What Is Happening to Ontario Electricity Prices?

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BACKGROUND PAPER

Background Report:
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Key Messages

- Ontario's electricity system has always been the subject of a great deal of policy and political debate. The strength and reliability of the system and in particular the low price of electricity have historically afforded the province a measure of economic advantage that has served it well.
- Electricity price increases over the last few years have ignited a debate over the future of the system. That debate has illustrated the need for clear information on the economics of the system and the underlying forces driving investment and pricing.
- The analysis contained in this background report provides some useful context for this debate. First, Ontario power consumers have always – except during the period from 1992 to 2004 when a price cap was in place – experienced price increases. Second, the drivers of cost increases have been fairly evenly distributed between generation, transmission, and distribution costs. And third, the necessity for new investment in Ontario's energy system, driven in part by the decision to address air pollution and climate change impacts by closing down the province's coal-fired power plants, has pushed up power rates in the province.
- The contribution of renewable power and the *Green Energy Act* (GEA) to cost increases has – despite media reports – been minor up to now. The analysis contained in this report suggests that, depending on assumptions, the GEA will contribute about 60% to the price increase between 2010 and 2015 arising from transmission, customer and distribution and electricity price charges, but the GEA cost increase will be less than 25% of the overall cost in 2015.[1]

The Issue

The Ontario electricity system is the subject of a great deal of policy and political debate. Much of that debate is based on unclear and inadequate information. Nowhere is the problem more acute than on the issue of pricing, and in particular on what is causing electricity prices to increase in the province. This background report is intended to de-mystify and explain the drivers of electricity cost increases in Ontario, with a view to contributing to a full and informed public debate on the subject.

The Knowledge Base

The first section of the document will provide a basic overview of the Ontario electricity system and its component parts. The second section will look at how electricity prices evolved in the province from 2000 to 2010, and assess how developments in the various sub-sectors of the electricity system contribute to changes in average prices for the Ontario consumer. Finally, the third section will look at the period from 2010 to 2015, and will try to forecast what the price drivers will be over that time period, and how prices are likely to evolve.

[1] The cost and price calculations in this report are for the average Toronto consumer.

A. Overview of Ontario's Electricity System

Ontario's electricity system consists of three basic components: generation, transmission and distribution. In addition, it has a market operator, a power purchase authority and a regulator.

Ontario Power Generation (OPG) owns several hydroelectric generating stations including the Adam Beck station at Niagara Falls, nuclear generating stations at Pickering and Darlington and some thermal generating stations including the large coal-fired Nanticoke generating station on Lake Erie. Bruce Power operates the Bruce nuclear station at Kincardine. There are many other generating facilities owned and operated by various firms including hydroelectric stations, gas turbine and combined-cycle gas turbine stations, and many wind, solar and other renewable stations.

The electricity from these generating stations is carried over the high voltage transmission grid, owned by Hydro One, to large customers and to municipal electric utilities. The municipal utilities distribute the electricity to individual residential, commercial and industrial customers.

The Independent Electricity System Operator (IESO) manages the operation of the system, takes bids for generation and dispatches generation, telling each generator how much to generate at any time. The Ontario Power Authority (OPA) does system planning and enters into long-term contracts with new generators. The Ontario Energy Board (OEB) regulates the prices charged by many generators, the transmission company and distribution utilities.

Evolution and Components of the Consumer Power Bill

In addition to the complexity of the system itself, which can make it difficult for consumers to understand the drivers of price increases, the complexity of the power bill each consumer receives is also a problem. This section will briefly describe the evolution of the power bill, and its component parts, over the past decade.

In July, 2002, after the opening of a competitive electricity market on May 1, residential consumers received a bill that listed:

1. a combination of a customer charge representing a fixed amount per month and distribution charge (based on the electricity consumed) that together compensate the municipal utility for distribution services;
2. a transmission charge to compensate Hydro One;
3. administrative charges;
4. a debt retirement charge to begin to pay down the accumulated debt of the electricity system largely attributable to the nuclear fleet; and,
5. an energy charge to pay for generation of electricity.

Late in 2004 the bill was simplified, with distribution, transmission and wholesale operations combined into 'Delivery' and administrative charges combined into 'Regulatory.'

In 2011, bills still display four categories of cost: electricity, delivery, regulatory, and debt retirement. For an increasing number of customers who are on time-of-use pricing the electricity cost is divided into three time periods (peak, mid-peak and off-peak).

Adding to the complexity of the terminology of the bill, various pricing systems have been used. Under the Regulated Price Plan (RPP) adopted in November 2002, there is a lower energy price for consumption up to a threshold (the 'first tier'), and a higher price for every kWh beyond that threshold (the 'second tier'). The threshold varies between summer and winter, as shown in Table 2 on page 13. With Time-Of-Use (TOU) pricing, customers pay three different prices during peak, mid-peak and off-peak hours. These multiple charges and the way they are charged mean that there is no single number that represents 'the price' for electricity.

In this report, individual prices are presented, though in order to understand the impact of all these price components on the average customer, several assumptions are made. The monthly electricity cost calculations in this report are based on a residential customer consuming 1000 kWh per month, at various times and in various cities, using the applicable rates for each component of the bill. The consumption rate of 1000 kWh/month was held constant across cities and over time to allow a fair comparison.

B. Electricity Price Drivers and Trends From 2000 to 2010

A little history is warranted as a starting point. Four decades of Ontario residential price history from 1966 to 2006 are shown in Figure 1. The nominal prices, denoted in current dollars, show a steady increase for a quarter century, a jump in 1993-94 and another increase after 2002. The average annual increase is 5.98% from 1966 to 2006. However, three quarters of this increase is attributable to inflation. With inflation factored out, the upper graph in constant 2010 dollars emerges, with an average annual increase of 1.42%. Note the very low price of electricity in 1966. At that time we had cheap electricity compared with the nearby states, primarily because of the Adam Beck generating station on the Niagara River and other low-cost hydroelectric facilities. By the 1960's, however, we had exploited most of our low-cost hydroelectric resources and we constructed thermal generating stations burning coal or oil and nuclear generating stations. Our costs for these facilities are no lower than those of other North American jurisdictions. As we added high-cost facilities to our low-cost heritage hydroelectric facilities, our average costs increased. We are no longer a cheap electricity jurisdiction – our prices are similar to those of our neighbours to the south. This is the inevitable consequence of growing electricity demand when we have run out of low-price generation options.

The upper graph shows a jump in the mid-1970's, then another jump in the early 1990s when the Darlington nuclear generating station costs were rolled into consumer prices. The government capped the price in 1993, causing inflation-adjusted prices to decline until the cap was removed for 6 months in 2002, and then removed permanently in 2004 when prices were regulated.

Figure 1: Long-Term Ontario Average Residential Price (1966-1996)[2]

Source: Statistics Canada, 2009. *Electric Power Generation, Transmission and Distribution* (Publication 57-202), http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=57-202-X&lang=eng.

One of the lessons of this recent history, then, is that except for 1994-2002, electricity consumers in Ontario have experienced rising prices. The other lesson is that governments may cap power prices in the face of sufficient public protest. The result is a simultaneous political risk that discourages investment in the province's electricity system, and an increase in the debt level to be paid down by future consumers.

[2] Statistics Canada derives the prices in Figure 1 by dividing reported residential electricity revenue by reported consumption. The revenue includes energy, transmission and distribution costs – it is the total payment by consumers. Different local utilities classify multi-unit residential buildings differently as between residential and commercial categories, but the author believes that the price series is consistent over time.

