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ELECTRICITY REFORM IN ONTARIO

Getting Power Prices Down

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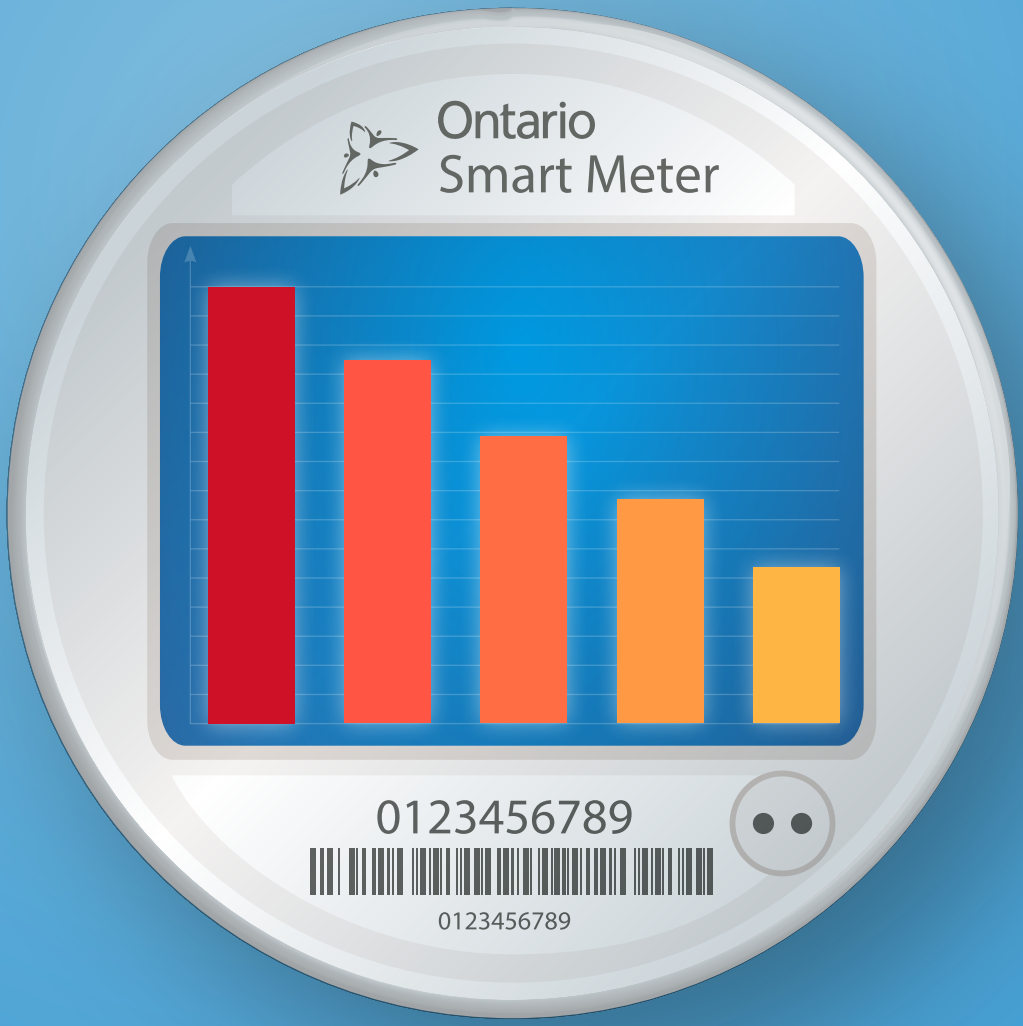

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Executive Summary

Ontario's implementation of the Green Energy Act (GEA) has resulted in high electricity costs across the province. The centerpiece of the act includes a schedule of subsidized electricity purchase contracts called Feed-in-Tariffs (FITs), that provide long-term guarantees of above-market rates to generators of renewable sources (wind, solar, bio-energy, and some hydro).

In order to fund FIT contracts and other system costs that are not recovered from wholesale electricity market earnings (including the costs of conservation programs, gas-capacity expansion, and nuclear-power refurbishment programs), Ontario levied a surcharge on electricity prices called the Global Adjustment (GA). Between 2008 and 2017, the GA grew from under one cent per kWh to about 10 cents, causing a drastic increase in electricity prices. Therefore, the key to lowering electricity prices in Ontario is to reduce the GA.

In this study, we break the GA down into its components to better understand the cause of the drastic increase and thereby provide some specific recommendations on how to lower electricity costs.

