has been increasing because of major capital investments that have been made in recent years as a result of the province's decisions to refurbish nuclear plants, close coal plants (which required investments in new natural gas), and procure renewable energy. In 2015, the cost of new and refurbished generation - natural gas, nuclear, and renewables – made up the largest share of the global adjustment (95%), while conservation programs represented only 5% (see Figure 2.12).

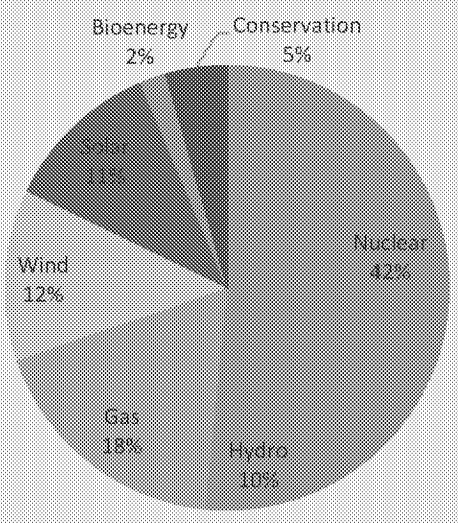


Figure 2.10. Estimated cost components of the Global Adjustment, by electricity resource (2015)

Source: Ontario Energy Board; Independent Electricity System Operator[25]

Although electricity rates have been increasing steadily in Ontario, there are still many jurisdictions in North America with higher electricity rates, for example: Massachusetts, New York and California.[26] And, even though Ontario may have the highest electricity rates in Canada, its overall home energy costs are in the middle of the pack, due to the dominant use of inexpensive natural gas for home heating, in contrast to some other provinces.[27]

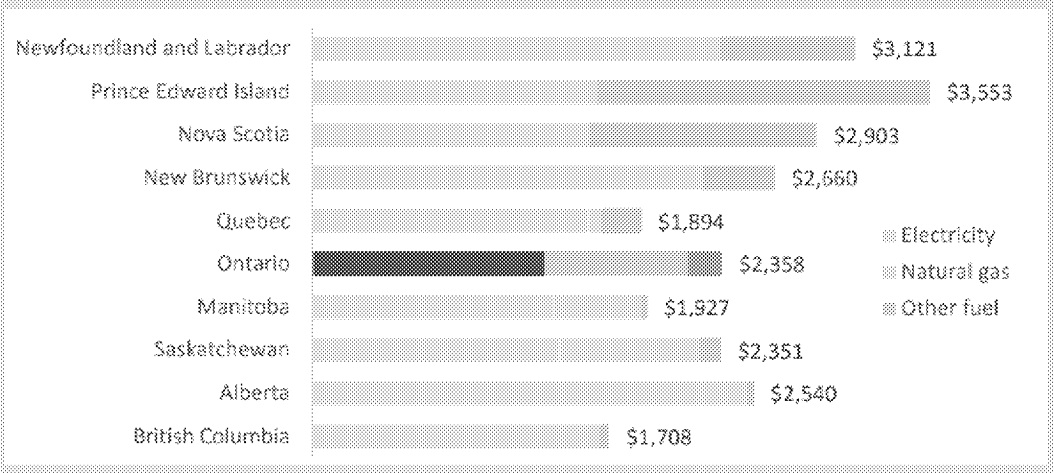


Figure 2.11. Average household home energy spending (2014)

Source: FAO analysis of data from the Statistics Canada survey of household spending.

2.2.6 Propane, Oil, and Other Fuels

Propane use (typically for home heating in rural areas, or for mobile industry uses) remained steady (from 37 to 36 PJ). Oil use (typically for home heating) dropped slightly (from 35 to 31 PJ). As with natural gas, this reduction may be partially explained by a warmer winter. Ontario's remaining energy sources (i.e. 'other fuels'), which include steam, coal, petroleum coke, and coke oven gas, are not possible to analyze because Statistics Canada has not disclosed coke use data for 2013-2015 and coke oven gas data for 2015.

