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E-BRIEF

August 15, 2017

ENERGY AND NATURAL RESOURCES

Ontario's Green Energy Experience: Sobering Lessons for Sustainable Climate Change Policies

by
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- The *Green Energy Act*'s Commitment to renewable energy policies in Ontario has dramatically increased users' electricity charges over the past eight years.
- These policies have yielded modest environmental benefits. They have also had a likely negative effect on employment in the province.
- A revenue- and technology-neutral carbon tax (or cap-and-trade equivalent) would be a much more cost-effective policy than massive subsidies to technologies or users, with subsidies restricted to supporting basic R & D on new abatement technologies.

With the enactment of the *Green Energy and Green Economy Act* (*Green Energy Act*) in 2009, the Ontario government committed ratepayers to massive subsidization of various forms of renewable energy, especially wind power and solar energy, along with the phasing out of coal-fired generation in the province – a goal achieved in 2014. In the eight years since the initiation of these policies, what tentative assessment can we make of their impact? Such a review is especially important in light of recent commitments by the federal government and most provinces to adopt a minimum carbon tax (or its equivalent) across Canada and to provide a variety of subsidies to users of low-emission technology.

The author thanks Benjamin Dachis, Don Dewees, Roy Hrab, Brian Rivard, Grant Sprague, Brady Yauch and anonymous reviewers for comments on earlier drafts. He also thanks Francesco Ducci for excellent research assistance. The author retains responsibility for any errors and the views expressed.

Any evaluation of the impact of Ontario's green energy policies to date should focus on three factors: i) the costs of renewable energy; ii) the environmental impact of these policies; and iii) their impact on employment in the province. On the evidence to date, these policies have had a dramatic impact on electricity costs in the province, but they have generated very limited environmental benefits and have had a negligible to negative effect on economic growth and employment. In short, the current Ontario green energy policies have run up against Pielke's iron law of climate change: when citizens are faced with a major trade-off between the economy and the environment, the former will almost always prevail (Pielke 2010). Ontario's experience shows that, rather than an extensive reliance on technology or activity-specific subsidies, the best approach by far is a carbon tax (or its cap-and-trade equivalent) that is technology-, activity-, and revenue-neutral.

Cost of Energy

In accordance with the *Green Energy Act*, which allowed the government to establish feed-in tariffs under 20-year fixed-price take-or-pay contracts, the price for power from wind turbines in Ontario was set at 13.5 cents per kilowatt hour. Solar power qualified for up to 80 cents per kilowatt hour in feed-in tariffs under similar contracts. In 2009, the average total wholesale cost of electricity was around 6 cents per kilowatt hour.[1] How these new feed-in tariff prices were arrived at has never been explained. According to the Auditor General's report, a competitively procured process would have saved approximately $4.7 billion over the life of the contracts (Ontario, Auditor General 2015).[2] In 2014, even after downward adjustments, the prices under Ontario's fixed price renewable program were still double the prevailing rates elsewhere for wind and three-and-a-half times the prevailing rates for solar energy (Ontario, Auditor General 2015, 214-215), the costs of which have been falling dramatically due to technological innovation, which is likely over time to induce more distributed generation off-the-grid and strand more legacy costs on-the-grid (*The Economist*, "Clean Energy's Dirty Secret," February 25, 2017).

The Ontario government also entered into a multi-billion dollar contract with Samsung to buy electricity over 20 years at fixed prices in return for a commitment to build new wind and solar manufacturing plants in the province (although one major plant has recently been closed). Further major expenditures have been required to enhance and extend the transmission grid to accommodate many small, dispersed projects and to provide flexible back-up generation (typically natural-gas-fired generation) to accommodate the intermittency and unpredictability of wind and solar energy (Gallant and Fox 2011).

At the time of the enactment of the *Green Energy Act*, officials were optimistic that the impact on electricity costs would be modest.[3] A little more than two years later, however, the Ontario government released its 20-

1 This figure is the sum of monthly averages of the Hourly Ontario Electricity Price and the Global Adjustment for 2009.

2 In 2014 and going forward, these tariffs for solar power were sharply reduced, and those for wind power were more modestly reduced.