We looked at the evolution of the GA components over time and found that the share allocated to renewables has risen substantially. The renewable component represented about 20 percent of the GA cost in 2011/2012 but is now nearly 40 percent, making it the largest single component. This growth becomes more problematic when considering the fact that renewables (wind, solar and biomass) accounted for just under 7 percent of Ontario's electricity output.

Notably, almost all revenue earned by renewable power producers is from the GA subsidy rather than actual power sales. From May 2017 to April 2018, market revenues for renewable generators based on wholesale market sales totaled about $0.5 billion, which was supplemented by $4.2 billion from GA revenues to satisfy FIT contract requirements. In other words, almost 90 percent of the revenue to renewable generators came through the GA subsidy, rather than through sales of actual power.

The Ontario government recently introduced legislation to scrap the Green Energy Act, acknowledging that the act has resulted in skyrocketing electricity prices in the province. This will help prevent further price

increases but will not bring the GA down. The logical next step for the government would be to use its legislative powers to cancel funding commitments under the FIT contracts. This would reduce the GA by almost 40 percent, resulting in an approximately 24 percent reduction in residential electricity prices.

In addition to cancelling the existing FIT contracts, the Ontario government could take further action to reform various other components of the GA, including reducing payments to the relatively new small-scale hydroelectric plants of Ontario Power Generation (OPG) and cutting funding for unneeded conservations programs. In order to quantify the potential consumer price reductions from such measures it would be necessary to examine detailed GA allocation accounts, which have not been released publicly.

Introduction

Ontario's new government has committed to reducing the cost of electricity. Ontario's rising power costs have been blamed in part on the province's 2009 Green Energy Act (GEA). In May 2009, the province passed the Ontario Green Energy and Green Economy Act, which sought to expand production of renewable energy, encourage energy conservation, and create new jobs. Its centerpiece was a program called the Feed-in Tariff, designed to accelerate investment in renewable energy sources. Under this program, the province started offering long-term guaranteed contracts to generators using renewable sources (wind, solar, bio-energy, and some hydro) at a fixed purchase price well above market rates.

The new Conservative government in Ontario recently introduced legislation to scrap the GEA in an effort to lower electricity costs. In this report we explain why Ontario power costs rose as much as they did over the past decade, and we offer some specific recommendations for reversing the trend. We also quantify the impact of terminating existing subsidies to renewable energy sources, which would require action in addition to scrapping the GEA.

Ontario power prices consist of the wholesale cost, called the Hourly Ontario Energy Price (HOEP), and a surcharge called the Global Adjustment (GA). Over the past decade the HOEP has declined, but the GA has soared (see next section). Consequently, the key to lowering electricity prices is reducing the Global Adjustment. In this report we explain why the GA is levied and what the money is used for. It is triggered by a combination of discretionary spending and contractual commitments by the province, both of which need to be revised downward, as we will explain.

The reforms we propose herein will not undo all the damage of the policy changes of the past decade, but they will make a constructive start. We estimate that the measures we propose will reduce average electricity prices by at least 3.8 cents per kilowatt hour (kWh). We also propose other potential cost reductions and provide illustrative calculations of their potential effects, though quantifying their likely benefits for consumers

would require more detailed information on GA allocation accounts than we had access to.

This study proceeds as follows. We begin by providing background information on the two components of Ontario electricity prices. The next section breaks down the GA allocations into its components and illustrates the evolution of those components. The final section offers specific recommendations for reducing the GA and estimates the potential reductions from doing so.