2.3 Sector-by-Sector Energy Use Changes

There was no significant shift in how energy use was distributed between Ontario's sectors (see Figure 2.13). The small shift in the industrial sector's fuel use is partially attributable to the missing coke oven gas data for 2015. The preliminary nature of the 2015 energy use data could also be partially responsible.

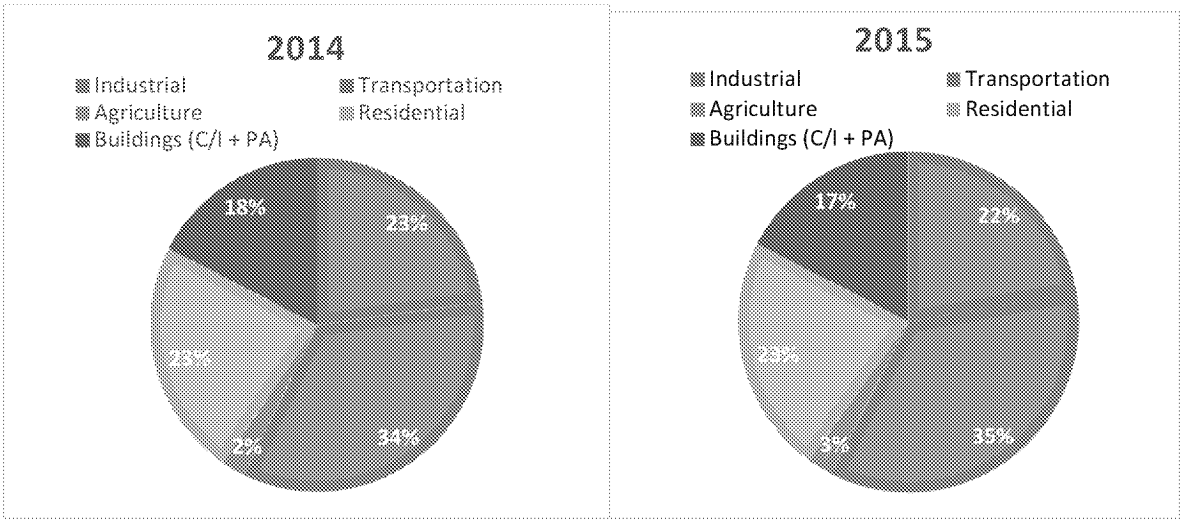


Figure 2.12. Ontario's fuel use by sector (2014 vs. 2015)

Note: 2015 data is preliminary, meaning it is likely to be revised (typically about 1-2%) within a year by Statistics Canada.

Source: Statistics Canada, CANSIM table 128-0016.

2.4 Improvements to Electricity Use Reporting for Ontario

Where feasible, our office seeks to improve the quality of publicly available fuel use data for Ontario. Over this past year our office aimed to improve Statistics Canada's electricity use data by initiating communication between Statistics Canada and Ontario's Independent Electricity System Operator (IESO). As a result, Statistics Canada has significantly adjusted its electricity use numbers for Ontario for 2009-2015.

The macro-adjustment made by Statistics Canada to its electricity use data going back to 2009 included:

- accounting for electricity used by local distribution companies (LDCs) on the low voltage grid, and

- using IESO data as a control for Statistics Canada's survey-based electricity generation and imports and exports data.

As Table 2.1 (below) makes clear, the data from both sources is still not exactly aligned.

Table 2.1. Statistic Canada Electricity Use Methodological Change in 2017: 2014 Case Study.

Ontario 2014 Electricity Use Final Demand		
Preliminary (Statistics Canada)	117.888 TWh	+17.5%
Adjusted (Statistics Canada)	138.587 TWh	-3.8%
IESO (including embedded generation, not including off-grid generation)	143 TWh	

Source: Statistics Canada and IESO.

