

Examining the potential cost of the Ontario Green Energy Act, 2009

prepared for the Official Opposition in Ontario by London Economics International LLC



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Executive Summary

Key themes

- Suggesting that the Green Energy Act, 2009 (GEA) is flawed is not the same as opposing the environment; more cost effective ways may exist to achieve similar or higher amounts of avoided emissions
- Feed-in tariffs (FIT) price inputs, not outcomes; the program does not directly target emissions reductions, place a value on them, and allow the market to determine the most effective way to achieve desired targets
- Loss of local control matters; if the average resident were asked what they would need to be paid to give up the right to influence siting of a power station near their homes, most would likely put a non-zero, and potentially quite high, value to it
- The devil is in the details; significant uncertainty remains as to who bears the costs and how entities such as municipal utilities will be reimbursed for added burdens

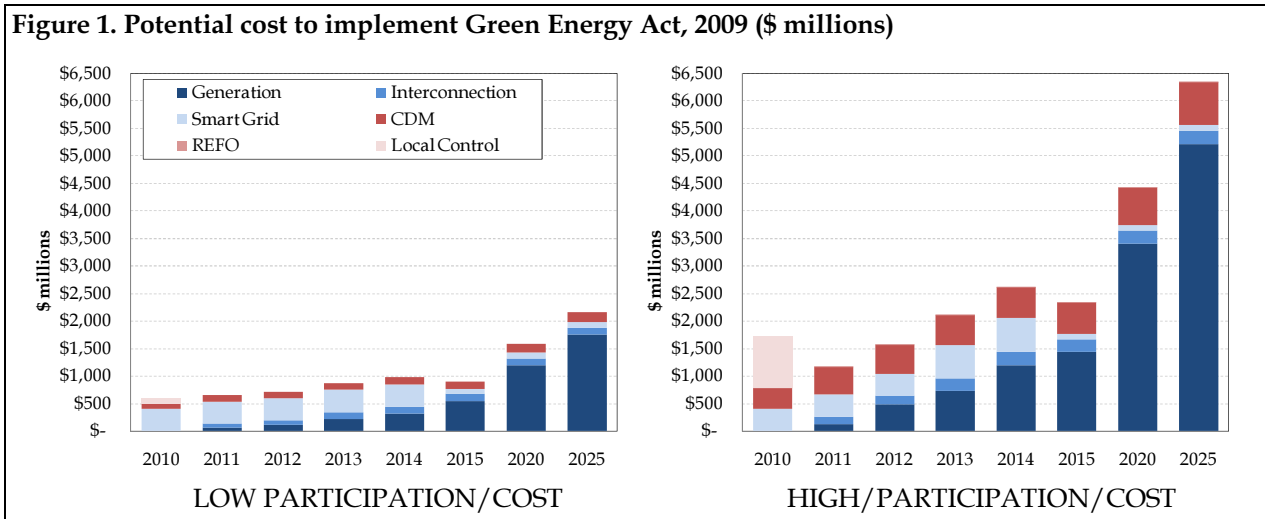
Results and modeling approach

- Estimate of the non-discounted cost per household ranges from \$280 to \$780 on average per year between 2010 and 2025, equivalent to between approximately two and a half and seven additional monthly electricity bills.¹
- Study based on verifiable third party sources, Ontario Power Authority (OPA) data, and reasonable estimates of potential take up
- Costs consist of six elements: generation, interconnection, smart grid implementation, incremental conservation and demand management (CDM) initiatives, loss of local control, and the establishment of the Renewable Energy Facilitation Office (REFO).
- The basis for the cost estimates are as follows:
 - Generation: based on estimate of level of participation in FIT and proposed prices²
 - Interconnection: based on an estimated per facility cost and the number of FIT facilities

¹ Cost estimates do not include the 8% harmonized sales tax. Total cumulative non-discounted cost ranges from \$20.8 to \$57.3 billion, present value ranges from \$8.6 to \$22.9 billion, assuming a 10% discount rate.

² Estimates assume that for reliability purposes many existing planned nuclear and gas projects will continue to be needed, albeit with gas projects potentially reconfigured.

