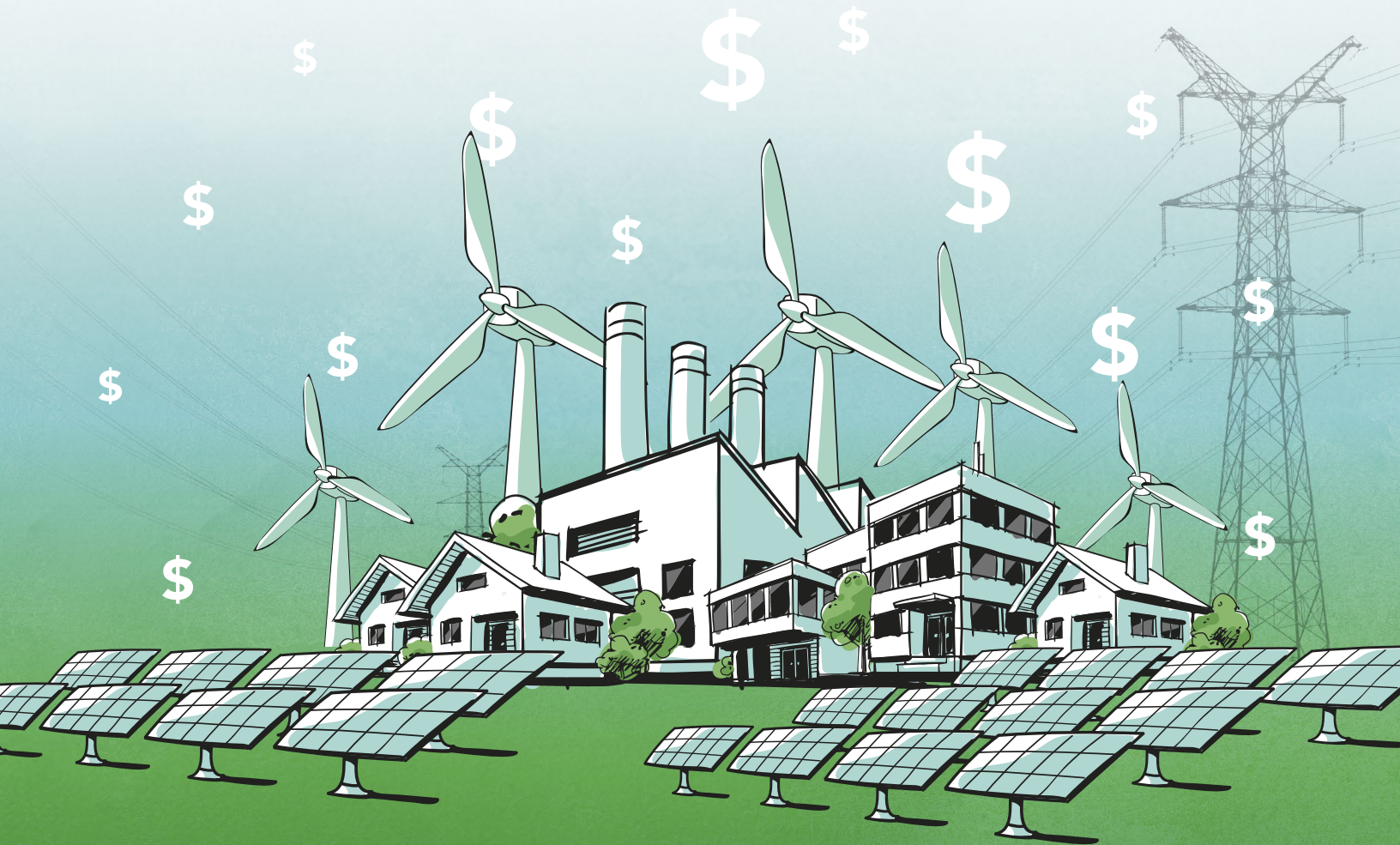


Understanding the Changes in Ontario's Electricity Markets and Their Effects

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Executive Summary

Energy consumption is a driver of economic growth. Policymakers in Ontario have made poor policy decisions, resulting in rising electricity costs, lower employment, and lower competitiveness, while achieving minimal environmental benefits. This publication presents a series of collected essays that critique the reasoning behind Ontario's electricity policy changes and spell out the long term consequences.

Ontario's main policy shift began around 2005 when the government made a decision to begin phasing out coal. The next major step occurred in 2009 when the government launched its Green Energy Act (GEA). The centerpiece of the GEA was a Feed-In-Tariff program, which provides long-term guaranteed contracts to generators with renewable sources (wind, solar, etc.) at a fixed price above market rates. In order to fund these commitments, as well as the cost of conservation programs, Ontario levied a non-market surcharge on electricity called the Global Adjustment (GA). Between 2008 and 2016, the GA grew more than 70 percent, causing a drastic increase in electricity prices. The high cost associated with aggressively promoting renewable sources is particularly troubling given the relatively small amount of electricity generated by these sources. In 2016, renewable sources generated less than 7 percent of electricity in Ontario while accounting for almost 30 percent of the GA.

Ontario's decision to phase out coal contributed to rising electricity costs in the province, a decision justified at the time with claims that it would yield large environmental and health benefits. The subsequent research showed that shuttering these power plants had very little effect on air pollution. Had the province simply continued with retrofits to the coal plants then underway, the environmental benefits of the shift to renewables could have been achieved at one-tenth the cost.

The issue of rising electricity costs in Ontario can be partly attributed to the imbalances between supply and demand of electricity. Between 2005 and 2015, the province decided to increase its renewable capacity to facilitate the coal phase-out. However, since renewable sources are not as reliable as traditional sources, the government contracted for more natural gas capacity as a back-up. Meanwhile, the demand for electricity declined,

partly due to rising electricity costs. The increase in the total installed capacity, coupled with lower electricity demand, has resulted in excess production being exported to other jurisdiction at a significant loss.

As a result of these structural shifts and poor governance, electricity costs have risen substantially in Ontario. Ontario now has the fastest growing electricity costs in the country and among the highest in North America. Between 2008 and 2016, Ontario's residential electricity costs increased by 71 percent, far outpacing the 34 percent average growth in electricity prices across Canada. In 2016, Toronto residents paid \$60 more per month than the average Canadian for electricity.

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 electric costs for the rest of Canada was only 14 percent. In 2016, large industrial users 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 compared to large electricity users in Quebec, Alberta, and British Columbia.

Soaring electricity costs in Ontario have placed a significant financial burden on the manufacturing sector and hampered its competitiveness. Compared to multiple comparable American and Canadian jurisdictions, Ontario has exhibited the most substantial decline in its manufacturing sector over the past decade. Overall, Ontario's high electricity prices are responsible for approximately 75,000 job losses in the manufacturing sector from 2008 to 2015.

Given the critically important role that affordable energy plays in economic growth and prosperity, the authors urge the Ontario government to pursue meaningful policy reforms aimed at lowering electricity costs for all Ontarians.

SECTION ONE: WHY ENERGY POLICY MATTERS

Prior to delving into the specific problems in Ontario's electricity market and possible solutions, we will first review some Fraser Institute research on why energy policies matter with respect to economic growth and prosperity.

The Importance of Sound Energy Policies

Ross McKittrick and Elmira Aliakbari

Editors' Note: The issue of whether energy consumption drives economic growth—or vice versa—is key to understanding the broad effects of increasing energy costs in Ontario. The following¹ is a summary of a 2014 technical study completed by Professor Ross McKittrick and Elmira Aliakbari, PhD, explaining the long term relationship between energy consumption and economic growth.

Economic growth in the modern world is fueled by energy. Although the total size of the economy tends to grow faster than total energy consumption, the two nonetheless trend together over the long run. This raises an important research question: Does economic growth cause an increase in energy consumption, or does an increase in energy availability cause an increase in economic activity, or both?