3 For example, then Energy Minister George Smitherman stated: "I have been very clear about it, one percent per year, incremental on the cost of a person's electricity bill, with corresponding capability through investments and conservation for people to lessen their use of electricity" (*Toronto Star*, April 7, 2009). In 2010, Rick Smith, then head of Environmental Defence Canada, was quoted as corroborating this estimate: "We've done some modelling on this and we're talking a penny's increase to your average person's electricity bill. Ontarians won't even notice any impact on electricity rates" (Corcoran 2016).

year Long-Term Energy Plan on November 23, 2010, which states: "The consumer rate will increase by about 3.5 percent annually over the length of the long-term plan. Over the next five years, however, residential electricity prices are expected to rise by about 7.9 percent annually (or 46 percent over five years)" (Ontario, Long-Term Energy Plan 2010).

The actual increase was significantly more for most consumers. According to the historical electricity prices posted on the Ontario Energy Board's website, in November 2009 the off-peak price was 4.4 cents per kilowatt hour, compared to 8.7 cents per kilowatt hour in November 2016 (a compound annual increase of 10.2 percent); the mid-peak price in November 2009 was 8 cents per kilowatt hour, compared to 13.2 cents per kilowatt hour in November 2016 (a compound annual increase of 7.4 percent); and the on-peak price in November 2009 was 9.3 cents per kilowatt hour, compared to 18 cents per kilowatt hour in November 2016 (a compound annual increase of 9.9 percent) (Ontario Energy Board, Historical Electricity Prices 2016).

In a study for Energy Probe, Brady Yauch reports that the average increase in the price of the energy component in electricity prices in Ontario has been 107 percent over the last nine years compared to an increase in the Consumer Price Index over this period of 17.8 percent. In 2006, electricity in Ontario was about 40 percent cheaper than in western New York state, but by 2015, Ontario's electricity prices were 5 percent higher than western New York state's (Dachis, Jacobs, and Muthukumaran 2016). Considering all the Canadian provinces, electricity prices in Ontario are now among the highest – a trend, according to an analysis made by Hydro-Québec, that appears to be consistent over the past seven years (Hydro-Québec 2016).

Further price increases related to fossil fuels are looming. For example, in her 2016 Annual Report, the Ontario Auditor General includes preliminary estimates by the Ministry of Finance at $285 in 2019 for the direct (e.g., gas and natural gas) and indirect (goods and services) costs to the average Ontario household of the proposed new cap-and-trade system that Ontario is negotiating with Quebec and California (Ontario, Auditor General 2016). Large industrial entities will receive a temporary four-year reprieve from the costs of the cap-and-trade system (Ontario, Ministry of Environment and Climate Change 2016), but smaller businesses, which will not, face significant cost increases (McCarthy 2016). Moreover, levels of debt incurred in the system are growing rapidly and will eventually be reflected in higher rates or higher taxes.

The Ontario government has recently committed to reducing residential electricity rates by 25 percent by amortizing outstanding electricity-related cost over a much longer period (while adding roughly $25 billion in interest costs over the next 30 years), by rebating the provincial sales tax of 8 percent on electricity sales, and by moving the electricity subsidy program costs of $2.5 billion over the next three years onto the province's general budget. However, the changes merely move costs from current ratepayers to future ratepayers (and indeed increase them), while moving other costs onto taxpayers who must finance the provincial deficit. Thus, current rate reductions are largely an accounting artefact that do not reduce underlying costs but, rather, defer and increase them or render them less visible (*Globe and Mail*, March 2, 2017).

Apart from electricity costs, the Climate Change Action Plan released during the summer of 2016 by the Ontario government outlines an extensive array of subsidies that it plans to provide to promote energy efficiency and low carbon technologies. Jeffrey Simpson, in one of his final columns for the *Globe and Mail*, on June 17, 2016, described the plan as "policy on speed." Whether or not any of this vast array of subsidy initiatives will translate into lower electricity costs or reduced consumption remains to be seen. Some of these programs will entail significant costs per tonne of emissions reduced. For example, subsidies to retrofit apartments will total as much as $900 million, at a cost to taxpayers of $425 per tonne of GHG emissions reduced (Dachis 2016).