Turning to the last decade, there is insufficient information for average residential prices across the province through 2010. Instead, this report examines Toronto in detail, where there is complete data. Comment will be provided on the experience in four other cities, to the extent that the local experience with distribution charges of local utilities (which matters as a component of local pricing) is different from Toronto's.

Table 1 shows the time pattern of residential bill components in Toronto and the total bill for a customer consuming 1000 kWh per month. We use prices on May 1 each year since prices generally change on May 1 and November 1. The total pre-tax bill for the average Toronto customer rose by 58.2% from 2000 to 2010 in nominal terms. Once taxes are added, the increase was 67% because of the switch to the Harmonized Sales Tax (HST) in 2010. This increase represents an average annual increase of 4.26% without tax or 4.77% with tax.

Table 1: Residential Price History - Toronto (2000-2010)

							2000–10 % CHANGE		2000–10 CHANGE	2000–10 ANNUAL % CHANGE	
15 APR 2011	**Year (1 May)**	**2000*** **	**2002**	**2004**	**2007**	**2010**	**Nominal**	**Real**	**$/month**	**Nominal**	**Real**
1000 kWh/month Bill	$/month	$83.50	$96.77	$101.36	$114.57	$132.06	58.2%	29.1%	$48.56	4.26%	2.35%
Bill with tax	$/month	$89.35	$103.54	$108.46	$121.45	$149.22	67.0%	36.3%	$59.88	4.77%	2.86%
Electricity price*	cts/kWh	4.3	4.3	4.7	5.3, 6.2	6.5, 7.5					
	$/month	$43.00	$44.62	$48.77	$58.93	$71.82	67.0%	36.3%	$28.82	4.77%	2.86%
Customer**	$/month	$8.90	$14.03	$14.02	$12.68	$18.25	105.1%	67.4%	$9.35		
Distribution	cts/kWh	1	1.34	1.41	1.55	1.57	57.0%	28.2%	$0.57		
	$/month	$10.00	$13.40	$14.10	$15.50	$15.70		28.2%	$5.70		
Trans	cts/kWh	1	1.04	1.04	1.02	1.2	20.0%	-2.0%			
	$/month	$10.00	$10.79	$10.79	$10.58	$12.45	24.5%		$2.45		
Reg & Debt	cts/kWh	1.16	1.32	1.32	1.32	1.35	–				
	$/month	$11.60	$13.43	$13.43	$13.43	$13.74	–		$2.14		
SSS	$/month	–	$0.50	$0.25	$0.25	$0.25					
Tax	%	7%	7%	7%	6%	13%					
	$/month	5.85	6.77	7.10	6.87	17.17	193.7%	139.8%	$11.32		
CPI	2000=100	100.00	105.15	109.99	116.51	122.50	22.5%				
Other Charges	$/month				3.2	-0.16					

*Prices as of May 1 each year. For tiered prices, the data here are for the first (lower price) tier.
**Actual bills cover two months. This customer charge is for one month, 30 days.
*** Allocation of 2000 energy price between energy, transmission and regulatory and debt is estimated.

Source: Ontario Energy Board electricity rate orders (various years) and DN Dewees utility bills 2002.

Breaking down the components of the bill in relation to the price increase shows a fairly even distribution. The actual price of electricity increased by 67% – from 4.3 cents to 6.5 cents/kWh for the first block of electricity and to 7.5 cents for the second block. By comparison, customer plus distribution charges increased by about two-thirds, and taxes increased by 85%. However, cumulative inflation over the decade amounted to 22.5%, so adjusting for inflation almost cuts the total bill increase in half. So, the rate of price increase after tax and after adjusting for inflation is 2.86% per year.

The overall bill increase in four other Ontario municipalities (London, Sudbury, Guelph and Hearst) was somewhat lower, but the increase in the price of energy was identical over the decade, since all cities were charged the same price by Ontario Hydro and the IESO. The percentage increases in combined customer and distribution charges in the three smaller cities appear smaller than those in Toronto and London. Toronto's customer and distribution costs throughout this decade are

about 20% higher than the other four cities. The reason behind this cost difference is not investigated in this report.

Explaining Price Drivers from 2000-2010

Why did the price of electricity itself increase by 67%? Back in 1993 when the public complained about rising prices, the government froze the wholesale price at about 4.3 cents/kWh, below Ontario Hydro's average total cost of about 4.5 cents/kWh. The price freeze was lifted on May 1, 2002 when the competitive market opened, but a new freeze at 4.3 cents/kWh for small consumers was imposed on November 11, 2002.[3,4] The freeze was supposed to run until 2006, but was lifted in April, 2004. Some of the subsequent increase in price represents the need to cover the full costs that were hidden when prices were held artificially low.

Generation

On December 1, 2008, an increase of 15% in the price paid for power from Ontario Power Generation's "heritage" (i.e. long-standing hydro, nuclear, and coal generation plants) assets took effect, to cover a variety of cost increases. In addition, throughout the decade new generation facilities were connected that had much higher costs than Ontario Hydro's average generation cost in 2000. That average generation cost reflected the stability of costs provided by the heritage assets, which had been invested in and paid for (with the notable exception of some of the nuclear assets) in previous decades.

At the end of 2010, it was becoming clear that new investment was needed in the provincial system. The investment chill created by policy uncertainty early in the 2000's was giving way to the need for new capacity and investment, based on the aging of nuclear units and possible increased demand. At the same time, the Ontario Power Authority worked to promote conservation and energy efficiency to help reduce demand, and thus manage the necessity for new generation.[5]

Finally, another key reason for the need for new generation was the decision to phase out the province's coal-fired generation. The significance of this factor requires a little more context. Environmental concerns, starting with the health effects of air pollution, and later including concerns about greenhouse gas emissions, led the provincial government to announce in 2003 that it would phase out coal-fired generation by the year 2007 (then 2009, and finally by 2015).[6] The Lakeview generating station was closed in 2005, output at the large Nanticoke generating station has been reduced substantially with two units closed in 2010, and two boilers have been closed at Lambton.[7] This reduction in coal combustion has substantially reduced electricity-related air pollution emissions and greenhouse gas emissions in Ontario.

At the same time, closing the coal plants has meant that the replacement generation capacity has been filled by technologies that are, in terms of the market price they must charge for their

[3] Dewees, Donald N., 2009. "Electricity Restructuring in the Provinces: Pricing, Politics, Starting Points, and Neighbours," in Burkhard Eberlein and G. Bruce Doern, eds., *Governing the Energy Challenge: Canada and Germany in a Multi-Level Regional and Global Context*, Toronto: University of Toronto Press. Page 76.
[4] Trebilcock, Michael J. and Roy Hrab, 2005. "Electricity Restructuring in Ontario," *The Energy Journal*, 26 (1), pp. 123-146.
[5] See Ontario Power Authority: *Conservation* at: http://www.powerauthority.on.ca/conservation.
[6] In the 2003 election Liberal leader Dalton McGuinty promised to phase out coal by 2007, which was pushed back to 2009 in 2007. In 2007 the legislature adopted a regulation prohibiting coal burning in generating stations after December 31, 2014. See: O. Reg. 496/07, Cessation of Coal Use – Atikokan, Lambton, Nanticoke and Thunder Bay Generating Stations, http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_070496_e.htm.
[7] Government of Ontario, 2010. *Ontario's Long Term Energy Plan*, http://www.mei.gov.on.ca/en/pdf/MEI_LTEP_en.pdf. Page 20.

electricity, more expensive than coal. In 2007, OPG received about 3.8 cents/kWh for electricity generated from its hydroelectric facilities, while its coal facilities received close to 5 cents/kWh.[8] In 2007 the Ontario Power Authority estimated that new baseload gas generation would cost between 7 to 10 cents/kWh, or more, depending on utilization, well above the 5 cent cost of continued coal generation.[9] Some nuclear units were renovated and restored to service and the high cost of this work was added to debt held by the Ontario Electricity Financial Corporation. Refurbishing these nuclear units both delayed the time when this debt will be paid down and ensured that the cost of refurbishment is not reflected in the current consumer cost of electricity. Some renewable energy projects have come on line but their contribution to electricity prices so far has been modest, even though the price they receive for electricity is much higher than current prices.