The question has important policy implications. Suppose GDP growth causes increased energy consumption, but isn't dependent on it. In this view, energy consumption is a kind of luxury good (like jewellery), the consumption of which arises from increased wealth. If policymakers wanted to, they could restrict energy consumption without impinging on future economic growth. The alternative view is that energy is a limiting factor, or essential input, to economic growth. In that framework, if energy consumption is constrained by policy, future growth will also be constrained, raising the economic costs of such policies. If both directions of causality exist, it still implies that energy restrictions will have negative effects on future growth. The final possibility is that energy consumption and GDP are unrelated.

¹ This essay is based on the executive summary from Ross McKittrick and Elmira Aliakbari (2014), *Energy Abundance and Economic Growth—International and Canadian Evidence*, Fraser Institute <<https://www.fraserinstitute.org/studies/energy-abundance-and-economic-growth>>.

Statistical evidence can be used to establish correlations, but we are asking a question about causality, and as the saying goes, one does not imply the other. In recent decades, new statistical methods have been developed that allow for investigation of a particular kind of causality, and these methods have been applied to the energy-GDP question. The conclusions from these analyses indicate that economic growth and energy either jointly influence each other, or that the influence is one-way from energy to GDP, but in either case the evidence now points away from the view that energy use can be restricted (or, equivalently, prices artificially increased) without constraining future growth. Also, out of all countries studied, Canada has yielded some of the most consistent evidence on this, in that studies done under a variety of methods and time periods have regularly found evidence that energy is a limiting factor in Canadian economic growth.

The authors' examination of Canadian data, applying the most modern time series econometric methods available, leads to the conclusion that energy use in Canada is not a mere by-product of prosperity, but a limiting factor in growth: real per-capita income is constrained by policies that restrict energy availability and/or increase energy costs, and growth in energy abundance leads to growth in GDP per capita. Thus, policies favouring the abundant availability of energy are important for sustaining strong economic growth, and policies that deliberately limit energy availability will likely have adverse macroeconomic consequences.

These considerations are important to keep in mind as policymakers consider initiatives (especially related to renewable energy mandates, biofuels requirements, and so forth) that explicitly limit energy availability. Jurisdictions such as Ontario have argued that such policies are consistent with their overall strategy to promote economic growth. In other words, they assert that forcing investment in wind and solar generation systems, while making electricity more expensive overall, will contribute to macroeconomic growth. The evidence points in the opposite direction. Policies that engineer increased energy scarcity are likely to lead to negative effects on future economic growth.

Imprudent Actions, Unpleasant Consequences

Ross McKittrick and Tom Adams

*Editors' Note: This 2014 column² discussed the debates around key energy policy reforms enacted by the Ontario government that were causing electricity prices to increase. A version of this column originally appeared in the **Financial Post**.*

Ontario's green energy transformation—initiated well over a decade ago under then-Premier Dalton McGuinty—is now hitting consumers. As Ontario consumers know all too well, the province has gone from having affordable energy to having some of the highest electricity prices in Canada.

An earlier study published by the Fraser Institute, *Environmental and Economic Consequences of Ontario's Green Energy Act*, explained how the Green Energy Act, passed in 2009, yielded at best tiny environmental benefits that cost at least 10 times more than conventional pollution control methods, and was directly harming economic growth by driving down rates of return in key sectors like manufacturing.

But complex rate structures and lack of official disclosure around large embedded costs have led supporters of the Green Energy Act to deny that green power is responsible for the price hikes. Green industry advocates, including the consulting firm Power Advisory and advocacy group Environmental Defense, have added up the direct payments to new renewable generators, and concluded that since those costs are relatively small, the impact of renewables on the total cost of power is likewise small.

However, such analyses ignore the indirect costs that arise from the way renewables interact with the rest of the power system. Adding

² This essay is based on Ross McKittrick and Tom Adams (2014), How Green Energy is Fleecing Ontario Electricity Consumers, *Financial Post* <<http://business.financialpost.com/opinion/how-green-energy-is-fleecing-ontario-electricity-consumers>>. The column relies on the original 2014 study by Ross McKittrick and Tom Adams: *What Goes Up... Ontario's Soaring Electricity Prices and How to Get Them Down*, Fraser Institute <<https://www.fraserinstitute.org/research/what-goes-upontarios-soaring-electricity-prices-and-how-get-them-down>>.

renewable generating capacity triggers changes throughout the system that multiply costs for the public through a mechanism called the Global Adjustment. A recent study, *What Goes Up... Ontario's Soaring Electricity Prices and How to Get Them Down*, quantifies the impacts of different types of new generators on the Global Adjustment, showing how Ontarians are getting a raw deal.

Here's how it works: over the last decade, Ontario closed its coal-fired power plants and built a rapidly expanding portfolio of contracts with other generators, including renewable energy companies, producing power from hydro, wind, solar, and biomass. These companies charge the Ontario Power Authority (OPA) higher-than-market-value prices for energy. To make up the difference, the OPA slaps an extra charge—called the Global Adjustment—on the electricity bills of Ontarians.

The Global Adjustment adds to the commodity portion of rates, which combined with charges for delivery, debt recovery, and regulatory factors, constitute the overall rate. Elements of the Global Adjustment that are not disclosed include payments to generators to not generate, rates paid to historic non-utility generators, and costs for new hydro-electric developments.

Since 2007, the Global Adjustment has risen six cents per kilowatt-hour in inflation-adjusted terms, pushing up the commodity portion of bills by 50 percent. Not long ago, Ontario's total industrial rate was less than six cents per kilowatt-hour. The rising Global Adjustment is by far the biggest driver of the resulting 21 percent increase in the overall average cost of power in the province over the period 2007-2013. The Global Adjustment's upward path is a direct consequence of government intervention in the electricity market. Our analysis unpacking the costs of different types of generation shows that the consumer impact of new renewables substantially exceeds the direct payments to those generators by as much as 3 to 1. And renewables are a big part of the problem: wind and solar systems provided less than four percent of Ontario's power in 2013 but accounted for 20 percent of the commodity cost paid by Ontarians.

Getting to the bottom of the rate implications of adding renewables gained new urgency when Premier Wynne declared that the 2013 fleet of wind and solar will almost triple by 2021. This is an incredibly reckless decision. In his *National Post* column on the 2014 Ontario Economic Summit, co-chair Kevin Lynch stated bluntly "that Ontario has a serious growth problem is rather difficult to deny, or debate."

What's the solution? If the province wants to contain electricity rate increases it needs to halt new hydroelectric, wind, and solar projects. In order to reverse rate increases, the province should seek opportunities to

terminate existing contracts between renewable energy companies and the OPA. Alas, as the premier has indicated, that's not where they're headed.

Alternatives to costly new renewables include using some imported electricity from Quebec while Ontario refurbishes its nuclear power plants, and maintaining 4 of 12 coal-fired power units at Lambton and Nanticoke that had been outfitted with advanced air pollution control equipment just prior to their closure, making them effectively as clean to operate as natural gas plants. *[Ed: This suggestion may no longer be possible to implement.]* Costly conservation programs encouraging consumers to use less electricity make particularly little sense these days in Ontario. Right now, Ontario is exporting vast amounts of electricity at prices that yield only pennies on the dollar, and also paying vast but undisclosed sums to generators to not generate.

Many European countries made costly commitments to renewable energy but are now winding them back. Germany is investing in new smog-free coal power generation. Environmentalists have often suggested that following Europe is the way to go. Perhaps Ontario should consider following it now.

SECTION TWO: WHAT REALLY HAPPENED TO ONTARIO'S ELECTRICITY MARKET

This section contains commentaries and essays that examine policy reforms in Ontario that have fundamentally altered the province's electricity market and lie at the foundation of why the province is suffering marked increases in electricity prices.

