Council for Clean & Reliable Electricity
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Commentary

There's a Baby in the Bathwater

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Ontario's Feed-in Tariff (FIT) program for buying wind and solar electricity at premium prices has come in for heavy criticism as consumers face the prospect of ever-rising electricity bills.[1] While today's electricity prices are in fact relatively unaffected by FIT, the program is most certainly building higher costs into tomorrow's electricity bills – probably more than $310 per year or a 22% increase[2] for an average residential customer (Dachis and Carr, 2011).

"...the current Feed-in Tariff (FIT) program should be modified to become a Distributed Generation Tariff (DGT)..."

The Ontario government established FIT to create jobs and launch a "green economy," with the costs of the subsidies involved borne entirely by electricity sales. It would be unfortunate if customer concerns about electricity prices resulted in FIT's cancellation, but the current program is economically unsustainable. This is due largely to its excessive subsidies[3] and lack of incentives for electricity generators to be innovative or improve cost-effectiveness.[4] As well, FIT's cumbersome structure requires detailed management, which results in the Ontario Power Authority (OPA), its administrator, being seen as a roadblock.

It is argued here that the current FIT program should be modified to become a Distributed Generation Tariff (DGT) better equipped to contribute to the province's electricity supply. DGT would take over where FIT has failed by facilitating economical investment in a broad range of small-scale renewable, integrated and waste energy projects. Switching to a DGT should be considered seriously as part of the impending FIT review (Ministry of Energy, 2010). Adopting a DGT would ensure that the baby – small-scale generation projects that reduce our environmental footprint – remains, while the dirty bathwater – the subsidies and prescriptions that encumber FIT – is thrown out

DISTRIBUTED GENERATION TARIFF

Like a FIT, a DGT would be a standardized agreement that defines the terms, conditions and prices under which a utility system would accept electricity from independent generators. The DGT "tariff" would comprise non-negotiable standard terms and pricing arrangements, similar to the way most consumers buy electricity.

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[1]See, for example "Rising Power," Toronto Star, Nov. 24, 2010 and "Ontario Green Power Plan Sparks Cost Concerns," Globe and Mail, April 9, 2010.

[2]Based on average provincial consumption (800 kilowatt-hour/month) and Toronto utility pricing using the Ontario Energy Board's (OEB) bill calculator available at http://www.ontarioenergyboard.ca/OEB/Consumers/Electricity/Your+Electricity+Utility.

[3]For example, in cents per kilowatt-hour (kWh), solar generators receive between 44.3 (large, ground-mounted) and 80.3 (small, roof-mounted) contrasted to the benchmark retail prices set by OEB that range from 5.9 (off-peak) to 10.5 (on-peak) and probably average about 7.5 cents per kWh for a typical household.

[4]Generators are offered a 20-year contract with prices either fixed (solar) or 20-per-cent indexed to inflation (all except solar). They have no obligations to produce electricity, but have a promise that they will be paid for whatever they produce whenever they produce it, regardless of the market price or customers' needs.

The main value of a standardized contract with a pre-established price is that it can facilitate the development of innovative and environmentally friendly integrated energy projects such as district heating and energy generation from waste. As well, standardized commercial arrangements reduce the cost and risk of developing new generating projects, which is particularly important for small-scale, distributed-generation projects associated with the emerging concept of the "smart grid."[5] Renewable energy projects benefit particularly since, by their nature, they tend to be small-scale.[6]

But any standardized tariff arrangement also has the potential to unnecessarily increase costs for consumers. Without such an arrangement, electricity suppliers who are independent of the utility operating the electricity system would arrange individual pricing and contract terms, typically through a competitive process. The supplier would be selected on the basis of price and performance obligations that best met consumers' needs. In contrast, a standardized tariff eliminates competition in the supply of electricity and thereby both stunts innovation and exposes customers to higher prices, particularly on large-scale projects.

"In essence, the new DGT would be technology-neutral, apply only to small-scale projects and not have a limited contract term."

Consistent with its economic objectives, Ontario's current FIT program is designed for only selected types of generators, especially wind and solar,[7] even though their intermittent nature means they cannot alone meet customers' electricity needs. As well as not providing supply reliability, this technology-specific approach disadvantages a number of other types of generators that also have reduced environmental impacts such as integrated energy systems and energy from waste projects.[8]

A yet-to-be published companion paper (Carr, 2011) outlines in more detail the design features for a new DGT that builds on the advantages of the current FIT while mitigating its disadvantages. In essence, the new DGT would be technology-neutral, apply only to small-scale projects and not have a limited contract term. Rather than being the main vehicle for supporting investment in generation, as FIT is, the DGT would underwrite investment that fills only a small, but nonetheless valuable, part of Ontario's future electricity needs.

INTEGRATED ENERGY SYSTEMS

One way our environmental footprint can be reduced is by making better use of raw energy resources – oil, gas – by combining what would otherwise be separate processes producing useful energy – heat, light, power – so that waste energy from one process cascades down to become the input to another process. For example, rather than burning gas in a furnace or boiler to directly heat a building, it is possible to burn the gas in an engine and use its exhaust for space heating. In this way, the electricity generator becomes a "cogeneration" plant since it produces both electricity and heat.