The fact is that Ontario's historic hydroelectric facilities and coal plants produce low-cost electricity. Any new facilities that are built inevitably cost more in strict financial terms than the old facilities; gas costs somewhat more, while most renewables cost much more. This has driven up the cost of electricity and will continue to do so.

But the cost of coal-fired power needs to be put in the context of its overall costs to Ontario and other jurisdictions. The concerns about the health effects of burning coal are legitimate and important, as are the concerns about greenhouse gas emissions. Solutions to these problems are not free or inexpensive except for some relatively cost-effective energy conservation projects. Research conducted by the author estimates the value of the harm from coal-plant emissions at between 5 cents and 10 cents/kWh generated at current Ontario emission rates.[10] While this is a wide range of uncertainty, it suggests a range of prices society should be willing to pay to eliminate those emissions. Reasonable people may suggest different values, but it is important to try to make these assessments if we are to make reasonable choices about pollution controls and about new modes of generation.

This means, of course, that, if continued operation of the coal-fired units cost 5 cents/kWh, and if the harm from the resulting emissions is worth 5 to 10 cents, then we should be willing to pay a total of between 10 and 15 cents/kWh for non-polluting generation that displaces coal. Alternatively we might require the installation of more effective pollution controls on the coal plants thus reducing the health and environmental harm per kWh generated. The internalization of this cost would provide a more rational basis for comparing generation costs in the province. If coal and gas generators were required to pay an effluent charge and carbon tax for their emissions based on the harm caused then the price of electricity would represent its full social cost.[11] They do

[8] Ontario Power Authority, 2007. *Methodology and Assumptions for the Cost to Customer Model*. Submission to the Ontario Energy Board EB-2007-0707, Exhibit G, Tab 2, Schedule 1, Attachment 1. Pages 7-9.
[9] Ontario Power Authority,2007. *Economic Analysis of Gas-Fired And Nuclear Generation Resources*. Submission to the Ontario Energy Board EB-2007-0707, Exhibit D, Tab 3, Schedule 1, Attachment 1. Page 11.
[10] Dewees, Donald N., 2008. "Pollution and the Price of Power," *The Energy Journal*, 29(2), Page 89 found health and environmental costs from coal plants around the Great Lakes to be around $33/MWh, ignoring CO_2. Higher values were found by DSS, 2005, "Cost Benefit Analysis: Replacing Ontario's Coal-Fired Electricity Generation," Report to the Ontario Ministry of Energy by DSS Management Consultants and RWDI Air. Page 7. The harm from Ontario's coal plants was valued at $113/MWh for health effects, $3 for environmental effects and $10 for greenhouse gas emissions, assuming that CO_2 is worth $10/tonne, all in 2004 $CAD. The health effects underlying this study are much higher than estimates in other studies and have been the subject of some controversy with other studies finding no health effects from Canadian air pollution levels after the mid-1970s. Koop, Gary, Ross McKitrick and Lise Tole, 2010, "Air Pollution, Economic Activity and Respiratory Illness: Evidence from Canadian Cities, 1974-1994," *Environmental Modelling and Software*, 25(7), Pages 873-885. Currently the author values CO_2 emissions at between $15/tonne and $50/tonne. Since coal plants emit about 1 tonne of CO_2 per MWh generated one can add CO_2 values to health and environment values to get a range of total harm from Ontario's coal plants. This could range from (33+15) = $48/MWh to (113+50) = $163/MWh. Recognizing the controversy over the DSS values the author suggests a range of $50 to $100/MWh. This converts to 5 cents to 10 cents/kWh.
[11] Dewees, Donald N., 2010. *The Price Isn't Right: The Need for Reform in Consumer Electricity Pricing*, C.D. Howe Institute Backgrounder #124, http://www.cdhowe.org/pdf/backgrounder_124.pdf.

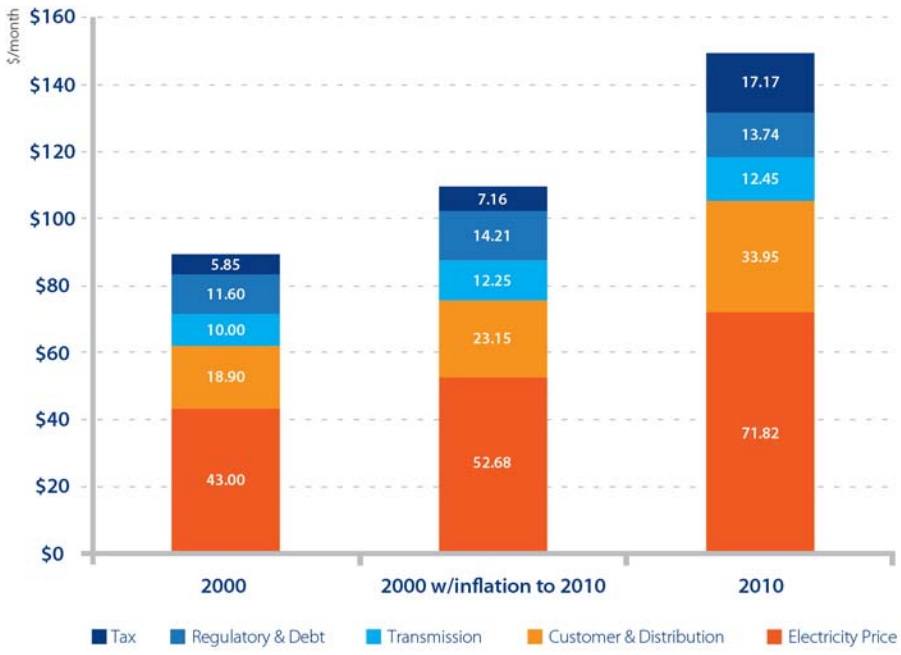
not pay so the price of a coal-generated kWH does not reflect its full costs, which are instead borne by taxpayers in the form of higher health care costs.

Distribution and Transmission

Distribution charges also increased substantially during the decade. A major cost increase was the restructuring that started in 2000, which turned municipal electric utilities from customer co-ops into municipally-owned corporations.[12] Rate increases to cover debt servicing and equity payments to the municipalities accounted for a significant portion of the increase in customer and distribution charges, along with costs associated with functioning in the new competitive electricity market. Toronto's increase in the combination of customer charge plus distribution charge was $8.53 per month between 2000 and 2002, an increase of 45% in just two years and more than half of their increase for the decade. Some of this increase may also be the consequence of the amalgamation of six utilities that accompanied the amalgamation of the City of Toronto and its suburbs on January 1, 1998. Figure 2 shows the breakdown of monthly costs for a Toronto residential customer in 2000 and 2010 and the effect of inflation alone.