Understanding the Effects of Ontario's Green Energy Act

Ross McKittrick and Tom Adams

*Editor's Note: This is a summary of findings from the 2014 Fraser Institute study **What Goes Up... Ontario's Soaring Electricity Prices and How to Get Them Down** by Professor Ross McKittrick and Tom Adams.³*

The costs of running Ontario's power system have risen much more rapidly than inflation in recent years, despite a decline in competitive wholesale market prices for power.

The commodity portion of Ontario electricity prices is composed of a competitive market-clearing component (the Hourly Ontario Electricity Price or HOEP) and a centrally planned surcharge, now called the Global Adjustment (GA), that directs funds to generating units based on revenue contracts with the province. Over the past decade, the market-clearing component has fallen to a relatively small component of Ontario electricity prices, while the centrally planned surcharge has risen six-fold—from a credit of about \$10 per MWh to about \$60 per MWh (6 cents per kWh). While the market-clearing component closely tracks neighbouring markets, the centrally planned costs are unique to Ontario. The centrally planned component of Ontario's power costs has become the dominant allocation mechanism in Ontario electricity pricing, which in turn means that relatively little of Ontario's electricity market is guided by competitive market price signals.

To understand why Ontario's electricity prices are rising, we need to explain what drives the centrally planned Global Adjustment. One complicating factor is that some new renewable and non-renewable generators are paid not only based on their outputs but also based on their total capacities. Consequently our analysis looks at both capacity development and

³ Ross McKittrick and Tom Adams (2014), *What Goes Up... Ontario's Soaring Electricity Prices and How to Get Them Down*, Fraser Institute <<https://www.fraserinstitute.org/research/what-goes-upontarios-soaring-electricity-prices-and-how-get-them-down>>.

actual power generation. We examined monthly data spanning 2005 to 2013 on the GA, the HOEP, capacity and output by generator type (wind, gas, solar, nuclear, hydro, and coal), and exports and imports. As a simple focus on direct cash flows to various generators would fail to account for the interactions between different components of the generation mix, we constructed a multiple regression model of the GA as a function of these explanatory variables.

The results are as follows:

1. We estimate that solar and wind systems provide just under 4 percent of Ontario's power but account for about 20 percent of the average commodity cost. By comparison, the Ontario Energy Board (2013) forecast that, in 2014, solar and wind would produce 7 percent of total supply and their direct costs would account for about the same fraction of the average commodity cost.
2. Each additional 1 MW of new wind capacity adds about \$0.02/MWh to the Global Adjustment, after taking into account the offsetting effect of revenues from wind production. The system-wide cost effect is about 3.6 times the direct Feed-In-Tariff (FIT) payment burden.
3. Each additional MW of new hydro over the past decade has added about \$0.015/MWh to the GA. Factors behind the deteriorating performance of hydroelectric generation warrant further investigation.
4. Solar power generation has large marginal effects on the GA, which have been concealed by the relatively minimal amounts generated so far in the province. An increase of 1 MWh per hour, on average over a month, will cause the GA for that month to rise by about \$0.016/MWh.
5. Reductions in coal-fired power generation in Ontario were associated with statistically significant increases in the GA.
6. Imports can potentially reduce the GA, but exports occur under circumstances that increase it. Ontario is a large and growing power exporter. Encouraging greater domestic consumption at times of surplus baseload would reduce power costs in Ontario.

We recommend measures such as a moratorium on new renewable power facilities, pursuit of regulatory and legislative options to reduce the amount of installed renewables capacity, restarting 4 of 12 coal-burning units at Lambton and Nanticoke that can operate as cleanly as natural gas plants, suspending conservation programs when the province has surplus baseload, and exploring the option of large-scale imports of power from Hydro Quebec to bridge the interval for nuclear power plant refurbishment.

No, Wind Power Really *Is* Part of the Problem

Ross McKittrick and Tom Adams

*Editors' Note: This 2014 column is a response to claims by the Canadian Wind Energy Association that challenged Ross McKittrick and Tom Adams' study, **What Goes Up...Ontario's Soaring Electricity Prices and How to Get them Down**.⁴ In that study, the authors found that adding wind power to the Ontario power grid increased costs by about three times the amount of direct payments to wind turbine operators.*

One of the issues regarding Ontario's escalation in electricity prices that is often misunderstood and in some cases misrepresented is the role of wind power within the larger mix of power generation in the province. The 2014 study, *What Goes Up... Ontario's Soaring Electricity Prices and How to Get Them Down*, analyzed the factors driving the rise in Ontario's electricity prices, focusing on the so-called Global Adjustment (GA), which is a non-market surcharge set by the province to fund payments to electricity producers for above-market revenue guarantees. The econometric analysis allowed the study to track not only the impact of direct payments to power generating firms but also the indirect effects arising when one distorted production decision subsequently distorts the incentives of others, boosting overall provincial liabilities. Among other things, the study found that adding wind power to the grid increases costs by about three times the amount of the direct payments to wind turbine operators, with the interaction effects making up the difference.

In response to the analysis, the Canadian Wind Energy Association (CanWEA) commissioned Power Advisory LLC to undertake its own analysis. CanWEA's press release acknowledges that electricity prices are increasing, but claims that these changes benefit Ontarians. While it is certainly true that rising prices—up 52 percent since 2004 in inflation-

⁴ This essay is based on the Ross McKittrick and Tom Adams column, "Hot Air from the Wind Power Lobby," that appeared in the *Financial Post* on November 12, 2014 <<http://business.financialpost.com/opinion/hot-air-from-the-wind-power-lobby>>.

adjusted terms—have been enormously beneficial to CanWEA and its members, they are harmful to Ontario consumers and firms. It is important to understand the real factors behind price trends, and not simply to take at face value the claims of an industry group with an obvious conflict of interest in the matter.

CanWEA claims that our “study fails to acknowledge several key drivers of electricity price increases, including the costs of upgrading and renewing aging electricity infrastructure (such as transmission lines and smart meters), and charges such as the Debt Retirement Charge associated with Ontario’s past investments in nuclear power.”

This is untrue. The study in question examined the impacts of all the power bill components including transmission and distribution costs, which includes smart meters. Our analysis of power bill components relies exclusively on official Ontario government sources. It is clear that the Debt Reduction Charge (detailed in appendix A on page 32 of the study) has applied no upward pressure on rates since 2004, and transmission and distribution costs have increased 14 percent, while overall commodity costs increased by 68 percent. The study focused on the rising commodity cost because it is by far the largest driver for rising rates.

The Power Advisory analysis complained that our study focused only on the GA, rather than the complete wholesale cost of power (namely the GA plus the hourly market price). This is also untrue. We showed in our study (see figure 1 on page 4 of the study) that the hourly market price has not been increasing; in fact it has fallen by more than 50 percent over the period of analysis. We focused on the GA because that is the component that has been driving the commodity cost increases.

Another Power Advisory complaint is that our regression analysis failed to include a time trend. A time trend would be spurious in this case. We provided a detailed explanation of the formula that determines the GA (pp. 7–10) and there is nothing in it that says it has to go up each year. In other words, it is not a trending variable. Power Advisory presents a chart showing the GA with a linear trend to support its assertion that the mere passage of time is the cause of the increase in the GA. But there is no necessary relationship between time and rising electricity costs, as evidenced by the fact that power prices outside Ontario have been falling over time. The reality is that their time trend variable is merely a proxy for the real cost drivers, particularly the policy-driven increases in wind, solar, and incremental hydro-electric generation capacity.

Power Advisory’s commentary claims (without supporting evidence) that “there is no secondary impact” of wind and solar. This is simply not credible, given the fickle nature of renewables and Ontario’s storage-constrained grid. Many common operating conditions for wind power drive

costs to consumers beyond those directly caused by payments to wind generators. For example, high wind output during low demand periods is clearly associated with Bruce nuclear generation curtailments and spilling of hydro-electric generation by Ontario Power Generation. The Power Advisory analysis assumes away these types of interactions, whereas our analysis captures them.