The Two Components of Ontario Electricity Prices

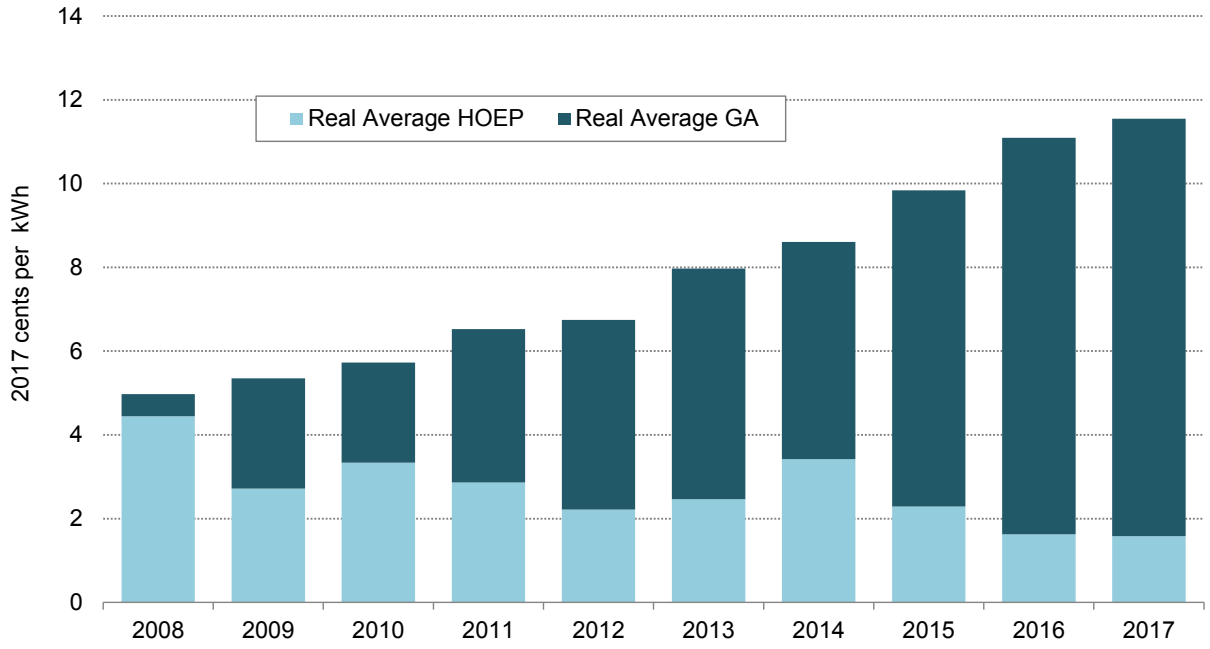
The Hourly Ontario Energy Price (HOEP) is an average, market-clearing price for electricity set each hour, based on the demand and supply for electricity, and is determined by a competitive process through offers submitted by generators. The HOEP was the primary mechanism by which consumers compensated generators for supplying electricity to the Ontario power grid prior to the introduction of the Global Adjustment.

The GA is a surcharge that consumers pay to make up revenue shortfalls between contracted costs (provincially-guaranteed rates for certain favoured classes of generators) and wholesale market revenue, as well as other non-market interventions such as conservation programs, and some costs related to nuclear power and gas capacity projects (IESO, undated). The GA in particular enables the province to fund so-called Feed-in-Tariff contracts (above-market rates for renewable generators) and other system costs that are not recovered from wholesale electricity market earnings. Since the GA is determined in part by the gap between the HOEP and the guaranteed payment level it has an inverse relationship with the HOEP.

The HOEP and the GA, which together constitute the commodity cost, are only a portion of the total electricity costs that ratepayers bear. The remainder is made up of transmission and distribution charges, wholesale market services, and a tax called the Debt Retirement Charge (DRC). However, among all the components of electricity costs, the commodity portion is the largest one, accounting for 62 percent of the total cost of electricity in 2014 (Auditor General of Ontario, 2015). The commodity cost has also been the fastest growing segment of total electricity costs, rising by 45 percent (adjusted for inflation) from 2005 to 2016 (McKitrick and Aliakbari, 2017).

Figure 1 shows the evolution of the HOEP and the GA from 2008 to 2017. In general, this portion of the bill has grown by a staggering 132 percent, from 4.97 cents per kWh in 2008 to 11.55 cents per kWh in

Figure 1: Real Average Hourly Ontario Energy Price (HOEP) and Average Global Adjustment (GA), 2008–2017 (in 2017 cents/kWh)



Source: IESO (undated).

2017.[1] The most dramatic change, however, has been the growth of the GA. In 2008, the average GA price was 0.52 cents per kWh or 11 percent of the commodity cost. By 2017 the GA increased to 9.97 cents per kWh, representing 86 percent of the commodity cost. The significant increase in the GA occurred while the wholesale electricity component declined over the same period, becoming a relatively small fraction of the commodity cost. Between 2008 and 2017, the HOEP portion of the commodity cost declined by 64 percent, from 4.45 cents per kWh in 2008 to 1.58 cents per kWh in 2017. Therefore, it is clear that the drastic increase in the GA, not the wholesale price, is the cause of rising electricity prices in Ontario.

Ontario used to have low electricity costs. However, as figure 1 shows, largely as a result of the surging GA, Ontario electricity prices have soared. Ontario had the fastest growing electricity costs in the country and among the highest in North America between 2008 and 2016. Over this period, Ontario's residential electricity costs increased by 71 percent,

[1] All prices are in 2017 dollars.

far outpacing the 34 percent average growth in electricity prices across Canada (Jackson et al., 2017).