Transmission charges do not seem to have contributed significantly to the cost increases since 2002.

Figure 2: Toronto Residential Cost Breakdown 2000, 2010



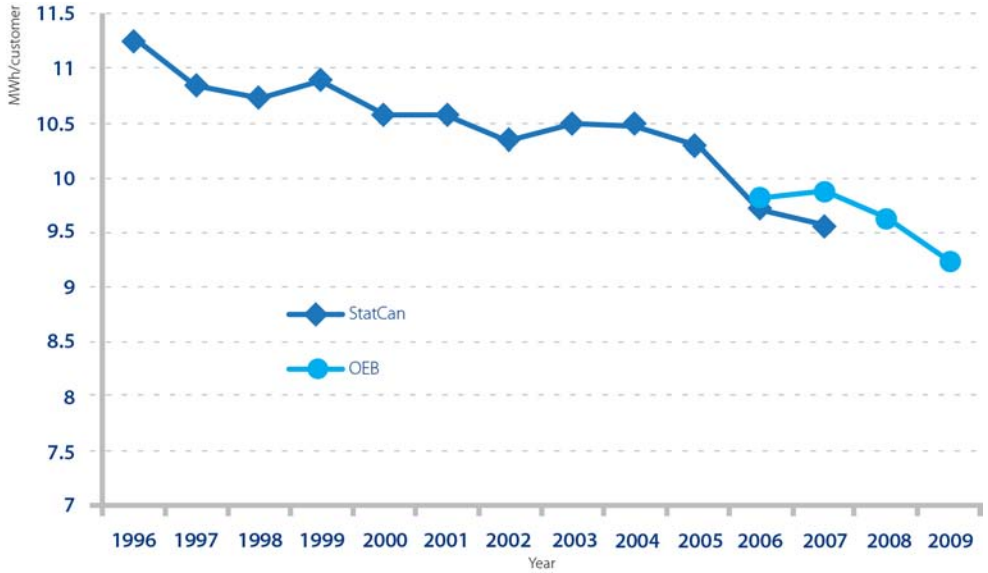
Source: Ontario Energy Board electricity rate orders (various years) and DN Dewees utility bills 2002.

[12] Reguly, Eric, April 5, 2005. *Distribution adds the shock to electricity bills in Ontario*, Globe and Mail, http://www.eprf.ca/energyprobe/index.cfm?DSP=content&ContentID=12906 and
Adams, Tom and Alfredo Bertolotti, 2005. *What happened to my electricity bill?,* http://energy.probeinternational.org/utility-reform/reforming-ontarios-local-electrical-distribution-sector/what-happened-my-electricity- .

Consumption

While analyzing a consumer using a constant 1000 kWh/month, one might worry that increased household electricity consumption had increased actual bills. This does not seem to be the case. The average monthly residential consumption in Toronto declined almost 9% between 2000 and 2009, while consumption in Sudbury increased almost 6%. For Ontario as a whole, residential and agricultural consumption per customer per year declined rather steadily from over 11,000 kWh in 1996 to just over 9,000 kWh in 2009, as shown in Figure 3. Individual consumers, however, may have increased their consumption sufficiently to have a substantial impact on their bills. Others will have reduced consumption and thus mitigated the impact of price increases.

Figure 3: Residential and Agricultural Consumption per Customer per Year (1996-2009)



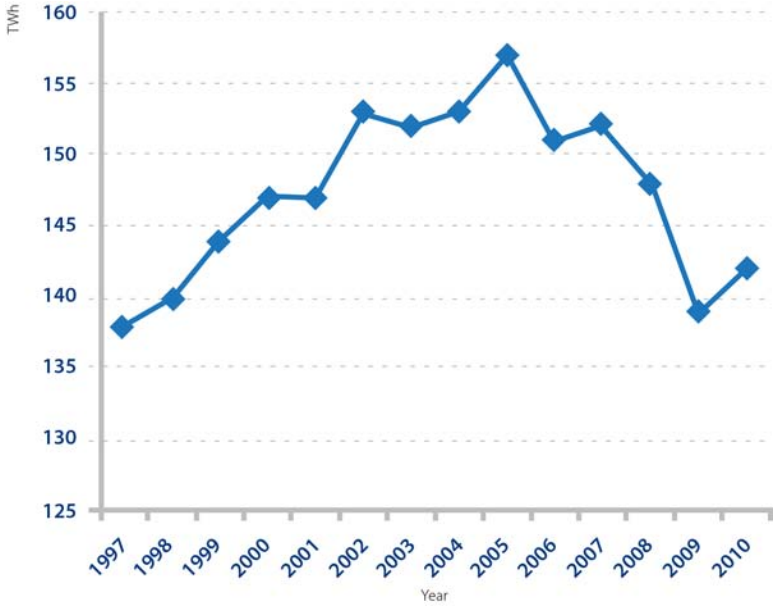
Source: Statistics Canada, 2009. *Electric Power Generation, Transmission and Distribution* (Publication 57-202), http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=57-202-X&lang=eng, Ontario Energy Board Yearbook 2006-2009, and Ontario Energy Board, 2010. *Yearbook of Electricity Distributors and Yearbook of Natural Gas Distributors*, http://www.ontarioenergyboard.ca/OEB/_Documents/RRR/2010_electricity_yearbook.pdf and http://www.ontarioenergyboard.ca/OEB/_Documents/RRR/2010_naturalgas_yearbook.pdf.
One MWh is 1000 kWh.

Total consumption of electricity by all users in Ontario, including commercial and industrial customers, increased from 1997 to 2005. It then declined because of shrinking industrial activity, and in 2009 it was almost down to 1997 levels, as shown in Figure 4. This recent decline in total Ontario consumption may have contributed to price increases because the fixed costs of the electricity system have to be paid for even if the amount of electricity consumed declines. The 10% decline in consumption may have led the transmission and distribution providers to seek increased rates per kWh consumed, perhaps up to 10%, so they might continue to cover the fixed costs of maintaining their capital equipment. In addition, in 2011 there were numerous incidents of surplus baseload generation at times of low demand. This situation caused the electricity spot price to go negative, and some wholesale consumers inside and outside Ontario were paid to take electricity, while some generators who are guaranteed fixed prices were paid not to generate.[13] The cost of

[13] Dachis, Benjamin and Don Dewees, July 19, 2011. *Plugging into Savings: A New Incentive-Based Market Can Address Ontario's Power-Surplus Problem*, C.D. Howe Institute e-brief 120, http://www.cdhowe.org/pdf/ebrief120.pdf.

these incidents, too, must ultimately be paid for by ordinary consumers through slightly higher prices.

Figure 4: Total Ontario Electricity Consumption, Including Commercial and Industrial (1997-2009)



Source: Independent Electricity System Operator (IESO), 2011. *Demand Overview*, http://www.ieso.ca/imoweb/media/md_demand.asp. One TWh = 1,000,000 MWh.

Pricing Structures

Another change at the end of this decade is the movement of customers with smart meters to time-of-use (TOU) pricing, where the price is low at night and on weekends and higher during the day when demand is expected to be high. The Ontario Energy Board (OEB) sets TOU prices with the intention that a typical customer will pay the same amount over the year for the same pattern of use whether on Regulated Price Plan (RPP) or TOU prices.