Finally, Power Advisory relies on the trite observation that “correlation is not causation.” Our statistical analysis provides clear supporting evidence for conclusions that also emerge from our analysis of the institutional structure of the Ontario power system, and it allows us to quantify the relative impacts of different components. It also allows us to test, and reject, the claim that increased renewables capacity are unrelated to rising Ontario electricity prices. The study reaffirms the conclusion that renewable power generation, particularly wind and solar power, are key drivers behind Ontario’s surging electricity prices.

The Chamber Gets it Right: What Happened in Ontario

Ross McKittrick and Tom Adams

*Editors' Note: This 2015 column,⁵ which originally appeared in the **Financial Post**, responds to a report from the Ontario Chamber of Commerce regarding the negative outlook for business in Ontario as a result of rising energy costs.*

In 2015, the Ontario Chamber of Commerce released the findings of an unprecedented consultation with its members and the results are painfully clear: soaring electricity prices are killing business in Ontario. One in 20 Ontario businesses now expect to shut their doors in the next five years due to electricity costs, and nearly 40 percent report that electricity costs have already forced them to delay or cancel investment decisions.

The chamber acknowledges that the larger policy picture from Queen's Park is grim, with plans for cap-and-trade, higher minimum wages, rising workplace safety premiums, and a new government-run pension system. But their report, *Empowering Ontario*, focuses above all on soaring electricity costs, a problem unique to Ontario that is directly traceable to a decade of foolish policy decisions.

The chamber is to be applauded for taking on this issue. Many Ontario businesses have tried to shield themselves by seeking beggar-thy-neighbour gimmicks that merely shift their costs onto others, resulting in a less efficient and transparent pricing system. For instance, the chamber slams the Class A/B rate split that benefits large consumers by redirecting some of their costs onto households and small businesses.

Perhaps Ontario business leaders are finally realizing that moving their deck chairs to the high side of a sinking ship is not a long-term solution. With the Ontario Liberal government this week preening on the

⁵ Ross McKittrick and Tom Adams (2015, July 10), Ontario's Job Killer: Business Sounds Alarm over Soaring Electricity Prices, *Financial Post* <<http://business.financialpost.com/opinion/ontarios-job-killer-business-sounds-alarm-over-soaring-electricity-prices>>.

global climate stage at the Climate Summit of the Americas in Toronto, doubling down on its costly green agenda, the business community needs to face up to the bigger picture.

Based partly on a 2014 study we did for the Fraser Institute, *What Goes Up... Ontario's Soaring Electricity Prices and How to Get Them Down*, the report explains that Ontario levies a (soaring) non-market surcharge on electricity called the Global Adjustment (GA), which funds above-market revenue commitments to power generators and the cost of conservation programs. As they correctly explain, the upward march of the GA began with the decision to phase out coal-fired power generation and phase in renewables using the costly Feed-In-Tariff (FIT) subsidy. The problem has been exacerbated by a capacity mismatch that leads to excess production being exported at a loss year-round.

The chamber reviewed 10 possible solutions and ranked them in terms of potential to mitigate the mess. While we agree with many points in the chamber's analysis, there are some important options they left out, and they overstate the relevance of others.

In their critique of a proposal to increase the peak-to-off-peak ratio of time-of-use (TOU) pricing, the chamber correctly alludes to the potential for unfairness and inefficiency when marginal prices for consumers do not reflect actual marginal costs of generation. The chamber also rightly downplays the potential role of hydro purchases from Quebec as a silver bullet for replacing nuclear down the road. The infrastructure required for large-scale imports, and Quebec's constraints in the winter months, make it unlikely this is a reliable long-term strategy for Ontario.

The chamber unfortunately dismisses the possibility of cancelling FIT contracts, mistakenly believing that to be illegal. As Bruce Pardy explained in a report published by the Fraser Institute in 2014,⁶ the government that signed the odious contracts can also pass legislation to nullify them, thus overcoming the legal obstacle to their cancellation.

While the chamber accurately charts the coal phase-out as the headwaters from which the river of bad policy flowed, they failed to follow their own logic and call for a reversal of the error. Instead they dismissed the option "given its environmental impacts." In saying this, they have unfortunately bought into, and thus perpetuate, a myth promoted by the government that the Lambton and Nanticoke coal-fired power plants had large adverse effects on Ontario air quality. The government's own meteorological simulations in 2005 showed this was untrue. Indeed a simple glance at Ontario's emissions data showed it could not possibly make sense.

⁶ Bruce Pardy (2014), *Cancelling Contracts: The Power of Governments to Unilaterally Alter Agreements*, Fraser Institute <<https://www.fraserinstitute.org/research/cancelling-contracts-power-governments-unilaterally-alter-agreements>>.

The Environment Canada emissions inventory for Ontario shows that in 2008, one year before the introduction of the Green Energy Act, coal-fired power plants emitted 4,070 tonnes of particulates, one-tenth of one percent of the 3.8 million tonnes emitted in the province that year.

Counting only ultra-fine particulates, the coal plants were responsible for four-tenths of one percent. That was down slightly from the six-tenths of one percent they emitted in 2005, the year the province began attributing over 300 deaths annually to coal plant emissions. On this logic, their model would imply that air pollution from all other sources kills about 50,000 people, which would be significant since there are only about 90,000 annual deaths in Ontario from all causes.

The coal death toll claim is absurd but it illustrates the government's warped propaganda campaign that derailed sensible power planning discussions. It is understandable that the chamber shied away from the coal option, so toxic is the demagoguery even today. But Ontario is in a dire situation and it won't be remedied until the falsehoods that got us here are refuted, one by one, including the myth of coal as mass murderer.

With the Canadian economy inching towards recession, the chamber has burst the bubble of official silence around Ontario's electricity policy disaster. They have exposed the link between rising power costs and provincial economic stagnation. This is a major policy disaster and it will require a major course correction to fix it.

Poor Policy Choices Unnecessarily Drive Up Electricity Prices in Ontario

Kenneth P. Green, Ben Eisen, and Taylor Jackson

*Editor's Note: This essay is based on a column⁷ that originally appeared in 2015 in the **National Post**, and is based on a study that summarizes many of the energy policy changes enacted in Ontario that have led to higher electricity prices.*

Ontario's approach to electricity policy has driven up prices for businesses and residents, undermining competitiveness. This is just one example of how misguided policy choices have contributed to Ontario's economic weakness in recent years.

Once the engine of Canada's economy, Ontario is now mired in a prolonged period of weak performance. In 2003, Ontario's real GDP growth fell below the national average and consistently lagged behind the rest of Canada over the next decade. Consequently, real disposable household incomes in Ontario, which were fully 10 percent higher than the national average in 2000, fell below the Canadian average for the first time on record in 2012 and 2013.

Investor confidence is understandably shaken, with the result being weak private-sector investment in the province. In fact, in 2013 (the last year for which we have data), private-sector investment still had not recovered to pre-recession levels.

The province's relative decline cannot be entirely blamed, as some do, on external forces such as the resource boom elsewhere in Canada. Instead, a range of poor policy choices have undermined Ontario's competitiveness. One of the clearest examples of this pattern can be found by examining the province's policy on renewable electricity generation.

⁷ Kenneth P. Green, Ben Eisen, and Taylor Jackson (2015 November 2), Poor Policy Choices Unnecessarily Drive up Electricity Prices in Ontario, *National Post* <<http://nationalpost.com/opinion/ben-eisen-taylor-jackson-kenneth-p-green-in-ontario-blame-bad-policy>>.

Ontario's foray into renewables began in 2009 when the government launched its Green Energy Act (GEA), which aimed to "expand renewable energy generation, encourage energy conservation and promote the creation of clean energy jobs." The plan subsidizes renewable electricity by providing producers with long-term price guarantees at above market rates through Feed-In-Tariffs.