In a succession of reports dating back to 2011, the Ontario Auditor General found that almost none of these policy initiatives had been subjected to a rigorous cost-benefit or cost-effectiveness plan where costs were estimated relative to environmental benefits and employment effects or compared to alternative policy options. Instead, over the same period, more than 100 *ad hoc* ministerial directives had been sent to various energy agencies in the province (Independent Electricity System Operator 2016), in place of any coherent long-term plan for the sector.

Environmental Effects

About 60 percent of Ontario's current generation capacity is already accounted for by low-emission hydro or nuclear-generated electricity, with the balance provided by natural-gas generation and to a lesser extent by renewables. Wind power and solar energy, because of their intermittency and unpredictability, require back-up generation, especially during peak-load capacity, and that has generally entailed the construction of natural-gas plants.

In Ontario, the phasing out of coal-fired generation has likewise led to the construction of more natural-gas–fired generation. The electricity sector's share of greenhouse gas emissions in Ontario in 2012 was only about 9 percent of total emissions, compared to the transportation sector with 34 percent and the industrial sector with 30 percent (Ontario, Auditor General 2015), meaning that further environmental gains in the electricity sector are inherently limited.[4] In any event, this impact needs to be compared to other alternatives, such as further enhancing transmission connections and expanding power purchase agreements with neighbouring jurisdictions, in particular Quebec and Manitoba, which have substantial clean hydroelectric resources. More generally, developing a competitively structured capacity market in Ontario may be a preferable long-term alternative strategy (Goulding 2013).

The focus on electricity is out of proportion with the areas of the economy that are most in need of closer scrutiny, such as transportation. Although the industrial sector accounts for the largest share of energy use in Canada,[5] the growth in use in the transportation sector outpaced all other sectors between 1990 and 2013 with a 43 percent growth, compared to 7 percent in the residential sector, 30 percent in the industrial sector, and 23 percent in the commercial sector (Natural Resources Canada 2016).

Employment Effects

At the time of the enactment of the *Green Energy Act*, government officials claimed that renewable energy policies would create 50,000 new green jobs in the province over the coming few years (*Toronto Star*, February 23, 2009). In retrospect, this prediction should be met with serious scepticism.

The Auditor General's 2011 Annual Report noted that 75 percent of these jobs are construction jobs of one to three years' duration and that, for each job created through renewable energy programs, jobs in other sectors of

4 The remaining share of greenhouse emissions is divided among buildings (17 percent), agriculture (6 percent), and waste (4 percent) (Ontario, Ministry of Environment and Climate Change 2014).

5 According to Natural Resources Canada, in 2013 the industrial sector accounted for 40 percent of the share of energy use, transportation for 30 percent, residential for 17 percent, commercial for 10 percent, and agriculture for 3 percent.

the economy are often lost because of higher electricity prices. These losses reduce effective demand for other goods and services and render some industries less cost competitive (McKittrick 2013). According to the 2013 Annual Report of the Auditor General, the Ministry of Energy estimated that, by the end of 2012, Ontario's clean energy policies had created over 30,000 jobs in different areas. It acknowledged, however, that this estimate did not distinguish between temporary and permanent jobs or between low-paid service jobs and higher-paid skilled jobs (Ontario, Auditor General 2013). The Auditor General also noted that Japan had filed a formal complaint with the WTO over local sourcing requirements in Ontario's FIT contracts. This complaint was subsequently upheld and required Ontario to phase out domestic content requirements in these contracts, going forward. This will presumably further reduce long-term employment projections of current policies, especially given the sharply falling costs of imported wind and solar technology which in some cases is now competitive or nearly competitive with fossil-fuel generation (*The Economist*, "Clean Energy's Dirty Secret," February 25, 2017), implying that these local sourcing requirements were misconceived from the outset if the policy objective was to achieve maximum environmental impact at the lowest cost.