However the RPP provides a lower rate for the first 600 or 1000 kWh per month while the TOU rates have no low-volume rate, as shown in Table 2. This means that low-volume customers will generally pay more on TOU rates than they would pay on RPP, while high-volume customers will pay less. Moreover, the actual bill amount depends on the time profile of customer use, a.k.a. the 'load shape.' A customer whose use of power is concentrated during peak periods will see a bill increase in moving to TOU, while a customer whose use of power is concentrated in the off-peak will see a bill decrease in moving to TOU.

In other words, even if average bills do not change, some consumers will see significant bill increases, or decreases, depending on their consumption.

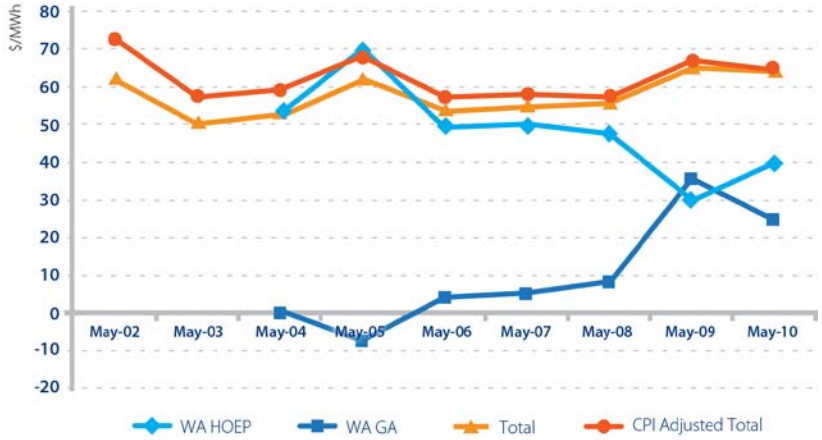
Table 2: Time-of-Use and Retail Price Plan Prices (November 2011)

RPP			
RESIDENTIAL CUSTOMER	**Tier**	Low	7.1 cents/kWh
		High	8.3 cents/kWh
	Threshold	Summer	600 kWh/month
		Winter	1000 kWh/month
NON-RESIDENTIAL CUSTOMER	**Tier**	Low	7.1 cents/kWh
		High	8.3 cents/kWh
	Threshold	All seasons	750 kWh/month
TOU			
PRICING	**Off-peak**	6.2 cents/kWh	
	Mid-peak	9.2 cents/kWh	
	On-peak	10.8 cents/kWh	

Source: Ontario Energy Board. *Electricity Prices,* http://www.ontarioenergyboard.ca/OEB/Consumers/Electricity/Electricity+Prices.

The IESE posts the market price for electricity, known as the Hourly Ontario Electricity Price (HOEP), which is the result of winning bids to supply power to the system. However residential consumers do not pay the HOEP, and only selected industrial customers pay it directly. The regulated price paid by consumers is set to cover the HOEP plus the Global Adjustment (GA), which is the extra amount that must be paid to generators on fixed price contracts and those entitled to a regulated rate for their generation. Figure 5 shows the annual average HOEP starting in 2002 when the market opened, and the associated GA starting in 2005 when it was introduced and the total, with and without an inflation adjustment. In both cases the price is weighted by consumption in each period. The fluctuations in HOEP arise from shifts in both demand, arising from weather and economic activity, and supply, arising from hydro availability and nuclear unit availability. The GA was first applied in January 2005, and has fluctuated widely from month to month, but the overall trend moves from a refund in 2005 to a large levy in 2010. Since the GA and the HOEP must add up to the compensation needed for the fixed price generators, their total has not varied greatly. The total of HOEP plus GA increased by 18.5% from 2002 to 2010; after adjusting for inflation it decreased by a similar amount.

Figure 5: HOEP, GA and Total, Weighted Annual Averages (2000-2010)



Source: Independent Electricity System Operator (IESO), 2011. *Market data*, http://www.ieso.ca/imoweb/marketdata/marketdata.asp and Independent Electricity System Operator (IESO), 2011. *Global Adjustment*, http://www.ieso.ca/imoweb/b100/b100_GA.asp. Prices are weighted by consumption to calculate averages.

In summary, the typical bill for all customer classes increased substantially over the last decade. In much of Ontario, residential bills are up about 60%. During the same time, inflation raised general prices by 22.5% so inflation accounts for a significant portion of the bill increases.

Roughly half of the residential increase is attributable to increased electricity generation costs. These in turn arise from the necessity for new investments in generation and transmission made necessary by a decade of under-investment in the province's electricity system. It is also a consequence of Ontario's determination to reduce air emissions by not building new coal plants and by closing down existing coal plants. New generation to replace coal and to replace or avoid rebuilding aging nuclear units costs more than coal and more than the current residential price of power (the 7.2 cents/kWh in the energy portion of 2010 bills) [14], but it does result in savings related to avoided costs of health impacts of air pollution and climate change adaptation.

The second largest cause of the bill increase is higher charges by local distribution utilities, part of which comes from their restructuring in the early part of the decade. Taxes are the third contributor to bill increases, partly from tax harmonization in which the HST became applicable to electricity and partly because with the rest of the bill increasing a percentage tax costs more.

[14] See Table 1, 2010, *Electricity Price $/month*.

C. Where Are We Going?

During the half decade from 2010 to 2015, electricity prices will continue to increase. Just how much they will increase, and how much of that increase will be attributable to the *Green Energy Act* is the subject of a great deal of public debate. To help inform the second of these issues, careful analysis of two data sets with different underlying assumptions was carried out.

Two Data Sets

The first data set is based on an exhaustive analysis carried out by Aegent Energy Advisors in 2010,[15] and the second is based on a 2011 analysis by ClearSky Advisors.[16] This background report relies heavily on the Aegent study, as well as other documents and regulatory filings by major market participants but modifies some of the results using the ClearSky analysis which utilizes some more recent data.

Assumptions

The two data sets project significantly different rates of cost increase attributable to differences in two key assumptions:

1. The "cost of power displaced by renewables" to be used as a point of comparison (shown in table 3 below);

2. The penetration rates for renewable energy.

The Aegent study identifies generation, transmission and distribution projects that are expected to come on line up to 2015 and the prices that they have contracted or will be contracted to receive or their expected costs. Some of these costs were adjusted for this report to account for more recent data in documents and regulatory filings by major market participants, so the electricity price forecasts differ somewhat from Aegent's forecasts. The Aegent study calculates the excess of those anticipated contract prices or costs over the expected spot market price of electricity (the HOEP) and multiplies this excess by the anticipated generation to determine the cost increase per MWh of electricity consumed.

ClearSky's analysis does not use the electricity spot price (as shown in table 3), because the historic spot price seems an unlikely baseline against which to compare the cost of renewables in 2015 when all coal plants are expected to be shut down. ClearSky relies on Ontario's Long-Term Energy Plan (LTEP) statement that almost 70% of required generation in 2030 will need to come from new or refurbished generation facilities (meaning natural gas) and assumes that renewable displace natural gas.[17]

[15] Aegent Energy Advisors, Inc., 2010. *Ontario Electricity Total Bill Impact Analysis August 2011 to July 2015*. Filed as evidence before the Ontario Energy Board on August 26, 2010 in connection with Board File EB-2010-0002.
[16] For more information about ClearSky Advisors, see: http://www.clearskyadvisors.com.
[17] Government of Ontario, 2010. *Ontario's Long Term Energy Plan*, http://www.mei.gov.on.ca/en/pdf/MEI_LTEP_en.pdf .