Ontario's skyrocketing electricity rates also apply to the province's industrial sector. Between 2010 and 2016, large industrial users in Toronto and Ottawa experienced cost spikes of 53 percent and 46 percent, respectively, while the average increase in electricity costs for the rest of Canada was only 14 percent. In 2016, large industrial users in Ontario paid almost three times more than consumers in Montreal and Calgary, and almost twice the prices paid by large consumers in Vancouver. Some select large industrial consumers were granted rate reductions but still paid higher rates than large electricity users in Quebec, Alberta, and British Columbia (McKitrick and Aliakbari, 2017).

There is a structural linkage between the GA and the HOEP that implies that the total commodity cost will not decline on a one-for-one basis as the GA goes down. When, for example, wind power producers are guaranteed revenue for any electricity they produce, they have an incentive to maximize output even when there is excess market supply. This tends to depress the HOEP, which in turn increases payments owing to other power producers outside of the wind sector who have revenue guarantees from the government, thus increasing the GA by more than the simple amount owing to the wind producers (McKitrick and Adams, 2014). If the revenue guarantees were rescinded, the amount owing on the GA would disappear, but so would the incentive to over-produce power, so while the GA would decline, the HOEP would increase, partially offsetting the benefit from the GA reduction. We will need to take this effect into account when we estimate the potential benefits from reducing GA liabilities.

Where the Global Adjustment Money Goes

As reported by the IESO (2018b) and as of this writing, the Global Adjustment recovers costs associated with the following:

1. Contracts for wind generation,
2. Contracts for biomass, landfill gas, and byproduct fuels generation
3. Contracts for hydro-electric generation (both Ontario Power Generation (OPG) and non-OPG)
4. Contracts for nuclear generation (both OPG and non-OPG)
5. Contracts for natural gas,
6. Contracts for solar generation,
7. "Industrial Electricity Incentive" programs,
8. "Funds and Financing" (which includes programs supporting community groups in the design and delivery of renewable energy initiatives and also includes contract penalties received from generators),
9. Conservation, and
10. Non-utility generation contracts held by the Ontario Electricity Finance Corporation (OEFC).

Individual amounts for each of these categories are not publicly available. From 2011 to 2017 the Ontario Energy Board (OEB) published Regulated Price Plan (RPP) Price Reports with details about the allocation of GA revenues across four large groupings. We will use the data from these reports to analyze the main drivers of the GA.

The 2017 RPP report projects a total of $11.2 billion in GA allocations over 2017–18, to be broken down as follows.

- *For renewable power generators:* $4.2 billion (38 percent). This represents the difference between estimated payment guarantees under contracts with the government ($4.7 billion) and estimat-

Table 1: Breakdown of Global Adjustment Components by Cost ($ billions and percentage of total)

Period	Renewable power generators	Prescribed OPG nuclear and hydro generators	Non-utility generators and others	Conservation programs, gas capacity and Bruce Nuclear
2017-2018	4.2	2.6	0.3	4.1
	38%	23%	3%	37%
2016-2017	3.8	3.2	0.6	4.0
	33%	28%	5%	34%
2015-2016	3.2	3.0	0.7	3.6
	30%	29%	7%	34%
2014-2015	3.0	1.7	0.8	3.2
	34%	20%	9%	37%
2013-2014	1.9	2.4	1.0	3.5
	22%	27%	11%	40%
2012-2013	1.3	2.0	1.2	3.1
	17%	26%	16%	41%
2011-2012	0.8	0.7	0.8	1.6
	21%	18%	21%	41%

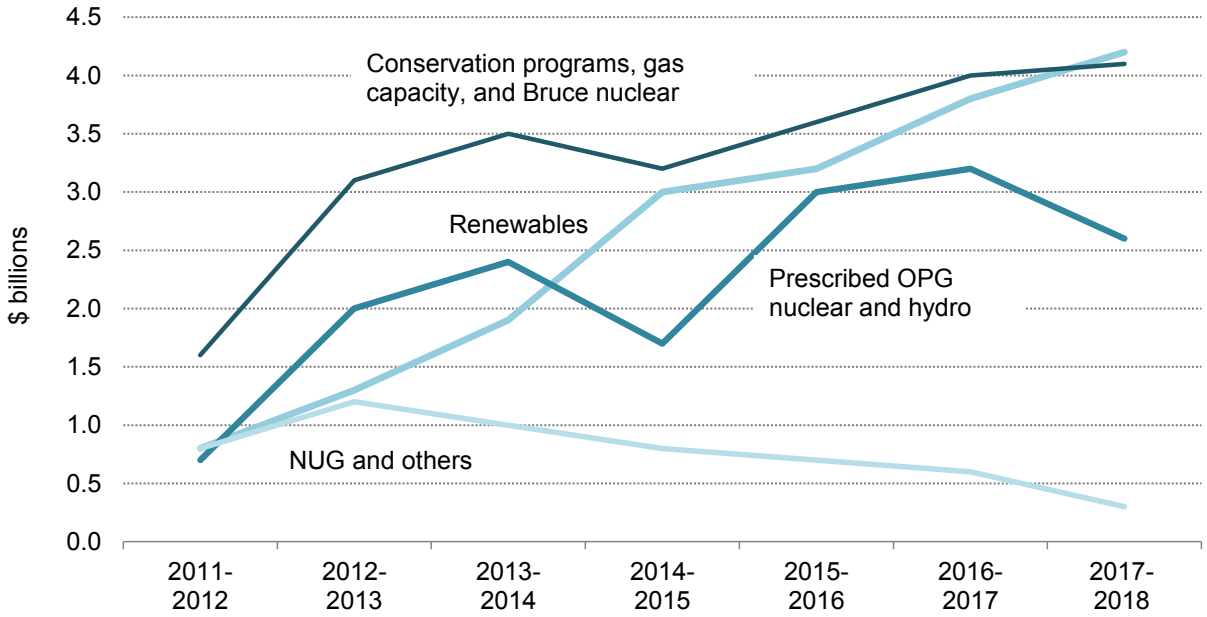
Sources: OEB RPP price reports (2017, 2016, 2015, 2014, 2013, 2012, and 2011).