The plan has expanded renewable energy generation but at a considerable cost. According to figures from one study, from 2009 to 2015, total annual power costs have risen by more than 30 percent. In fact, all the wind and solar installed by the province only accounts for four percent of Ontario's electricity, while amounting to 20 percent of the average commodity cost. Simply put, this is a high amount to pay for not much electricity.

These high costs put Ontario businesses and manufactures at a significant competitive disadvantage. This is best seen in a 2014 study, *Paying More for Power*, that estimated the prices (in \$CA) that small industrial consumers would pay for a kilowatt-hour (kWh) of electricity in 119 Canadian and American cities.

American rust belt cities like Chicago, Cleveland, Indianapolis, Cincinnati, and Pittsburgh all had electricity prices under eight cents per kWh. Small industrial customers in Toronto, on the other hand, experienced prices of almost 12 cents per kWh. Considering that a small industrial customer will consume about 400,000 kWh a month, this price gap has a significant adverse impact on the competitiveness of Ontario's businesses.

Ontario's beleaguered manufacturing industry is clearly damaged by higher electricity prices. Indeed, one study estimated that a 50 percent increase in Ontario's electricity costs would result in a 29 percent reduction in the rate of return to capital for the manufacturing industry.

All this pain for Ontario business has come with little environmental benefit. If Ontario had simply continued with on-going retrofits to coal plants, all the environmental benefits of the GEA could have been achieved at one-tenth the cost.

And as for the "green jobs" the GEA was supposed to create, a 2011 Ontario Auditor General's report noted that "studies in other jurisdictions have shown that for each job created through renewable energy programs, about two to four jobs are often lost in other sectors of the economy because of higher electricity prices."

With few positives (if any) to show from the GEA, Ontario's businesses are starting to feel the pressure. A survey of business owners found that 38 percent expect to see their bottom lines shrink due to rising electricity prices, resulting in delays or cancellation of investment in the province.

External factors such as exchange rates and global economic growth will always influence Ontario's economic performance. However, policy choices also play a major role in determining whether Ontario can thrive and prosper. On the electricity file, policy choices have weakened the provincial economy by unnecessarily driving up electricity prices. If the provincial government seeks to reverse Ontario's trajectory of economic decline relative to the rest of Canada, one important step it can take is changing course on electricity.

System Shock: Evaluating Electricity Price Growth in Ontario

Taylor Jackson, Ashley Stedman, Elmira Aliakbari,
and Kenneth P. Green

*Editors' Note: The Fraser Institute has undertaken a number of studies and essays explaining the large increases in electricity prices in Ontario for both residential and business customers. The following essay is based on the executive summary from the 2017 paper **Evaluating Electricity Price Growth in Ontario**⁸ and also draws from the 2017 column by the authors that appeared in the **Financial Post**.⁹*

Electricity is an essential part of our modern lives. It powers our economy, generating the economic activity that underpins our high living standards. It also allows Canadians to enjoy the comforts of modern life, from warm homes and warm meals to internet access and entertainment. The full enjoyment of these benefits depends on electricity remaining affordable for people across the income spectrum.

But affordable electricity appears to be a growing challenge for Ontarians. In fact, electricity prices in Ontario have risen substantially over the last decade, placing a burden on many Ontarian households. Indeed, the province of Ontario has the fastest growing electricity prices in the country and its cities have some of the highest average residential monthly bills in Canada.

Electricity prices in Ontario began increasing dramatically after 2008, rising by 71 percent from 2008 to 2016, compared to 34 percent nationally. Ontario's electricity price change between 2015 and 2016 alone

⁸ Taylor Jackson, Ashley Stedman, Elmira Aliakbari, and Kenneth P. Green (2017), *Evaluating Electricity Price Growth in Ontario*, Fraser Institute <<https://www.fraserinstitute.org/sites/default/files/evaluating-electricity-price-growth-in-ontario.pdf>>.

⁹ Taylor Jackson, Ashley Stedman, Elmira Aliakbari (2017, July 20), *It's Official: Toronto and Ottawa are Now the Most Expensive Cities for Electricity*, *Financial Post* <<http://business.financialpost.com/opinion/its-official-toronto-and-ottawa-are-now-the-most-expensive-cities-for-electricity>>.

was also substantial: 15 percent in one year, two-and-a-half times greater than the national average of 6 percent during the same period.

From 2008 to 2015, electricity prices also increased two-and-a-half times faster than household disposable income in Ontario. In particular, the growth in electricity prices was almost four times greater than inflation and over four-and-a-half times the growth of Ontario's economy (real GDP).

The large electricity price increases in Ontario have also translated into significant increases in monthly residential electricity bills. Between 2010 and 2016, monthly electricity bills (including tax) in major Canadian cities increased by an average of \$37.68. During the same period, electricity bills in Toronto and Ottawa increased by \$77.09 and \$66.96, respectively. This means that residents in Toronto experienced electricity price increases of double the national average between 2010 and 2016.

In Toronto and Ottawa, the average monthly bills for residential consumers including taxes in 2016 were \$201 and \$183, respectively.

On average in 2016, residents of major Canadian cities paid \$141 including taxes for monthly electricity bills. This means that Toronto's monthly electricity bills (including tax) are \$60 more per month (\$720 more per year) than the Canadian average. Consumers in Ottawa pay \$41 more per month (\$492 more per year) on electricity bills than Canadians in other provinces. Montreal had the lowest monthly electricity bills for residential consumers at \$83.

The problem of skyrocketing electricity prices and high bills is a made-in-Ontario problem directly tied to the provincial government's policy choices. Ontario's policies around renewable energy (wind, solar, and biomass) have resulted in large additional costs for consumers. More specifically, Ontario's high electricity prices can be attributed to poorly structured long term contracts, the phase-out of coal energy, and a growing electricity supply and demand imbalance in the province that is resulting in Ontario exporting electricity at a loss.

High electricity prices for Ontarians, particularly when taxation is included, should be of central concern when the government is devising energy policy decisions. Given the critically important role that affordable electricity plays in peoples' standard of living, it is time for the Ontario government to have a hard look at how their policy choices are affecting peoples' lives. It is also time for the government to begin pursuing meaningful policy reforms aimed at lowering electricity bills for Ontario residents.

SECTION THREE: PAIN WITHOUT GAIN

If Ontario's electricity policy changes had yielded tangible benefits then it might be easier to justify the accompanying price increases. This section looks at some of the claimed benefits of the policies and shows that unfortunately, the benefits were exaggerated or non-existent.

Wasting Time and Money Chasing the Efficiency Dream

Ross McKittrick and Kenneth P. Green

*Editors' Note: This column, which originally appeared in the **Financial Post** in 2014,¹⁰ counters claims made by Ontario's Clean Air Alliance that conservation programs that reduce electricity consumption are a "tremendous step forward." It relies on the findings summarized in Section One regarding the relationship between energy consumption and economic growth.*

In March (2014), the CEO of the Ontario Power Authority (OPA), issued a directive regarding the implementation of Ontario's "Long term energy plan" which spells out what the provincial energy regulator plans to do to spur energy conservation. The Ontario Clean Air Alliance summarized it by saying: "According to the OPA, the directive actually requires that utility-driven conservation programs will ensure that electricity consumption is 5 percent or seven billion kilowatt-hours less than it is now by 2020, which is a tremendous step forward."

While we're grateful to the Clean Air Alliance for clarifying the OPA's goal, we respectfully disagree that it is any kind of step forward. We are baffled why a group concerned with clean air views forcing down energy consumption as an end in itself. There is overwhelming evidence that as energy consumption and economic activity have grown over the past few decades, Ontario air quality has improved dramatically. If you don't believe it, check for yourself—detailed charts are online at YourEnvironment.ca, a website created specifically to disseminate federal and provincial pollution records in an easy-to-use graphical format.

So if cutting energy consumption is not necessary for improving air quality, is it at least good for the economy? The most recent evidence strongly suggests that it is not: Putting constraints on energy availability today means economic losses tomorrow.