According to Statistics Canada, IESO data was not adopted wholesale for the following reasons:

1) IESO data does not account for off-grid electricity use;
2) Statistics Canada also benefits from survey-based data;[28] and
3) IESO had not provided its embedded generation data.

Going forward Statistics Canada has indicated that as part of their efforts to improve the quality of their electricity use data for Ontario, they have reduced the threshold of one of their feeder surveys to include more renewable energy companies and will continue their information sharing project with the IESO.

Endnotes

[1] From 2,525 PJ in 2007 to 2,517.5 PJ in 2015. (However, 2015 data is preliminary. Factors influencing revisions include late receipt of company data and revisions to previously estimated or reported data. Preliminary Data is typically revised within a year of publication, often by 1-2%. At the time of writing (mid-2017), preliminary 2015 energy use data for Ontario was the most current data available from Statistics Canada, which provides the only comprehensive and consistently reported energy use dataset available for Ontario. (See Statistics Canada CANSIM table 128-0016.)

[2] Population in 2007 was 12.8 million, in 2015 it was 13.8 million (Ministry of Finance); From $450 billion to a $526 billion gross domestic product (expenditure-based, in chained 2007 dollars, as calculated by Statistic Canada, CANSIM Table 384-0038.

[3] According to preliminary fuel-by-fuel use data, in 2015, Ontario's overall energy use decreased slightly (-2%) from 2014 (from 2,483 PJ to 2,431 PJ). And, since 2007, Ontario's overall energy use data has decreased by about 4% (rom 2,525 PJ to 2,431 PJ). However, it is not possible to conclude an overall energy reduction trend from this data because:

- 2015 data is preliminary, and is typically adjusted by 1-2%;
- coke oven gas use data is missing for 2015, which typically represents 20-26 PJ (about 1% of energy use); and
- coke use data is missing for 2014 and 2015, which typically represents 80-100 PJ (about 4% of energy use).

According to Statistics Canada coke and coke oven gas data was not reported for commercial confidentiality reasons. However, Statistics Canada also reports the province's energy use on a sector-by-sector basis, where the confidential fuel use data is hidden (see Section 2.3).

Fuel-by-Fuel Energy Use Final Demand Data for Ontario (per Statistics Canada CANSIM table 128-0016)																				
Year	[illegible]	[illegible]	motor	diesel	heat	aviation	aviation	[illegible]	[illegible]	coal	steam	petrole	coke	coke	[illegible]	[illegible]	[illegible]

2007	892	909	*554*	*258*	*33*	0.5	63	471	170	12	10	24	98	25	40	44	**2,525.21**
2008	884	909	*550*	*259*	*29*	0.5	70	490	162	11	9	21	96	26	43	37	**2,524.39**
2009	801	899	*570*	*246*	*19*	0.4	63	455	130	10	7	20	72	20	38	34	**2,357.01**
2010	776	932	*587*	*264*	*20*	0.3	60	484	140	15	3	18	82	22	41	35	**2,408.44**
2011	837	930	*577*	*280*	*16*	0.3	57	497	155	16	7	17	90	26	49	37	**2,504.90**
2012	777	902	*539*	*277*	*18*	0.2	69	490	155	16	6	18	89	26	56	32	**2,411.86**
2013	860	947	*572*	*280*	*23*	0.2	72	503	60	15	5	16	n/a	24	40	33	**2,442.75**
2014	941	915	*559*	*265*	*21*	0.2	71	499	57	19	4	11	n/a	23	37	35	**2,483.33**
2015 *(preliminary)*	904	933	*568*	*277*	*16*	0.3	72	494	33	17	4	12	n/a	n/a	36	31	**2,431.12**