Table 3: Assumptions by Aegent and ClearSky

ADVISORS	Cost of power displaced by renewables
Aegent Energy Advisors	$48MWh (spot price – peak)
	$38 MWh (spot price – off-peak)
ClearSky Advisors	$130/MWh (cost per MWh for new gas fired generation)*

*Ontario Power Authority, 2011, *IPSP Planning and Consultation Overview: May 31, 2011,* http://www.powerauthority.on.ca/sites/default/files/page/Supply%20Presentation.pdf, slide 38.

Source: Sustainable Prosperity

ClearSky compared the cost of choosing renewable generation with the average all-in cost of the most likely alternative new generation, natural gas-fired generation, $130 per MWh, which is far higher than historic and recent spot prices. This $130/MWh cost of new baseload natural gas generation is relevant when considering new baseload renewable generation such as biomass and biogas and some hydro projects since such projects could displace new baseload gas generators. It is also relevant to the extent that solar and wind power can displace new gas generation projects. However, wind and solar power are intermittent, with output that varies with the wind or sun. Because of this variability the principal effect of wind and solar generation is to displace power from mid-merit gas plants. The costs saved are just the variable costs of the gas plant operation – fuel and maintenance which may range from $65 to $80/MWh. Wind and solar power can only modestly reduce the gas generation capacity needed to maintain system reliability, so only a fraction of the wind and solar output should be credited with saving the $130/MWh all-in cost of gas generation including capital costs. A weighted average of these savings ($65 to $80, $130) might be around $90/MWh.

To put it another way, as we retire coal plants we will need new gas plants to provide reliable baseload capacity. Intermittent renewables like wind and solar can save operating costs for the gas plants, but they only modestly reduce the gas capacity that is required, so they only modestly save capital costs. Since ClearSky uses $130 as the cost of displaced power for all the renewable generation, they under-estimate the added cost of renewable power, perhaps by $40/MWh. On the other hand, Aegent's $38 and $48 seem too low for the avoided costs of generation in 2015 when coal plants are shut down, perhaps by $40/MWh. We utilize a cost increase in the middle of the Aegent and ClearSky estimates; the anticipated increase in renewable generation between 2010 and 2015 will increase the average cost of power in 2015 by $17.225/MWh.

Is it reasonable to use prices for contracts that have been signed with generators or for prices on offer inside and outside of the FIT program when research and development and experience might reduce the costs of renewable technologies over time? The answer is yes for two reasons. First, any generator that signed a contract will receive the contract amount; the government should not tear up existing contracts. Those prices are, in a sense, locked into the system.

It is more problematic, however, to factor in what will happen to the costs of future contracts for such technologies over time. Because wind power is a relatively mature technology, not much decrease in cost can be expected by 2015. But the overall costs of wind power should decrease over time reflecting experience that may decrease manufacturing costs, economies of scale, financing costs (through scale, again, but also decrease in risk assessments and premiums), and decreased development and construction costs (through "learning by doing"). Other jurisdictions that have promoted renewable sources of electricity in the past have seen cost decreases over time.

While it is difficult to predict what these experience curves for mature (i.e. wind) and emerging (i.e. solar) technologies will be in Ontario, the Feed-in-Tariff must be adjusted over time to reflect that decrease in cost. The *Green Energy Act* provides for a price review mechanism, but in the absence of experience with that mechanism this analysis relies on the current FIT rates. In any event, much of the green power that will come on line by 2015 was contracted by the end of 2011 at today's prices. Even if some FIT prices came down by 5%, or even 10%, by 2013, the last year in which contracts would likely be signed for plants that are generating in 2015, this would affect only a small fraction of the power produced in 2015 and therefore would reduce only marginally reduce the price estimate for 2015.[18]

Clear Sky's analysis updates two other parameters in the Aegent study: the inclusion of offshore wind in its forecast (the Ontario government declared a moratorium on offshore wind in February 2011, after the Aegent study was released)[19] and assumptions on the penetration rates for renewable energy, which were developed before Ontario's Long-Term Energy Plan was released. The Aegent study assumes that Ontario will exceed the Long-Term Energy Plan (LTEP) targets by 1 GW (for example, Ontario will exceed the LTEP solar target by roughly 40%) and 3 years earlier than the LTEP assumption which now seems unlikely. These assumptions increase Aegent's cost forecasts.

The aggregate forecasts from the two studies are shown in Table 4. The first column shows Aegent's forecast cost increase per MWh of electricity caused by three renewable programs. The second column replicates the Aegent analysis but using $130/MWh as the cost of displaced power rather than $38 or $48. The third column assumes the reduced renewable penetration as indicated above, as well as the $130 cost of displaced power. Clearly the dominant assumption is the cost of displaced power.

Earlier research by ClearSky included a number of assumptions that differ from Aegent's. These include slightly lower capacity factors for wind and solar, decreasing solar tariffs and solar PV module efficiency over time and increased demand for electricity based on a recent IESO forecast. ClearSky found that the impact of renewable energy on the average residential ratepayer in Ontario by 2015 with these assumptions would be $4.54 per month, shown in the last column of Table 4. As indicated above, we believe that the best forecast would be between Aegent's $29.91 and ClearSky's $4.54. We use the mid-point: $17.755/MWh.

[18] This represents the application of the mathematical principle that 10% of 10% is only 1%.
[19] CBC, February 11, 2011. *Ont. declares moratorium on off-shore wind farms*, http://www.cbc.ca/news/canada/toronto/story/2011/02/11/ont-wind-farms.html.

Table 4: Increase in Electricity Costs/MWh from Renewable Generation in Ontario (2010-2015)

	AEGENT FORECAST	ADJUSTED AEGENT FORECASTS		CLEARSKY FORECAST
		$130 displaced power cost	Reduced renewable penetration & $130 cost	ClearSky assumptions
FIT Program	$26.93	$10.50	$6.55	$4.27
RESOP	$2.31	$1.40	$1.09	$0.56
Other Renewables	$0.67	-$0.29	-$0.29	-$0.29
Total Impact	$29.91	$11.61	$7.35	$4.54

Source: ClearSky Advisors,2011, and Aegent Energy Advisors, Inc., 2010, *Ontario Electricity Total Bill Impact Analysis August 2011 to July 2015*. Filed as evidence before the Ontario Energy Board on August 26, 2010 in connection with Board File EB-2010-0002. Page 7.

Projected Price Increases

We forecast that the pre-tax bill for a household consuming 1000 kWh per month will increase from $132 per month to $181 per month, an increase of 37.4%, or 5.4% per year, compounded. With an assumption of 2% inflation per year during this period, the inflation-adjusted increase will be 24.4%, or 3.7% per year.

The cost of the electricity itself will increase by 2.96 cents, an increase of 42% over the 2010 consumer price of 6.928 cents/kWh (the weighted average on May 1 of both tiers for 1000 kWh), or 29.1% after inflation adjustment. The largest component of this increase in the cost of energy is an increase of 1.741 cents/kWh for renewable power purchased under the Feed-in-Tariff (FIT) provisions of the *Green Energy Act, 2009*[20], almost 60% of the electricity price increase. About half of this FIT cost is attributable to wind power, both offshore and onshore, while about 1/3 of the cost (but a much smaller fraction of the power) is attributable to solar power.[21] Investment in Bruce Power renovation and upgrades contributes 0.374 cents/kWh to the electricity price increase. The debt retirement charge is assumed to be constant to 2015.