In 2014, the Fraser Institute published the study *Energy Abundance and Economic Growth—International and Canadian Evidence*, which

¹⁰ Ross McKittrick and Kenneth Green (2014, June 3), Why Engineering Energy Scarcity is Likely to Hinder GDP Growth, *Financial Post* <<http://business.financialpost.com/opinion/energy-conservation-gdp>>.

examines the relationship over time between energy consumption and economic growth. Many previous studies have explored this relationship but were inconclusive about causality: It was well known (and easily demonstrated) that energy consumption and economic growth were fellow-travelers, rising and falling, more or less in tandem, over time. A few studies that tried to tease out causality found indications that energy consumption leads economic growth while others were inconclusive. Until recently, the relationship was murky. But it is becoming clearer.

In our study, Ross McKittrick, economics professor at the University of Guelph, and Fraser Institute senior economist Elmira Aliakbari applied time series econometric techniques to Canadian provincial data from 1995 to 2010 to see if the direction of influence could be inferred out of the correlation between energy consumption and economic growth. In a nutshell, the answer was “yes.” That is, the study found that energy consumption, which can also be defined as energy abundance or energy affordability, is a limiting factor in economic growth. This discredits the notion that energy consumption and economic growth are merely random fellow-travelers or that energy consumption only grows as a sort of “luxury good” following periods of rising incomes.

The study concludes: “These considerations are important to keep in mind as policymakers consider initiatives (especially related to renewable energy mandates, biofuels requirements, and so forth) that explicitly limit energy availability. Jurisdictions such as Ontario have argued that such policies are consistent with their overall strategy to promote economic growth. In other words, they assert that forcing investment in wind and solar generation systems—while making electricity more expensive overall—will contribute to macroeconomic growth. The evidence points in the opposite direction. Policies that engineer increased energy scarcity are likely to lead to negative effects on future GDP growth.”

If the government of Ontario—or other governments across Canada—want to foster economic growth, the current thinking that “less energy is a primary goal” should give way to an understanding that energy consumption is the means to economic prosperity. Cutting energy use should not be seen as an end in itself, or as a proxy for environmental improvement, or as an instrument for promoting economic growth.

Energy abundance is a fundamental input to a growing economy and is necessary if Canadians want to enjoy the economic prosperity and robust social services that are funded by a strong economy. Fostering energy abundance, not trying to ration, reduce, or overprice energy, should be the guiding principle of energy policy whether at the local level, the provincial level, or the federal level.

How “Conservation” Became Waste

Ross McKittrick and Tom Adams

Editors’ Note: The following is the executive summary from a 2016¹¹ study that examines the economics of energy conservation programs in Ontario, an all-too-often ignored aspect of the province’s energy policy reforms.

Ontario consumers have borne substantial costs for Demand-Side Management (DSM) programs that aim to promote more efficient use of electricity. DSM programs were underway from 1988 until 1996, and then again from 2004 until the present. The Ontario Power Authority (OPA) spent nearly \$400 million on conservation programs in 2013 alone. Electric distribution utilities have also engaged in programs supervised by the Ontario Energy Board outside of those funded by the OPA, as have federal, provincial, and municipal governments. Plans are in place to expand these programs at least through 2020.

But do they actually save consumers money? Notwithstanding the billions of dollars spent on such programs over almost three decades, no independent audit based on verifiable field studies of actual usage has ever been made publicly available. Our report, *Demand-Side Mismanagement: How “Conservation” Became Waste*, examines the basis for claims that conservation programs save consumers money; we find it likely that they do not.

The term “negawatts” was coined 25 years ago to push the idea that, on a per-megawatt basis, it would be cheaper to subsidize conservation than to build new generating capacity. The idea became popular among politicians but has been resisted by economists because it implies that consumers systematically pay more for their electricity than they consider it to be worth. In other words, it implies that consumers make mistakes over and over in their purchases, and depend on government planners to tell them how to order their affairs.

¹¹ Ross McKittrick and Tom Adams (2016), *Demand-Side Mismanagement: How “Conservation” Became Waste*, Fraser Institute <<https://www.fraserinstitute.org/studies/demand-side-mismanagement-how-conservation-became-waste>>.

Paternalistic assumptions permeate the literature on energy efficiency. One recent study of US government analyses showed that the assumption of systematic consumer irrationality now accounts for between 80 and 90 percent of the claimed benefits of new energy efficiency regulations.

Nor is energy efficiency necessarily a cost-saving option for firms. Businesses use a mix of energy, labour, capital, and materials to make goods and services. Forcing them to use less energy may simply push them to make costlier substitutions. Once firms have selected their cost-minimizing mix of inputs, forcing them to change that mix in order to reduce one particular input (namely, energy) increases their overall costs, making it an inefficient use of society's resources overall.

Utilities often claim success for their conservation programs, but these numbers need to be carefully scrutinized. A well-known 1992 study by Paul Joskow and Donald Marron, *What Does a Negawatt Really Cost? Evidence from Utility Conservation Programs*, found that utility program costs were understated and the benefits overstated. In particular, many utilities ignored whole categories of program costs (especially for implementation, monitoring, and evaluation), few utilities computed the costs to consumers of participating in the conservation programs, and utilities systematically overestimated the amount of electricity saved. The authors conservatively estimated that the actual cost of conservation negawatts was at least double what utilities were reporting.

An important study in 2015 by Meredith Fowlie, Michael Greenstone, and Catherine Wolfram out of Berkeley University, *Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program*, looked at participants in the US Weatherization Assistance Program (WAP). This home retrofit program has been in operation since 1976, but in 2009 the budget was increased more than ten-fold to \$5 billion annually. What makes this study particularly important is that the authors were able to construct a randomized sample of program participants and non-participants, making it the first ever experimental test of a major energy conservation program.

An apparent puzzle in the energy literature has been the low level of voluntary investment by households in efficiency improvements that, according to engineering estimates, would save them money. The Berkeley study shows that households were right and the engineering models were wrong. The study found that, on average, engineering models predicted 2.5 times more energy savings than were actually realized. And the cost of the energy efficiency program per household was about twice the value of the energy savings. In other words, the program cost two dollars for every dollar saved in energy, even after accounting for the value of reduced air pollution emissions.

Queen's Park is betting heavily that conservation programs will provide an effective and low-cost means of managing power needs in the coming decades. Unfortunately, Ontario energy plans rely on unsubstantiated and overly optimistic claims. We closely examine the analyses behind the province's "Conservation First" plans, and find either an absence of credible data, or overly-optimistic numbers based on methodologies known to be unreliable.

Ontario seems determined to gamble on costly new energy conservation programs without first stopping to weigh the costs and benefits objectively. As with the Green Energy Act, we expect this experiment to end badly, with Ontario taxpayers and ratepayers paying far more for the programs than they save in power costs.

Killing Affordable Coal Power-Generation for Little Environmental Benefit

Ross McKittrick and Elmira Aliakbari

*Editors' Note: The following essay is based on a column by Ross McKittrick that appeared in the **Financial Post** in January 2017. The column relies on data and arguments from Ross McKittrick and Elmira Aliakbari's study, which examines the actual environmental gains enjoyed by Ontario from the closing of coal-fired power plants.¹² It is a critical component in understanding what went wrong in Ontario. It turns out that Ontario's painful coal phase-out didn't help pollution—and Queen's Park even knew it wouldn't.¹³ There are far too many examples in which proper and adequate cost-benefit analyses were not undertaken prior to making key decisions, resulting in Ontarians paying high prices for comparatively small benefits.*

The federal government plans to impose a national coal phase-out, based on the same faulty arguments used in Ontario, namely, that such a move will yield significant environmental benefits and reduce health care costs. One problem—those arguments never made sense, and now with the Ontario phase-out complete, we can verify not only that they were invalid, but that the Ontario government knew it at the time.