Sector-by-Sector Energy Use Final Demand for Ontario (Statistics Canada par CANSIM table 128-0016)							
Year	**Industrial**	**Transportation**	**Agriculture**	**Residential**	**Buildings (C/I + PA)**	**Energy Use Final Demand**	***Fuel-by-fuel Total***
2007	678.603	856.228	51.155	544.201	395.019	**2,525.21**	*2,525.21*
2008	663.33	851.646	52.718	558.93	398.02	**2,524.64**	*2,524.39*
2009	553.657	852.428	46.269	525.273	379.392	**2,357.02**	*2,357.01*
2010	571.342	877.537	60.459	519.878	379.222	**2,408.44**	*2,408.44*
2011	604.308	870.641	65.371	551.593	413.294	**2,505.21**	*2,504.90*
2012	604.738	849.845	62.3	511.34	383.635	**2,411.86**	*2,411.86*
2013	585.761	889.997	64.437	555.684	419.097	**2,514.98**	*2,442.75*
2014	584.53	880.543	59.269	590.548	446.479	**2,561.37**	*2,483.33*
2015 *(preliminary)*	558.429	888.822	61.864	570.918	437.444	**2,517.48**	*2,431.12*

[4] 26.5% by 2030 for natural gas (ICF International, *Natural Gas Conservation Potential Study: Final Report* (2016) at iv); 31% by 2035 for electricity, which includes behind the meter generation and an assumption of 11% increase in electricity use (IESO, *Achievable Potential Study: Long Term Analysis* (25 November 2016) at 2, 5, and 43); Greater efficiencies are possible though not currently economical.

[5] Government of Canada, news release, *Harper government Improves Fuel Efficiency of Canadian Vehicles,* November 27, 2012, www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=33B625CB-653E-4766-8C92-ACA551C94AB0)

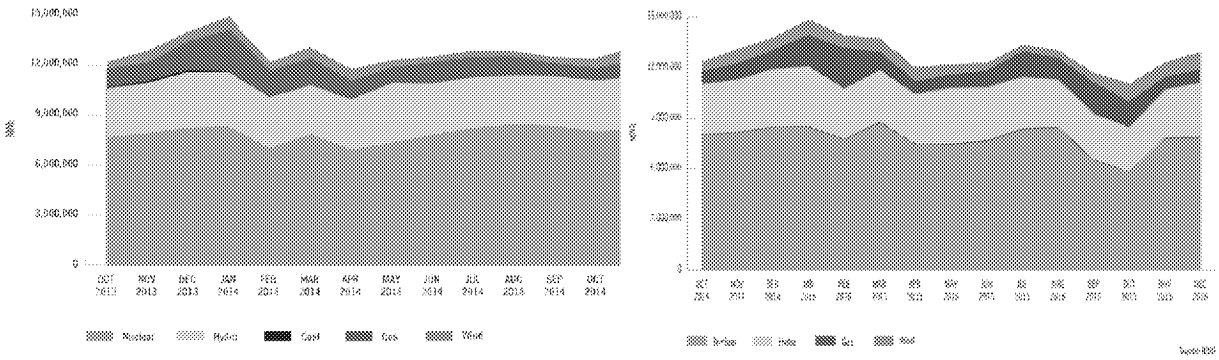
[6] All scenarios considered in the Ontario Planning Outlook and the Fuels Technical Report (which both feed into the 2017 Long Term Energy Plan) assume economically achievable electricity and natural gas efficiencies as well as vehicle efficiency regulations. None of the outlooks come close to meeting the energy system's proportional share of the 2030 GHG target. (Environmental Commissioner of Ontario, *Developing the 2017 Long-Term Energy Plan,* December 2016, Figure 3.)
[7] There is some degree of efficiency that would take place independent of these five factors due to technical innovation.
[8] Natural Resources Canada, *Improving Energy Performance in Canada, Report to Parliament Under the* Energy Efficiency Act *2-13-2015,* 2016, Figure 2.
[9] Natural Resources Canada, *Comprehensive Energy Use Database* (2016), Transportation Sector, Ontario, Table 9: Road Transportation Secondary Energy Use and GHG Emissions by Energy Source.
[10] Ontario Ministry of Energy, Fuel Prices, online: www.energy.gov.on.ca/en/fuel-prices/?fuel=REG&yr=2014.