The next largest increase comes from distribution at 0.736 cents/kWh, an increase of 48.6%. This increases the monthly bill by $7.64/month. 72% of this increase, 0.531 cents, is attributable to distribution costs required by the *Green Energy Act.*[22] The distribution projects include investments that make it safe for 'distributed generation' (local renewable generation facilities) to connect to the distribution system without causing disruption to that system or to the grid.[23]

The third largest component of the cost increase arises in transmission, at 0.708 cents/kWh in 2015. Hydro One and the Ontario Power Authority (OPA) identified transmission projects that would be required to facilitate FIT program renewable generation.[24] Renewable generation will

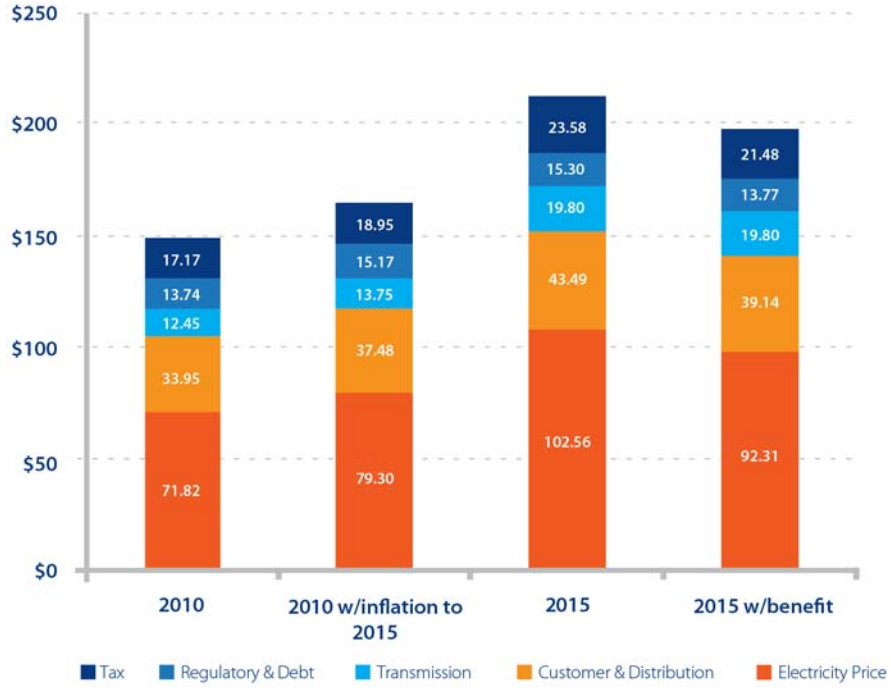
[20] Bill 150, Royal Assent received May 14, 2009.
[21] Aegent Energy Advisors, Inc., 2010, *Ontario Electricity Total Bill Impact Analysis August 2011 to July 2015.* Filed as evidence before the Ontario Energy Board on August 26, 2010 in connection with Board File EB-2010-0002. Table T1c.
[22] Aegent Energy Advisors, Inc., 2010. *Ontario Electricity Total Bill Impact Analysis August 2011 to July 2015*. Filed as evidence before the Ontario Energy Board on August 26, 2010 in connection with Board File EB-2010-0002. Page 7.
[23] Hydro One, 2009. *Distribution Green Energy Plan*, Submission to the Ontario Energy Board EB-2009-0096, Exhibit A, Tab 14, Schedule 2, updated September 25, 2009, http://www.hydroone.com/RegulatoryAffairs/Documents/EB-2009-0096/Exhibit%20A/A-14-02_Green_Energy_Plan.pdf.
[24] Hydro One, 2010. *Transmission Green Energy Plan*, Submission to the Ontario Energy Board EB-2010-0002, Exhibit A, Tab 11, Schedule A, May 19, http://www.hydroone.com/RegulatoryAffairs/Documents/EB-2010-0002/A/A-11-04%20Green%20Energy%20Plan.pdf. Page 2.

generally be located far from the transmission grid and far from the major consumption areas, requiring connection facilities and capacity increases for the grid. The capital expenditure by Hydro One may exceed $5 billion by 2015.[25]

Finally, conservation and demand management programs (CDM) increase costs by 0.187 cents/kWh which is rolled into the Regulatory & Debt charge. About 55% of this increase is attributable to a low-income household program[26] that encourages energy efficiency.[27] Other CDM programs are targeted to residential, commercial and industrial consumers, providing incentives for energy efficiency. The program costs account for 24% of the increase, with the rest paying for operating costs of the OPA and the municipal utilities.

Figure 6 shows the contribution of the various cost elements to the 2015 cost increases. Even with a low inflation rate of 2% per year, the addition of inflation alone to the 2010 price yields a significant bill increase by 2015, shown in the second bar in Figure 6. The increase from the second bar to the third bar, representing cost increases above inflation, is considerably greater. Looking at the overall increase from 2010 to 2015, the *Green Energy Act* and FIT account for 2.98 cents of the price increase or $30/month. This amounts to about 60% of the bill increase for the period. Other renewable programs account for another 0.3 cents or $3/month.

Figure 6: Toronto Residential Cost Future with Benefit



Source: Author's analysis based on Aegent and ClearSky data.

[25] Hydro One, 2010. *Transmission Green Energy Plan*, Submission to the Ontario Energy Board EB-2010-0002, Exhibit A, Tab 11, Schedule A, May 19, http://www.hydroone.com/RegulatoryAffairs/Documents/EB-2010-0002/A/A-11-04%20Green%20Energy%20Plan.pdf. Pages 9-27 and Aegent Energy Advisors, Inc., 2010, *Ontario Electricity Total Bill Impact Analysis August 2011 to July 2015*. Filed as evidence before the Ontario Energy Board on August 26, 2010 in connection with Board File EB-2010-0002. Appendix table T10b.

[26] Aegent Energy Advisors, Inc., 2010, *Ontario Electricity Total Bill Impact Analysis August 2011 to July 2015*. Filed as evidence before the Ontario Energy Board on August 26, 2010 in connection with Board File EB-2010-0002. Table T9, CDM.

[27] See the OEB's CDM website and individual utility reports listed there: http://www.ontarioenergyboard.ca/OEB/Industry/Regulatory+Proceedings/Policy+Initiatives+and+Consultations/Conservation+and+Demand+Management+(CDM)/Electricity+CDM .

Table 5 shows that many of the prices for renewable power under the Feed-in Tariff greatly exceed the cost of coal generation plus environmental harm, health harm and climate change harm, which, using the values suggested above, might add up to between 10 to 15 cents/kWh. If the renewable power displaces natural gas the environmental benefits are much smaller and the CO2 benefits are 60% smaller, but the cost of displaced power is higher so we might still use a price range of 10 to 15 cents/kWh to evaluate renewable projects. All of the solar projects cost far more than this range. Other projects such as biomass, large biogas, water power, landfill gas and onshore wind are within the upper range of costs justified by the reduction of harm. Landfill gas projects have the added advantage of removing methane, a powerful greenhouse gas, from the atmosphere, so these projects are particularly attractive.