A 2017 Fraser Institute study entitled *Did the Coal Phase-Out Reduce Ontario Air Pollution?* thoroughly reviewed the closure of coal plants in Ontario and its effects on air pollution from 2002 to 2014. Our expectation was that we would find very little evidence for pollution reductions

¹² Ross McKittrick and Elmira Aliakbari (2017), *Did the Coal Phase-out Reduce Ontario Air Pollution?* Fraser Institute <<https://www.fraserinstitute.org/studies/did-the-coal-phase-out-reduce-ontario-air-pollution>>.

¹³ Ross McKittrick (2017, January 17), *Turns Out Ontario's Painful Coal Phase-Out Didn't Help Pollution—and Queen's Park Even Knew It Wouldn't*, *Financial Post* <<http://business.financialpost.com/opinion/ross-mckittrick-turns-out-ontarios-painful-coal-phase-out-didnt-help-pollution-and-queens-park-even-knew-it-wouldnt>>.

associated with eliminating coal. This expectation arose from two considerations.

First, ample data at the time showed that coal use had little effect on air quality in Ontario. Environment Canada's emissions inventories showed that the Ontario power generation sector was responsible for only a tiny fraction (about one percent) of provincial particulate emissions, a common measure of air pollution.

Further, a study by the province in 2005 showed that a majority of local particulates originated from US sources. Another study done for the province predicted that eliminating coal would have extremely small effects on urban particulate levels. Taken together, these reports provided a credible basis for predicting that a coal phase-out would only have a small effect on the province's air quality. They also showed, based on the results of retrofits then underway at the power plants, that the same air quality improvements could be obtained at a fraction of the cost by installing scrubbers on the smokestacks, rather than shutting the coal-fired plants down.

Second, the government's claims about the health effects of phasing out coal were highly implausible. It stated (and continues to assert) that coal plant emissions cost the province more than \$3 billion annually in health care costs. But this was at a time when the total provincial health care budget was only about \$35 billion annually. In other words, they claimed that nearly one-tenth of all health care spending was due to illnesses and mortality arising from power plants that, again, were responsible for only about one percent of annual particulate emissions. That would imply that all emissions sources together caused an annual health care burden many times larger than the entire health care budget. It should have been obvious at the time that this was not remotely true.

The Fraser Institute study analyzed data for the cities of Hamilton, Toronto, and Ottawa between 2002 and 2014. Our statistical model allowed us to isolate the effects of declining Ontario coal use compared to changing emissions from other Canadian and US sources and effects due to weather. In line with our expectations and the prior evidence, we found that phasing out coal was responsible for only very small changes in Ontario air pollution levels.

In fact, the reduction in fine particulates associated with declining coal use was likely a bit greater than the 2005 studies had forecast, but were still very small and, in Hamilton and Toronto, statistically insignificant. The coal phase-out had no apparent effect on nitrogen oxide (NO_x) levels, which instead were significantly improved by declining NO_x emissions in the United States. We found the elimination of coal was associated with a significant reduction on Ontario ozone levels. However, this was offset by increased emissions from natural gas power plants, such that per

terawatt (a unit of energy), trading gas for coal yields slightly higher net ozone levels.

We did not look at greenhouse gases because they are not local air pollutants, they only matter on a global level, and emissions could be offset by purchasing credits anywhere in the world. The climate issue was, and remains, a red herring in the discussion about the costs and benefits of eliminating coal.

Ontario is suffering a crisis of high and rising electricity costs that's causing real, long-lasting damage to households and businesses. The province insists the pain is worth it because of the environmental improvements. The numbers show otherwise. Phasing out coal had almost no effect on Ontario's air pollution levels—and the government at Queen's Park knew this was likely to be the case. It has all been for nothing.

SECTION FOUR: THE CONSEQUENCES FOR ONTARIO INDUSTRY AND CONSUMERS

The following essays summarize Fraser Institute research on the impacts of energy price increases for Ontario industry and the future liabilities being created for households as a result of the current band-aid solutions being implemented by the province.

Socking It to Industry in Ontario

Ross McKittrick and Elmira Aliakbari

*Editors' Note: The following column, which originally appeared in the **Waterloo Region Record** in 2017,¹⁴ highlights the comparatively high electricity prices that industrial users in Ontario are paying.*

Ontario manufacturers are feeling the pinch from high electricity prices. But how high are the province's industrial electricity rates relative to other jurisdictions?

Before we answer that question, consider this—Ontario now has the highest *residential* electricity costs among all Canadian provinces. Ontario electricity prices increased twice as fast as the national average over the past decade, and the average Toronto resident in 2016 paid \$60 more per month than the average Canadian for electricity.

This takes us back to industrial electricity rates, which are paid by industries including manufacturing (automakers, for example) and mining around the province. As noted in a 2017 Fraser Institute study, *Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector*, data from 2016 show that out of 16 major cities, Toronto and Ottawa ranked third and fourth for the most expensive electricity behind only New York and Boston.

Specifically, small industrial consumers (with a power demand of one megawatt and monthly consumption of up to 400 megawatt hours) in the Toronto area paid, on average, 16.27 cents per kilowatt hour (kWh, a common unit for measuring power), nearly double what comparable-sized

¹⁴ Ross McKittrick and Elmira Aliakbari (2017, November 9), *Ontario Electricity Rates for Industry among Highest in North America*, Fraser Institute <<https://www.fraserinstitute.org/article/ontario-electricity-rates-for-industry-among-highest-in-north-america>>. The underlying study upon which the column is based is Ross McKittrick and Elmira Aliakbari (2017), *Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector*, Fraser Institute <<https://www.fraserinstitute.org/studies/rising-electricity-costs-and-declining-employment-in-ontarios-manufacturing-sector>>.

firms paid in Montreal (9.11 cents) and Vancouver (9.49 cents), and nearly three times what they paid in Calgary (6.53 cents).

And although industrial electricity costs in New York and Boston remain higher than in Ontario cities, the cost differential is shrinking over time as Ontario cities experience faster increases. For instance, in 2010, electricity costs for small industrial users in Toronto were 85 percent lower than in New York. By 2016, the differential had shrunk to 51 percent.

The same pattern exists with large industrial consumers. In 2016, large industrial users (with a power demand of five megawatts and monthly consumption of 3,060 megawatt hours) in Toronto and Ottawa paid almost three times more than consumers in Montreal and Calgary, and almost twice what large consumers in Vancouver paid. Even some select large industrial consumers (Class A) that were granted rate reductions from the provincial government still paid higher rates than large electricity users in Quebec, Alberta, and British Columbia.

In addition to having some of the highest industrial electricity costs in North America, Ontario also has some of the fastest-growing costs. Between 2010 and 2016, electricity costs paid by large industrial consumers rose 53 percent in Ottawa and 46 percent in Toronto compared with a 14 percent rise in the rest of Canada. Over the same period, Montreal saw a modest increase of 10 percent while costs actually dropped in Edmonton (-7 percent), Calgary (-5 percent), and Chicago (-19 percent).

Out of 16 cities examined, the fastest rates of increase were in Portland and Seattle, but even with their rapid growth, their electricity costs for large industrial consumers were significantly lower than Toronto's in 2016 (71 percent lower in Portland, 62 percent lower Seattle).

All of this raises the crucial question—what has caused surging electricity prices for residents and industries in Ontario?

Simply put, government policy choices. In particular, the province's aggressive promotion of renewable energy sources (solar, wind, and biomass) has produced higher electricity costs for all Ontarians. Other policy decisions, including poorly structuring long-term contracts with generators and phasing out coal, have also contributed to price increases in the province.

To finally lower electricity bills for current and future ratepayers, the Ontario government should look at electricity costs in other jurisdictions and pursue meaningful policy reform.

Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector

Ross McKittrick and Elmira Aliakbari

*Editors' Note: In many ways, this essay is a companion to the previous column, which highlighted the uncompetitive electricity prices now being paid by industrial users in Ontario. It is based on the executive summary of the 2017 Fraser Institute study, **Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector**,¹⁵ and on a column by the authors that appeared in the *Financial Post* in 2017.¹⁶*

Ontario used to be a jurisdiction with low electricity costs. This was a competitive advantage, helping to attract and keep business and foster economic growth. Recently, however, largely as a result of the Green Energy Act and its induced inefficiencies, Ontario electricity prices have soared, threatening industrial competitiveness, particularly that of the manufacturing sector for which electricity is a major input cost.

Ontario now has the highest electricity costs across all Canadian provinces and among the highest costs in North America. In 2016, large industrial consumers in Toronto and Ottawa paid almost three times more than consumers in Montreal and Calgary, and almost twice the prices paid by large consumers in Vancouver. Even some select large industrial consumers (Class A) that were granted rate reductions still paid higher rates than high-demand electricity users in Quebec, Alberta, and British Columbia.

¹⁵ Ross McKittrick and Elmira Aliakbari (2017), *Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector*, Fraser Institute <<https://www.fraserinstitute.org/studies/rising-electricity-costs-and-declining-employment-in-ontarios-manufacturing-sector>>.

¹⁶ Ross McKittrick and Elmira Aliakbari (2017, October 17), 75,000 Manufacturing Jobs Lost—That's the Price of Ontario's Electricity Disaster, *Financial Post* <<http://business.financialpost.com/opinion/75000-manufacturing-jobs-lost-thats-the-price-of-ontarios-electricity-disaster>>.

Ontario's electricity costs are also among the fastest-growing. Between 2010 and 2016, electricity costs for small industrial consumers in Ottawa increased by 50 percent and in Toronto, 48 percent, while the average rate of increase in the rest of Canada was only 15 percent. Increases for large industrial consumers of electricity in Ontario were likewise far above those in other provinces.

Ontario's manufacturing sector accounts for almost 40 percent of Canada's exports, so its decline is a matter of national concern. Between 2005 and 2015, Ontario's manufacturing output declined by 18 percent and employment by 28 percent. Notably, the paper manufacturing and iron and steel sectors, the two most electricity-intensive sectors in Ontario prior to the big price increases, shrank the most: the paper manufacturing sector by 32 percent and the iron and steel sector by 25 percent. Manufacturing in all provinces fell during the 2008 recession but bounced back elsewhere in Canada. Only Ontario has failed to recover to pre-recession levels. The drop in employment from 2008 onwards in Ontario was 14 percent.

Compared to many American and Canadian jurisdictions, Ontario has exhibited the most substantial decline in its manufacturing sector over the past decade. Between 2005 and 2016, while many Northeast jurisdictions that are Ontario's main competitors boosted their manufacturing sector's share of GDP, in Ontario it declined by 5.1 percentage points. Since Ontario's manufacturing sector is lagging behind other jurisdictions, global factors such as world demand, exchange rates, and technological change cannot explain the poor performance. What is different for Ontario is the problem of rising electricity costs, which have likely placed too large a financial burden on Ontario's manufacturing sector and hampered its competitiveness.

Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector documents the decline of Ontario's manufacturing sector and then seeks to evaluate the role of growing industrial electricity costs. We estimate that about 64 percent, or two thirds, of the lost manufacturing jobs from 2008 to 2015 could be attributable to rising electricity prices. Taking the provincial government's claims for its green energy job-creation initiative at face value at face value, we estimate that Ontario may have lost at least 1.8 permanent manufacturing jobs for every new job created under the green energy initiative since 2008. This is likely a lower bound since many of the green energy jobs were only temporary.

The problem of rising electricity costs is a problem made in Ontario, directly tied to the provincial government's policy choices, which include aggressively promoting renewable sources, structuring long-term contracts poorly, and phasing out coal. The significant employment losses in

Ontario's manufacturing sector and the overall stagnant employment and economic growth rates in the province should concern policymakers. We urge the government to consider meaningful reforms aimed at significantly lowering electricity costs in the province.

Ontario's Temporary Solutions for High Electricity Prices and the Impact on Ontarians

Kenneth P. Green, Elmira Aliakbari, and Ashley Stedman

*Editors' Note: This essay is based on a column that appeared in the **Toronto Sun** in October 2017.¹⁷*

A 2017 report from Ontario's auditor general slammed the Wynne government's "needlessly complex" plan to reduce electricity bills for Ontarians. According to the report, the government is keeping the true cost of its plan off the books.

The so-called Fair Hydro Plan, meant to respond to widespread angst about sky-high power bills in the province, reduces electricity bills for households and some small businesses and farms by 25 percent.

However, as the auditor general noted, the plan will increase provincial debt to reduce electricity bills in the short-term, so future ratepayers will be paying the bills. As the AG report *The Fair Hydro Plan: Concerns About Fiscal Transparency, Accountability, and Value for Money* explains, "[f]rom 2028 on, ratepayers will be charged more than the actual cost of the electricity being produced to pay back the borrowings." In other words, instead of pursuing meaningful policy reforms, the Wynne government is kicking the can down the road and shifting costs from one place to another.

To make matters worse, the government is concealing the real financial impact of the rate reduction by understating future annual deficits and net debt. According to the plan, entities such as Ontario Power Generation can borrow at higher interest rates, further increasing electricity costs for future ratepayers.

¹⁷ Kenneth P. Green, Elmira Aliakbari, and Ashley Stedman (2017, October 22), *Ontario's Fair Hydro Plan—A Temporary Band-Aid with High Costs*, Fraser Institute <<https://www.fraserinstitute.org/article/ontarios-fair-hydro-plan-a-temporary-band-aid-with-high-costs>>.

How much more will Ontarians pay? According to the auditor general, almost \$40 billion. And up to \$4 billion more than necessary due to additional interest costs over the next 30 years.

Ontarians are already reeling from high electricity costs. Recent studies show that Ontario has the fastest-growing electricity prices in the country and its cities have some of the highest average residential monthly bills in Canada. From 2008 to 2016, electricity prices in Ontario increased by 71 percent—more than double the national average. Monthly electricity bills (including tax) for Torontonians are \$60 more per month (\$720 more per year) than the Canadian average. And ratepayers in Ottawa pay \$41 more per month (\$492 more per year) on electricity bills than Canadians in other provinces.

Crucially, Ontario's skyrocketing electricity prices are also hurting industries and hampering their competitiveness. In fact, a recent study shows Ontario's "electricity disaster" has cost the province more than 74,000 manufacturing jobs. In 2016, large industrial consumers (with a power demand of five megawatts and monthly consumption of 3,060 megawatt hours) in Toronto and Ottawa paid almost three times more than consumers in Montreal and Calgary and almost twice as much as consumers in Vancouver. Even some select large industrial consumers in Ontario, which were granted rate reductions (Class A), still paid higher rates than large electricity users in Quebec, Alberta, and British Columbia.

Electricity is a major cost for the manufacturing sector, and rising costs are causing Ontario's manufacturing sector to fall behind other jurisdictions. Compared to multiple American and Canadian jurisdictions, Ontario has seen the most substantial decline in manufacturing over the past decade. Between 2005 and 2016, while some nearby US states such as Michigan boosted their manufacturing sector's share of GDP, Ontario's declined by five percentage points.

Ontario needs real reform to lower electricity prices for residents and businesses. Unfortunately, the Wynne government is opting for improper accounting practices and temporary Band-Aids, sticking current and future Ontarians with the bill.

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Tom Adams is an independent energy and environmental advisor and researcher focused on energy consumer concerns. He has worked for several environmental organizations and served on the Ontario Independent Electricity Market Operator Board of Directors and the Ontario Centre for Excellence for Energy Board of Management. He is a media commentator and guest newspaper columnist. He has published peer-reviewed papers in a range of fields. He has presented expert testimony before many legislative committees and regulatory tribunals in Canada.



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