ed market revenues from electricity sales ($0.5 billion) (Ontario Energy Board, 2017: 16)

- *For prescribed OPG nuclear and hydro generators*: $2.6 billion (23 percent). This represents the difference between estimated payment guarantees under contracts with the government ($4.2 billion) and estimated market revenues from electricity sales ($1.6 billion) (Ontario Energy Board, 2017: 14–15).
- *For Non-Utility Generators and others:* $0.3 billion (3 percent). This represents the difference between estimated payment guarantees under contracts with the government ($0.4 billion) and estimated market revenues from electricity sales ($0.1 billion) (Ontario Energy Board, 2017: 15).
- For energy conservation programs, gas capacity contracts, and Bruce Nuclear: $4.1 billion (37 percent) (Ontario Energy Board, 2017: 16–18).

Table 1 displays the allocations of the GA requirements into these four components from 2011 to 2017 based on figures drawn from the Ontario Energy Board's RPP reports over the same period. Figure 2 shows the same data graphically.

Figure 2: Evolution of the Global Adjustment's Components from 2011–2018



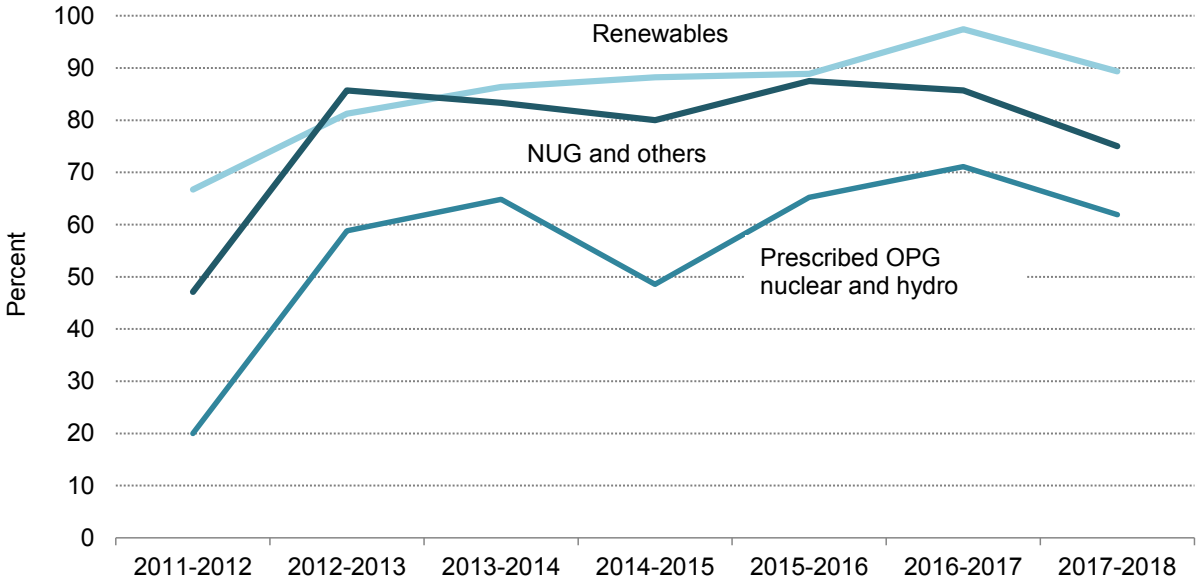
Sources: OEB RPP price reports (2017, 2016, 2015, 2014, 2013, 2012, and 2011).