- Smart Grid: benchmark of Independent Electricity System Operator (IESO) Smart Grid Forum estimate, plus analysis of potential for cost overruns
- CDM: Based on incremental cost of additional savings (500 to 1,500 MW), cost of energy audits, and cost to develop and monitor CDM plans
- Loss of local control: estimated based on indicative value residents may place on the ability to influence siting through locally based processes
- REFO: cost to establish and maintain an office of up to 25 people.
- The range of costs is based primarily on variation in the level of participation in the FIT program, from a low of approximately 4,600 MW to a high of approximately 9,600 MW³



Other potential challenges arising from Green Energy Act

- Claims of potential job gains in excess of 50,000 unsubstantiated; for comparison, the entire motor vehicle manufacturing industry employed 38,000 people in Ontario in 2008.⁴ FIT could cost jobs if it makes Ontario uncompetitive
- FIT perversely pays more to the smallest installations, increasing unit costs of green energy to consumers
- Increased number of small installations results in more disruption of sites, potential for greater life cycle costs
- May be ineffective in reducing number of gas plants needed, as renewable resources likely to be non-dispatchable, produce energy when least needed (high cost energy from wind at times of low demand), and be insufficient to maintain reliability; impact is that planned capital investments in gas plants will still need to be made, but these facilities will be less utilized, further increasing unit costs

³ 9,600 MW is less than the medium and long term potential suggested by a recent OPA survey of new projects at various stages of development, which exceeded 15,000 MW; if these levels were to be realized, costs would increase further above the high case.

⁴ Labour Statistics Division, Statistics Canada, Table 281-0024, NAICS Code 3361

- Act creates new bureaucracies and augments existing ones; municipal utilities may be overwhelmed with new project requests, some from homeowners or developers with little technical or financial ability to complete project; this further wastes resources
- Process for arriving at prices paid for various resources is opaque
- GEA further distorts volumetric price signals related to energy commodity cost to consumers – thus weakening a critical tool when it comes to achieving CDM savings
- GEA may distract attention from continued need to refurbish and potentially add to nuclear fleet whilst managing cost and risk to consumers

Observed approaches elsewhere

- Ontario approach differs significantly from that taken by other Canadian provinces and Northeastern states
- Cap and trade (Northeast) and carbon tax (BC) make better use of market forces, provide environmental benefits at potentially lower cost
- Approach also more expensive (depending on exchange rates) than other feed-in tariff systems, for example in Europe
- Previous feed in tariff approaches in some jurisdictions led to stranded costs, undermined financial health of utilities
- If cap and trade going to be imposed regardless under Kyoto II, feed in tariff may be at best redundant, and at worst an added burden on industry

Future considerations for policy makers

- OPA's Renewable Energy Standard Offer Program (RESOP) provides an existing platform with proven success (520 MW of solar alone have been placed under contract at prices lower than those proposed here); GEA is a potentially a solution in search of a problem. RESOP provides transparent competitive process for determining required revenues to renewable developers; GEA could instead focus on further enhancing RESOP
- Exploring relationship with the Regional Greenhouse Gas Initiative (RGGI)⁵; impact would be that existing and future carbon-emitting plants would need to purchase allowances, increasing potential returns to renewable generation
- A reassessment of FIT levels, explicit caps on volumes to be procured, incorporation of some form of competitive procurement; these changes can be incorporated into the existing RESOP framework
- Making provincial permitting pre-emption subject to a lag, preserving role of local communities unless they fail to take appropriate action within one year of permit application

⁵ While the Ontario market structure differs from the Northeast, assessing linkages with RGGI would replace ad hoc measures designed to limit production from carbon-intensive plants with a clear price signal and process whereby externalities are priced and non-emitters benefit.

About London Economics International LLC

London Economics International LLC (LEI) is a global economic, financial, and strategic advisory professional services firm specializing in energy, water, and infrastructure. The firm combines a detailed understanding of specific network and commodity industries, such as electricity generation and distribution, with sophisticated analysis and a suite of proprietary quantitative models to produce reliable and comprehensible results. LEI participated in the birth and development of competitive electricity markets worldwide. Its market design experience dates back to the inception of the UK Pool, and encompasses the development of markets such as Victoria (Australia), California (US), and Ontario (Canada). Today, this accumulated knowledge is leveraged to provide asset valuation, market design, price forecasting, and strategic advisory services to private investors, financial institutions, market entities, governments, and regulators around the world.

Canadian experience

LEI has extensive experience analyzing and advising on issues relating to Canadian energy markets. The firm has offices in Toronto and has worked extensively across Canada, from Vancouver to St. John's. In Ontario, the firm has in the past worked for both the OPA and the OEB, as well as testifying on behalf of clients before the OEB. For private sector clients, LEI has exhaustively and repeatedly modeled wholesale energy markets in Ontario, advising on several acquisitions and refinancings. The firm has similar depth of experience in Alberta, where it has testified on behalf of utilities before the Alberta Utilities Board, led the Electricity Industry Structure Review, advised on financing of new renewable assets, and modeled Pacific Northwest markets.