The technical concept involved is not new. Cogeneration's higher efficiency and resulting lower environmental impact are rooted in the physics fundamental that a higher quality of energy is required to turn an engine than to heat a building. And since space heating can be achieved with the relatively lower-quality heat exhausted from an engine, such a cogeneration project makes productive use of what would otherwise be energy ejected to the natural environment.

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[5] "Smart grid" is not a well-defined term, but generally encompasses the increased use of automation and communications to make existing centrally controlled electricity systems more adaptive to localized conditions through distributed control.

[6] While individual wind and solar generators are small-scale electrically, they are often grouped into "farms" that make them large-scale both physically and electrically.

[7] OPA's 2011-Q1 report indicates the current FIT and previous Standard Offer programs combined account for 1,904 MW (54%) wind, 1,318 MW (37%) solar, 216 MW (6%) hydro and 126 MW (4%) bioenergy.

[8] A FIT program for integrated and waste energy systems is being introduced (Ontario Power Authority, 2010), but it is not expected to result in any contracts being awarded until the third quarter of 2011 and is limited to a province-wide aggregate of 100 MW.

WASTE ENERGY SYSTEMS

Another approach to cogeneration is to supplement heat supplied by a primary fuel with waste heat. One such example involves the heat created when natural gas is compressed at pipeline compressor stations. This heat is too low in quality to run an engine directly, but it can be used to pre-heat the water going into a boiler that in turn produces steam to drive a generator. Pre-heating reduces the amount of fuel needed to make steam, thereby reducing the volume of combustion emissions released into the air.

As well, waste itself can be used as a fuel. One process involves heating municipal solid waste to extremely high temperatures through the use of electric arcs inside a sealed container. As a result, waste is converted into a large volume of combustible gas and a small amount of glass-like solid residue. The gas has characteristics much like natural gas and can be used either directly or to fuel an electric generator. As well, the high temperatures and closed reaction chamber avoid the emissions associated with traditional garbage incineration processes. The solid residue is a tiny fraction of the volume of incinerator ash and, being inert like sand or glass, is not an environmental contaminant (Young, 2010).

"This distributed nature of generation sources reduces the need to transport electricity over long-distance transmission lines."

SMALL-SCALE GENERATING PROJECTS

Integrated and waste energy systems are typically small-scale from an electric power perspective – less than 10 megawatts (MW) compared to conventional generating stations of hundreds or thousands of MW. As well, they are located either close to their fuel sources – municipal waste or waste heat, for example – or close to the associated heat customers such as communities with district heating or industries requiring process heat.

This distributed nature of generation sources reduces the need to transport electricity over long-distance transmission lines. This has both economic and environmental benefits as it minimizes the amount of energy lost in transportation and lessens requirements for transmission lines.

As mentioned previously, many types of renewable generation projects including wind and solar systems are also small in size and therefore share these potential advantages. Many hydroelectric sites are also too small for development under conventional commercial arrangements. All these types of renewable energy projects could benefit from a DGT approach.

MEETING COMMERCIAL CHALLENGES WITH DGT

However, combining separate energy-producing processes entails the additional challenge of amalgamating separate businesses. Each component activity has its own budget cycle, decision-making timeframe or arrangement for establishing prices, making it difficult or impossible to get the convergence necessary for proceeding with a single integrated business. Because a DGT arrangement fixes the pricing, terms and conditions for selling the electricity, the commercial arrangements for the overall project can be organized around the non-electricity requirements.

Regardless of a project's size, some minimum level of effort is required to plan, design and gain regulatory approvals. As a result, this "transaction cost" is proportionately much higher for small projects compared to large projects. By eliminating the competitive tendering process and substituting standard contractual and pricing arrangements, a DGT reduces project transaction costs, of particular importance to the economic feasibility of smaller-scale projects.

It is these DGT benefits that save the baby of small-scale generation projects while throwing out FIT's bathwater of subsidies.

CONCLUSIONS

A DGT program can add to Ontario's options for building an electricity supply with a low environmental footprint while also not sacrificing economic, reliability and diversity benefits. A DGT approach would also keep pace with technological and commercial innovation while allowing simplified local management to replace complex centralized administration.

Ontario's current FIT arrangements miss delivering on these promises because, among other failings, they are available only to prescribed types of generating technologies – a limited list that will inherently always lag behind the potential of innovation. The current FIT program is also vulnerable because it will inevitably raise electricity prices.

The impending formal review provides an opportunity to transform Ontario's FIT program to a new DGT arrangement that delivers more cost-effective benefits to electricity customers.

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Declaration of Interest
The author is a director of both Guelph Hydro Inc. and Navitus Plasma Inc. Both companies have business plans which include selling electricity into the Ontario grid under a feed in tariff.

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