Consistent with the modeling work of McKitrick and Adams (2014), payments to renewable energy sources are a major component of the GA. The May 2017 Regulated Price Plan projects that the market revenues for renewable generators based on sales of power in the wholesale market from May 2017 to April 2018 would total $0.5 billion, to be supplemented by $4.2 billion to satisfy revenue commitments made by the provincial government to renewable generators. In other words, almost 90 percent of the revenue to renewable generators would come through the GA subsidy rather than through actual sales of power.

The increasing dominance of GA revenue rather than market-based earnings is also a feature of other generator types. Figure 3 shows that for each of the three generator classes with GA-funded revenue subsidies, the non-market fraction of revenue has risen steadily over time, and now represents a large majority of each group's revenue. As estimated in 2017, Ontario Power Generation nuclear and hydro generators and non-utility generators received 62 percent and 75 percent, respectively, of their revenue from GA subsidies.

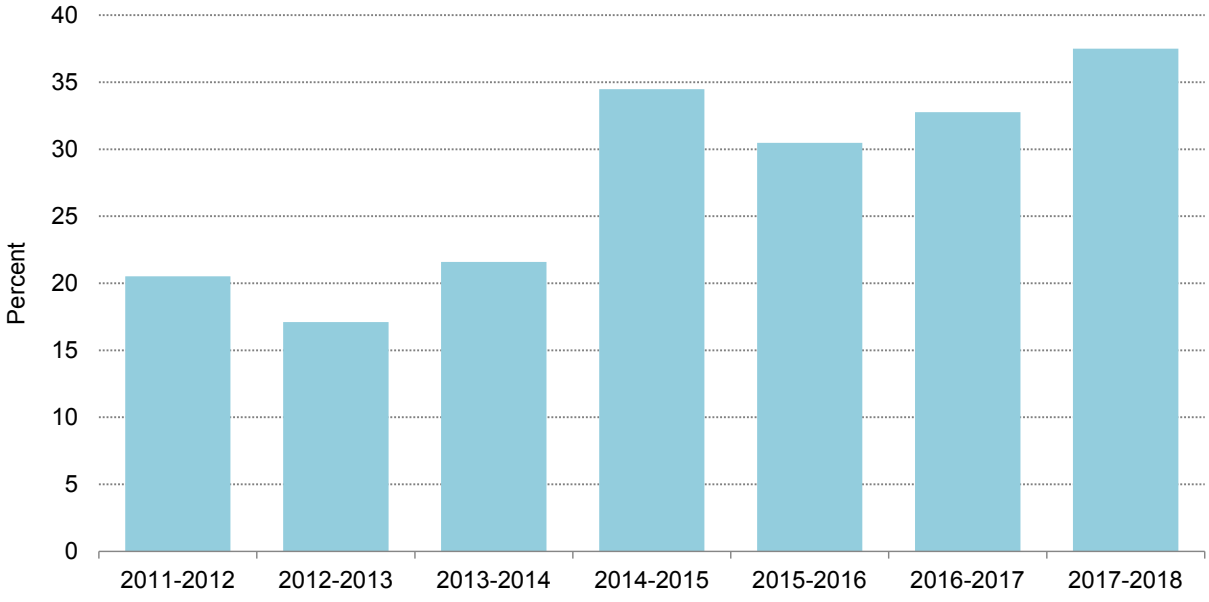
Figure 4 presents the annual share of the renewable component in the GA from 2011 to 2018. As the figure shows, it used to represent about

Figure 3: The Non-Market Fraction of Revenue for the Three Electricity Generator Classes, 2011–2018



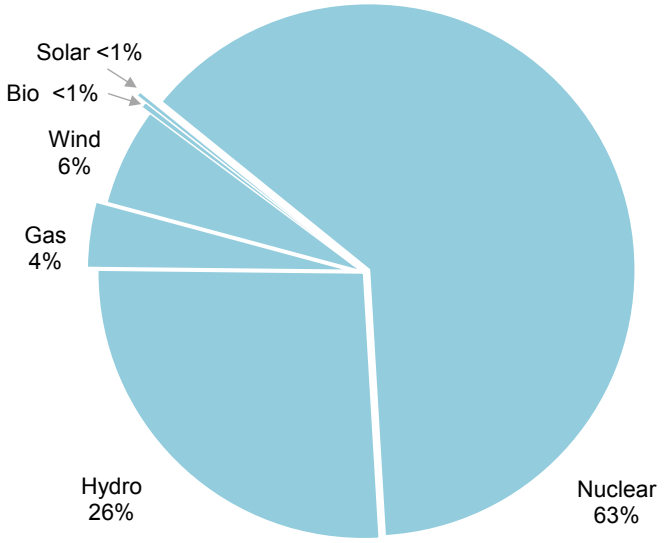
Sources: OEB RPP price reports (2017, 2016, 2015, 2014, 2013, 2012, and 2011).