Renewable energy

LEI provides a range of services associated with the renewable energy industry. This includes working with developers to value potential revenue streams from conventional market sources, renewable energy credits (RECs), and/or emissions offsets; advising private equity funds to craft investment plans targeted at "green" technologies; and counselling governments and regulators on creating policies which efficiently incentivize investment in renewable energy.

Generation procurement: LEI has experience working with state and provincial authorities in the design of renewable energy procurement initiatives and with clients crafting their responses to solicitations. The firm has examined or helped design renewable energy procurement efforts in Connecticut, Kentucky, Maine, the Pacific Northwest, and several Canadian provinces, addressing such issues as contract length, eligibility requirements, and pricing. Respondents assisted by LEI include cogeneration, small hydro, and biomass producers.

Biomass: LEI's biomass-related experience extends across the value chain, including fuel supply, PPA negotiation, assessment of operating contracts, and project valuation. LEI has provided asset management services for a private equity firm focused on biomass acquisitions. LEI has compared numerous fuel contracts and fuel types, examined restart and retrofit programs, and managed biomass construction projects.

Hydro: For small hydro projects, LEI has performed a range of economic assessment tasks. The firm has assisted in providing market analysis used to support financing. Such engagements have involved projecting market revenues from energy, capacity, and RECs under multiple market and production scenarios. LEI has also marketed RECs and output from small hydro projects on behalf of existing owners, obtaining bids, and negotiated PPAs. Additional tasks included examining and negotiating operating contracts, reviewing FERC compliance, and seeking project synergies. LEI has also assisted in examining and comparing the economic impact of differing financing proposals for small hydroelectric facilities.

Solar: LEI has advised investors and developers of rooftop and ground mounted solar PV projects on issues including interconnection requirements and costs, siting, financing, and technology choice.

Wind: For investors and developers of wind projects, LEI has forecast revenues under a variety of market, REC pricing, and wind scenarios. LEI forecasts and market analysis have been incorporated into offering memoranda and used to underpin board level decision making processes. The firm has also advised developers of energy storage devices intended to be paired with wind projects.

Biographies

A.J. Goulding: In his role as President of London Economics International LLC, A.J. manages a growing international consulting firm focused on finance, economic, and strategic consulting to the energy and infrastructure industries. A.J. also serves as an adjunct professor at Columbia University, where he teaches a course on electricity market design and regulatory economics. With nearly two decades of experience in evolving electricity and natural gas markets, A.J.'s diverse background enables him to work effectively in both emerging markets and OECD countries. In North America, A.J. has been articulate in describing the new market relationships between wholesale power marketers, merchant plants, aggregators, and the existing investor owned utilities. In emerging markets, A.J. has considerable experience dealing with the challenges of mixed private and public ownership, difficulties in creating credit-worthy distribution and retail entities, and the realities of line losses, unreliable fuel deliveries, and politicized labour relations. AJ is currently leading LEI's mandate to write the renewable energy plan for the Kingdom of Saudi Arabia. AJ received his M.A. in International Business from Columbia University, New York. He also holds a B.A. in economics from Earlham College in Richmond, Indiana.

Benjamin Grunfeld: A Senior Consultant with London Economics International LLC; Ben provides analytical expertise and strategic advice to governments, regulators, public and private power companies, and energy-related business ventures. He works with clients to develop, evaluate, and implement, business strategies that take advantage of opportunities within both their core and potential market spaces. Ben has over five years of experience in the Ontario electricity sector and has advised clients such as the Ontario Energy Board and the Ontario Power Authority on issues ranging from the Regulated Price Plan to the development of the Integrated Power System Plan. Recently he led the development and managed the

construction of two biomass generation facilities in California. Ben has also advised on numerous issues relating to the financing and development of renewable energy facilities in North America. Ben holds a B.Sc. in Applied Mathematics and Electrical Engineering from Queen's University, Kingston. He is currently a candidate (expected June 2009) in the M.Sc. Management and Economics programme at the London School of Economics and Political Science, London.

Neil Bush: A Senior Consultant with London Economics International LLC; Neil is an experienced economist with diverse engagements at the World Bank and the Bank of England, involving analysis of the macroeconomic factors of international capital flows, and extensive work on Eastern Europe. He led negotiations with the Kosovo Government and other stakeholders in formulating a framework for a \$1.3 billion foreign investment into the energy and mining industries. Neil was chief author of the World Bank Interim Strategy for Kosovo, 2006-2007. He also worked on a number of other documents and publications, including a front-page article in *The Economist*, while conducting research on international finance at the Chief Economist's Office of the World Bank in Washington, DC. Neil holds a B.A. Honours in Philosophy, Politics, and Economics from Oxford University and is a graduate of the London School of Economics and Political Science, London and Columbia University, New York, dual M.P.A. in Public and Economic Policy.