Average annual regular unleaded gasoline price ($)	2014	2015	% change 2642014→2015
Northern Ontario	133.2	111.3	-16
Southern Ontario	126.8	104.7	-17

[11] See: http://www.mto.gov.on.ca/english/publications/pdfs/freight-supportive-guidelines-english.pdf.
[12] Heating degree days is a measure of the annual sum of the degrees of the average daily temperature for all days below 18 °C. The higher the HDD value, the colder the location. (per Natural Resources Canada, www.nrcan.gc.ca/energy/products/categories/fenestration/13954)
[13] Government of Canada, Monthly Climate Summaries, online: climate.weather.gc.ca/prods_servs/cdn_climate_summary_e.html.

	Toronto Int'l Airport Weather Station		Timmins A Weather Station	
Year	Heating Degree Days	Cooling Degree Days	Heating Degree Days	Cooling Degree Days
2014	4,103	264	6,502	56
2015	3,766	351	5,975	102
% Change 2014→ 2015	-8	+33	-8	+82

[14] Draft 2015 DSM reports for both Enbridge and Union Gas, Tables 3-8. (6% is based on adding annual net natural gas savings from 2007-2015, compared to overall natural gas use in 2015).
[15] Based on a comparison of energy equivalent commodity prices that excludes delivery to the end user.
[16] Environmental Commissioner of Ontario, *Developing the 2017 Long-Term Energy Plan,* at 13.
[17] "Historical Natural Gas Rates", online: Ontario Energy Board <www.oeb.ca/rates-and-your-bill/natural-gas-rates/historical-natural-gas-rates>; "Historical Electricity Rates", online: Ontario Energy Board <www.oeb.ca/rates-and-your-bill/electricity-rates/historical-electricity-rates>.
[18] Although Ontario's Independent Electricity System Operator (IESO) electricity demand data is different and potentially more accurate (518 PJ in 2014 to 515 PJ in 2015), for consistency purposes across fuels, we enlist Statistics Canada data for our macro-level analysis of Ontario's energy use. Both sources indicate that electricity use reduced slightly from 2014 to 2015 (>1%). (Ontario Planning Outlook, September 2016, Figure 4 and Appendix B, Module 2, Slide 6 and 7.)
[19] Information request response from IESO. 5,763 GWh = 20.75 PJ, which represents 4% of IESOs electricity use data for 2015 (see previous endnote)
[20] 13,530 GWh = 48.7 PJ. Based on IESO's electricity use data for 2015. (see endnote 15)
[21] IESO, month-by-month fuel output reports.
[22] Scheduled Emergency nuclear shutdowns in 2015 are listed here: <nuclearsafety.gc.ca/eng/acts-and-regulations/event-reports-for-major-nuclear-facilities/event-reporting/nuclear-power-plants.cfm>.
[23] net exports of 17 TWh, 10% of electricity production. (IESO, Ontario Planning Outlook, Page ref)
[24] See also (from Ontario Energy Report):



[25] Ontario Energy Board, *Regulated Price Plan Price Report, November 1, 2014 to October 31, 2015* (OEB, 2014) at 17, 20. Independent Electricity System Operator, information provided to the ECO in response to ECO inquiry, April 6, 2017.

[26] P.4, www.hydroquebec.com/publications/en/docs/comparaison-electricity-prices/comp_2016_en.pdf#page=6

[27] www.fao-on.org/web/default/files/commentaries/1602%20Home%20energy/FA1602%20Home%20Energy%20Cost%20Commentary%20FINAL_ENG.pdf

[28] StatsCan (RESD) uses data they receive from the Annual Supply and Disposition Survey which takes into account: (1) Producer consumption (i.e., electricity consumed by a business for its own use); (2) LDCs on the low voltage grid; (3) transmission losses.