Studies in Denmark and Germany find that very few new permanent jobs have been created as a result of renewable energy policy. In Denmark this policy costs between US$90,000 to US$140,000 per job per year in public subsidies (Sharman, Meyer, and Agerup 2009), and in Germany, up to US$240,000 per job per year (Frondel et al. 2009). A Spanish study finds even more dramatic adverse effects of employment: for every job created, two have been destroyed (Álvarez et al. 2009). The Ontario government's projections of 50,000 jobs, even if taken at face value, would entail public subsidies of $179,000 per job per year (Dachis and Carr 2011).

Where Do We Go From Here?

A vast majority of economists, from Greg Mankiw on the right to Paul Krugman on the left, as well as former senior Republican officials (*New York Times*, February 13, 2017), favour carbon taxes or, less desirably, cap-and-trade equivalents as the primary policy instrument for reducing CO2 emissions, although important design issues will affect the efficacy of such a tax (McKitrick 2016). For good reasons, economists strongly prefer putting a price on carbon rather than attempting to pick winners through subsidy policies. They would rely on subsidies to play a much more secondary role, supporting public goods such as basic research into innovative abatement technologies (Popp 2016). Thus, in a Canadian context, much is to be said for a national carbon tax that promotes economy-wide cost-effective emission reductions, with revenues rebated to the provinces from which they originate, supplemented by limited and well-targeted subsidies (Snoddon 2016). In contrast, Ontario appears to be in the process of piling a cap-and-trade regime on top of subsidy policies.

As eminent environmental economist, William Nordhaus, states in his widely acclaimed book, *The Climate Casino*:

> A recent study by the National Academy of Sciences looked at the impact of several subsidies related to GHG emissions. It found a vast difference in their effectiveness in terms of CO2 removed per dollar of subsidy. None of the subsidies were efficient; some were horribly inefficient, and others such as the ethanol subsidy were perverse and actually increased GHG emissions. The net effect of all the subsidies taken together was effectively zero. So in the end it is much more effective to penalize carbon emissions than to subsidize everything else (Nordhaus 2013, 266).

In *The Carbon Crunch*, Dieter Helm, a widely respected British energy economist, makes the case for subsidies to support research and development for new carbon abatement technologies in place of subsidies to users:

> This is where the bulk of the money should go: inventing the industries of the future. That is the policy – and political – imperative. Our task is not to predict which specific technologies will be the winners. Picking winners is typically not a good way to go. Yet, despite this we are not completely in the dark … So although we cannot pick winners, we can pick out the rich seams for research (Helm 2012).

Even if my proposed policy reorientation were adopted in Canada, it leaves open the extremely vexing question of achieving effective collective action by all major greenhouse gas-emitting countries globally, particularly given the Trump administration's scepticism toward climate change policy. Aggressive abatement policies adopted by any single jurisdiction risk being negated by the migration of emissions, investments, and jobs to more permissive jurisdictions – an environmentally, economically, and politically disastrous policy outcome. Canada is at high risk in adopting costly abatement policies just as the US government proceeds with proposed plans to scale back its clean energy policies. In this context, it is crucial that Canada's private sector not bear a large overall fiscal burden. Moreover, in addition to domestic policies, the ability of Canadian firms to compete in global markets will also play an important role in developing a Canadian clean energy technology sector. The creation of larger markets for Canada's green innovators – for example, by promoting renewable energy policies worldwide – would support the development of sufficient demand for Canadian low-emission energy technologies better than policies prioritizing domestic end-use of low-emissions technology, which are likely to be less cost effective in Canada (Popp 2016).

Short of concerted action by most of the parties to the Paris Agreement on climate change (now renounced by the Trump administration), we face the prospect of massive international free-riding undermining any effective global collective action. The world should take precautions against the potential consequences of failure to act, in the same sense that we wear seat belts in our cars, install smoke detectors in our homes, and buy insurance against other more remote and less-catastrophic risks.

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This E-Brief is a publication of the C.D. Howe Institute.

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