Table 5: Feed-in Tariff Rates (Fall 2011)

RENEWABLE FUEL	Size Tranches	Contract Price cents/kWh
Biomass		
	≤ 10 MW	13.8
	≥ 10 MW	13.0
Biogas		
On-Farm	≤ 100 kW	19.5
On-Farm	> 100kW ≤250 kW	18.5
Biogas	≤ 500 kW	16.0
Biogas	> 500kW ≤ 10 MW	14.7
Biogas	> 10 MW	10.4
Waterpower		
	≤ 10 MW	13.1
	> 10 MW ≤ 50 MW	12.2
Landfill gas		
	≤ 10 MW	11.1
	> 10 MW	10.3
Solar PV		
Rooftop	≤ 250 kW	71.3
Rooftop	> 250 kW ≤ 500 kW	63.5
Rooftop	> 500 kW	53.9
Ground Mounted	> 10 kW ≤ 10 MW	44.3
Wind		
Onshore	Any size	13.5
Offshore	Moratorium	19.0

Source: Ontario Power Authority. *Feed-in-Tariff Program*, http://fit.powerauthority.on.ca/fit-program.

The variability of wind and solar power have caused operational challenges for the system operator and when there is low demand and substantial wind output there have been incidents of surplus baseload power, driving the spot price negative and sometimes requiring curtailment of output by generators who are guaranteed a fixed price. These incidents are expected to return in the

summers of 2012 and 2013.[28] Such incidents contribute in a small way to increased prices for most consumers.

If the *Green Energy Act* did not exist, presumably more natural gas generation would be built and mid-merit gas plants would run longer hours in place of intermittent wind and solar. This would cost more than existing coal and heritage generation but the premium would be less than for renewable generation.

The Government's Long Term Energy Plan projects residential electricity price increases from 2010 to 2030.[29] They project an increase of 46% in nominal residential prices by 2015, which is a compound annual increase of 7.9%, of which over half, or 56%, is attributable to investment in renewable green generation. Adjusting for inflation yields a real increase of 32% over five years or 5.7% per year. These increases are somewhat larger than those in this report and the renewable energy portion is slightly smaller, but the general picture is consistent.

A reader interested in a longer-term perspective on this issue should consult a recent study for the Pembina Institute,[30] which looks at Ontario's electricity choices for the next 20 years and forecasts electricity costs for several scenarios. An important distinction is that the Pembina study looks at aggregate power prices, not residential prices. The Pembina study is an excellent comparison of the long-run price effects of different policies on aggregate electricity costs, but it does not focus on residential price trends to 2015.

Mitigating Factors

The impacts of the increases detailed in this report are mitigated by two government policies. The Ontario Energy Tax Credit provides relief from the sales tax levied on energy bills for low and middle-income families and individuals.[31] If a typical residential consumer was fully eligible, the relief would be $9.24 per month or about $111 per year in 2010 and $157 in 2015 but there is insufficient income data to estimate the actual average eligibility and relief. The Ontario Clean Energy Benefit provides financial assistance to residential and small commercial consumers equal to 10% of the cost of their commodity electricity plus the delivery, regulatory and debt retirement charge and the associated HST for years 2011 through 2015.[32] It will reduce costs for a residential consumer in 2015 by $18.23 per month. The effect of this 'benefit' is to reduce the residential bill increase in 2015 after tax to 25.1%, down from 37.4%. See Figure 6. Both of these mitigation measures are paid for out of general Ontario tax revenues. Unfortunately, the Clean Energy Benefit will reduce effective energy prices and thus reduce energy conservation, which would otherwise reduce the need for costly new facilities.

The high costs of nuclear refurbishment during the last decade postponed the date when the accumulated debt might have been paid off. This report does not speculate whether, in the absence of those projects, there might have been some reduction in the debt retirement charge before 2015.

[28] IESO, 2011. *18-Month Outlook, from December 2011 to May, 2013*, IESO_REP_0699v1.0, http://www.ieso.ca/imoweb/pubs/marketReports/18MonthOutlook_2011nov.pdf . Pages 13- 14.
[29] Government of Ontario, 2010. *Ontario's Long Term Energy Plan*, http://www.mei.gov.on.ca/en/pdf/MEI_LTEP_en.pdf. Pages 59-60.
[30] Weis, Tim and Partington, P.J. ,2011. *Behind the Switch: Pricing Ontario Electricity Options*. Pembina Institute, http://www.pembina.org/pub/2238.
[31] Ontario Ministry of Revenue, 2010. *Ontario Energy and Property Tax Credit*, http://www.rev.gov.on.ca/en/credit/oeptc/faq.html#Q1.
[32] Ontario Ministry of Energy, *Ontario Clean Energy Benefit*, http://www.energy.gov.on.ca/en/electricity-prices/clean-energy-benefit/.

Electricity prices, and thus electricity bills for residential consumers, are going to increase by 2015, compared to 2010 as shown in Figure 6. For the assumed consumption of 1000 kWh/month, the forecast bill increase will be on the order of 37.4% in nominal dollars, or 24.4% after adjusting for anticipated inflation of 2% per year. The "Clean Energy Benefit" for residential and small commercial customers reduces their nominal bill increase to about 25%.

D. Conclusions

The analysis carried out for this background report allows us to arrive at the following conclusions:

- Price increases have been a feature of Ontario's electricity system for half a century, with multiple drivers. A major cause of these increases is the fact that any new generation facility built during the period under discussion in this report is much more expensive than power from our heritage hydroelectric facilities. Growing electricity demand over that long time period made rising prices inevitable.

- Following from that, there is no "zero cost increase" scenario for electricity in Ontario. Whether it is the necessity to re-invest in transmission and distribution infrastructure, or the decision to phase out coal-generation capacity that will need to be replaced by more expensive (while remembering the caveats about the health costs of coal) natural gas, nuclear, or renewable power, both basic electricity and the electricity system in Ontario will cost more.

- Residential electricity prices increased faster than inflation between 2000 and 2010, with increases including taxes averaging 4.77% per year in nominal terms, or 2.86% after adjusting for inflation. The increases of that decade derive primarily from new natural gas projects and infrastructure renewal; and secondarily from changes at the wholesale and distribution level arising from the introduction of the competitive market in 2002, including higher local distribution charges. Taxes are the third largest contributor.

- Prices will continue to rise from 2010 to 2015, with a nominal rate of increase of over 5% per year, which is somewhat higher than the historical average. By the summer of 2011 there had already been an increase in the energy portion of the bill of about 17% compared to April 2010. This implies that a significant part of the projected increase has already taken place.

- The increases to 2015 will be driven primarily by renewable power projects, including generation costs, and transmission and distribution costs to accommodate local renewable power. Nuclear refurbishment costs during the last decade may have reduced the opportunity to reduce debt charges before 2015.

- It is not easy for consumers to determine what is causing the increased prices. Part of the problem comes from the varying and confusing nature of information received by consumers. A clearer and more consistent presentation of information to consumers is warranted. Another part of the confusion comes from the counterintuitive labelling of certain components of the electricity bill. For example, calling the Global Adjustment the "Provincial Benefit" became misleading as soon as it became a cost rather than a cost reduction. Similarly the "Clean Energy Benefit" is a misleading name for the taxpayer subsidy to residential and small commercial consumers from 2011 to 2015.

- It would have been better to present estimates of the likely cost of green power and its impact on electricity bills when the *Green Energy Act* was being debated and to craft that *Act* so that it minimized the cost of achieving its environmental goals. The Long Term Energy Plan contains extensive descriptions of changes in the electricity system and jobs supposedly created by those changes, but it does not compare costs of various forms of generation. Indeed, it does not present costs per MWh of generation from various sources. It is not possible for a reader of the Plan to assess what costs each component contributes to the Plan, and thus it is not possible to

assess how changes in the Plan or alternatives to the Plan would affect costs or environmental outcomes. While Ontarians may be prepared to pay for reducing air pollution and greenhouse gas emissions, the Plan does not help assess the balancing of environmental goals and electricity cost.