Figure 4: Share of the Renewable Component of the Global Adjustment Cost, 2011–2018



Sources: OEB RPP price reports (2017, 2016, 2015, 2014, 2013, 2012, and 2011).

Figure 5: Ontario Electricty Generation by Fuel Type (Percentage of Total), 2017



Sources: IESO (2018a).

Table 2: Average Generation Costs (cents/kWh) by Fuel Type in Ontario

Wind	17.3
Solar	48.0
Bio energy	13.1
Nuclear	6.9
Hydro	5.8
Gas	20.5

Source: Ontario Energy Board, 2017.

Notes:
1) Hydro excludes non-utility generators (NUGs) and generation not prescribed by Ontario Power Generation (OPG).
2) Gas includes Lennox, NUGs, and OPG bio-energy facilities. In spite of low natural gas prices, the anticipated cost of power from natural gas is quite high. This can likely be attributed to the low-capacity use of natural-gas generation assets (Fremeth, Holburn, Loudermilk, and Schaufele, 2017).

20 percent of the GA cost but has now risen to nearly 40 percent, making it the largest single component.

The high cost associated with renewable generators becomes more problematic when considering the trivial contribution of these fuels to electricity generation in Ontario. Figure 5 shows the percentage of Ontario's electricity supply attributable to various generation sources in 2017. Nuclear power is the most significant, accounting for 63 percent. Hydro is next at almost 26 percent. Wind, solar, and biomass generated just under 7 percent.

The Ontario Energy Board RPP reports also estimate the annual average generation costs by fuel type in Ontario, based on total payments to contracted generators and contribution of different generation sources to electricity supply. Table 2 presents the data for the period from May 2017 to April 2018. Nuclear and hydroelectric generators receive much lower rates than wind, solar, and biofuel generators. The rate paid to solar generators (48 cents per kWh) is more than six times the rate paid to nuclear generators (6.9 cents per kWh), and more than eight times the rate paid to hydroelectric generators (5.8 cents per kWh).

Feasible Power Price Reductions

According to data presented in the previous sections, the current GA is about 10 cents per kWh, which breaks down as follows:

3.8 cents	FIT payments to renewables
2.3 cents	Payments to OPG facilities
0.3 cents	Payments to Non-Utility Generators (NUGs)
3.1 cents	Payments for conservation, natural gas capacity and Bruce nuclear
10.0 cents[2]	Global Adjustment per kWh

In this section we consider various ways to reduce the GA by cutting spending commitments within each category.

FIT payments: 3.8 cents

This summer the Ontario government canceled 758 early-stage renewable energy projects in an attempt to reduce electricity bills in the province (Ontario, 2018). This is a positive move for ratepayers in the long-term as it will prevent some future price increases. However, this move likely will not reduce current electricity prices because the cancelled projects were in the early stages, meaning they had not reached specific milestones or received notice from the government to proceed. The government recently moved further and introduced legislation to scrap the Green Energy Act. This, likewise, will help prevent further price increases but will not bring the GA down. The logical next step would therefore be to use legislative measures to cancel Ontario's funding commitments to renewable energy sources under the FIT contracts. Doing so would ultimately reduce the GA by 3.8 cents per kWh.

As of 2107, the average residential electricity price in Ontario (based on data from Toronto and Ottawa and excluding taxes) was 15.8 cents per

2 The figures don't sum up to exactly 10 due to rounding.

kWh (Hydro-Québec, 2017). Terminating FIT payments would therefore reduce Ontario residential electricity prices by about 24 percent. Note that the 24 percent reduction reflects an upper bound as this estimate does not account for the potential offsetting impact from HOEP.

In terms of the legalities surrounding the cancellation of the FIT contracts, legal scholar and Queen's Law Professor Bruce Pardy concluded in a 2014 analysis that the government of Ontario could pass laws to change or cancel legally binding agreements as long as it acts within its constitutional jurisdiction and uses unambiguous statutory language. Provincial governments, of course, clearly have subject-matter jurisdiction over electricity generation, and in Canada there is no constitutional right to compensation for expropriated property (Pardy, 2014). In order to avoid liability for compensation pursuant to the terms of the contracts, the government must proceed by passing explicit legislation. Simply cancelling the contracts as an administrative or policy directive without properly worded legislation could easily result in enormous compensation liabilities for the government. (While the provincial government has the power to change or cancel FIT contracts held by Canadian residents and companies, foreign investors who are parties to such contracts may be able to seek compensation under Canada's various foreign investment protection agreements.)

Illustrative further potential reductions

Because of the lack of detailed information in the RPP reports we cannot break out the remaining GA payments into sub-categories, but there are some areas where GA payments could be reduced, adding to the savings from eliminating FIT contracts. The next few sections discuss these on the basis of some assumptions, as indicated.

Payments to OPG: 1.1 cents

There is insufficient detail in the RPP reports to identify the exact nature of these payments. However, since both nuclear and hydro plants impose relatively low average generation costs on the power system (see table 2), it is unlikely that they are the principle recipients of this component. It is more likely that most of these payments are associated with relatively new small-scale hydro plants that were developed as "green" power sources. They contribute little to the province's electricity needs since we currently have surplus generating capacity, and therefore could be curtailed. As an illustration, if we suppose that half of this category could be eliminated, it would reduce power costs by 1.1 cents per kWh.

Payments to NUGs

There is insufficient detail in the RPP reports to make an estimate regarding potential savings in this category, so we will leave it unchanged.

Other payments: 0.9 cents

We would require a further breakdown of this category to make an accurate estimate of potential savings. Since the average cost of natural gas power electricity is so high in Ontario despite the low fuel cost (see table 2) we surmise that the gas capacity contracts are a substantial liability and account for 40 percent of this category. We then suppose, for the purposes of illustration, that the remaining 60 percent is divided equally between conservation and Bruce nuclear.

As explained in Adams and McKitrick (2016), conservation programs are perennial money-losers whose costs exceed the benefits, and they are especially ill-advised in Ontario since the province has excess generating capacity. They could be eliminated entirely without incurring net social losses, and if this were to happen, and if they make up 30 percent of this category, the GA could be reduced by 0.9 cents per kWh.

We assume that the Bruce nuclear payments and gas capacity contracts are not reduced.

Offsetting HOEP increase: 1.5 cents

Removing the supply distortions associated with take-or-pay contracts and the FIT program would reduce somewhat the marginal supply of electricity and push up the wholesale price equilibrium. Looking at figure 1, prior to the distortions of the GEA, the HOEP was just over 4 cents per kWh. If the market had not been subject to GEA-based manipulation, the HOEP might have stayed about the same, or even declined slightly since fuel prices (led by natural gas) have gone down. Thus, if the GEA were to be repealed and market distortions were to be removed, the HOEP would likely rise, and we can use the pre-GEA level as an estimate of where it would end up. We therefore estimate that the HOEP would rise by 2.5 cents per kWh, to 4.0 cents. This is just below its level in 2008, reflecting the decline in demand and the emergence of a structural surplus in Ontario's market.

Such a rise would, however, reduce the GA liabilities for the remaining categories where revenue guarantees exist, namely, OPG, NUGs, Bruce nuclear, and natural gas capacity. In order to reflect this aspect, we specu-

late (very imprecisely) that 1 cent of the 2.5 cent HOEP increase would be offset by a further GA reduction, for a net change of 1.5 cents.

Total effect

Taken together, this analysis suggests that the potential reduction in Ontario power costs from eliminating FIT contracts would be about 3.8 cents per kWh, and further reforms to the GA could increase this, possibly to as much as 4.3 cents.

Eliminating FIT contracts	-3.8 cents
Reduced OPG payments	-1.1 cents
Reduced other payments	-0.9 cents
Offsetting HOEP increase	+1.5 cents
Total	-4.3 cents

As of 2107, the average residential electricity price in Ontario (based on data from Toronto and Ottawa and excluding taxes) was 15.8 cents per kWh (Hydro-Québec, 2017). A price reduction of 4.3 cents per kWh would reduce residential electricity prices by approximately 27 percent.

Conclusion

Ontario used to have low electricity costs. However, poor government policy decisions have resulted in surging Global Adjustment rates, leading to skyrocketing electricity prices for all Ontarians. The new government's intention to reduce electricity costs for Ontarians is laudable; however, additional actions are required to eliminate structural subsidies to renewable generators and lower electricity prices for Ontarians. Therefore, the government should use legislative measures to cancel its funding commitments to renewable energy sources under the existing FIT contracts. Based on the analysis presented in this paper, we estimate that the measures we propose will reduce average electricity prices by at least 3.8 cents per kilowatt hour (kWh). It is time for the government to implement constructive reforms that will lower electricity prices for current and future ratepayers..

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