Energy Council of Canada
Conseil canadien de l'énergie

Energy in Canada @150 and Beyond
Mutually Assured Disruption:
Change and Change Alike in Canada's Electricity Sector

By Robyn Budd and Ben Weir, Members, Energy Council of Canada Young Energy Professionals Network

One in a series of papers prepared by Canadian energy sector leaders – at the invitation of the Energy Council of Canada – exploring key aspects of our ongoing national energy story on the occasion of the 150th anniversary of Confederation.

Summary: The authors describe an emerging trend of reciprocal disruption affecting what are traditionally termed "disruptive actors", in an attempt to reintroduce balance to the electricity sector. Specific examples include: net metered distributed generation, where debate continues over grid integration and valuation; and large-scale renewables, where regulators are looking for new ways to value products such as capacity and reliability. The authors express the hope that a more stable state will emerge from this mutually disruptive process, to the advantage of ratepayers and the grid.

A Changing Balance of Power

While certainly before these authors' time, the Cold War was a period characterized by the threat of nuclear war between the United States and the Soviet Union; when Mutually Assured Destruction (MAD) was the mantra of the day. MAD was a state of affairs which garnered stagnation and inaction between major players. No one wanted to do anything that could shake up the balance for fear of the potential consequences to themselves. Today's electricity sector, on the other hand, is more aptly characterized as a system of mutually assured disruption, rather than destruction.

Now, as policy and regulation start to catch up, we are beginning to see a secondary wave of disruption.

Throughout the industry, disruptive actors using new technologies and business models are actively seeking to change the balance of power (no pun intended) between incumbents and themselves. Distributed generation, storage, renewables, engaged customers, demand response, etc. all fit into this category. These disruptive actors have the potential to introduce greater amounts of environmental sustainability and cost efficiency into the electricity sector. The disruptions, however, are not always deployed in ways that lead to the most optimal outcomes, and in many cases, they are introduced within regulatory frameworks ill-suited to accommodate them. This leads to push back from incumbents including system operators, distributors, and centralized generators. Now, as policy and regulation start to catch up to the realities of the day, we are beginning to see a secondary wave of disruption which affects the disruptors themselves in an attempt to reintroduce balance. The disruption to incumbent business

models caused by the new actors assures the corresponding regulatory disruption to the new actors, in turn.

We have seen this dynamic in a number of different arenas but perhaps no more prevalent today than net metered distributed generation threatening distributor's business models, and low marginal cost renewable generation eroding wholesale market revenues for large generators.

Net Metering: The Appeal and the Challenge

Of these two issues, net metering seems to receive the bulk of the media's attention because it touches the largest number of people (each rooftop solar system represents another interested energy customer with skin in the game) and because it has the potential to cause serious issues for electricity distributors' revenue streams. This is a recipe that has encouraged some very public battles over how to integrate distributed solar into the grid, and, maybe more importantly, over how the energy it produces should be valued by other non-solar customers, distributors and system operators.

Most provinces in Canada have some version of a net metering regulation. In its most basic form, net metering provides a mechanism for smaller electricity customers to produce their own renewable electricity, consume a portion of that electricity behind their meter, and export any extra electricity to their distributor for a credit. Because net metering regulatory frameworks generally guarantee this method of credit valuation (at full retail rates), many distributors have bristled at connecting increasing amounts of net metered generation because it can impact their bottom line. It does this by allowing net metered customers to avoid paying certain charges (like distribution and transmission charges) when these charges are calculated volumetrically (i.e. based on kWh consumption). If a customer uses less electricity from the grid, they pay less of those charges. The problem is, if the net metered customer isn't paying those charges, someone else is. From a distributor's and regulator's perspective, that can be dangerous.

Net metering touches a large number of people and has serious implications for distributor's revenue streams.

Full retail rate compensation for net metered customers has some justification. Distributed generation, in sufficient quantity and density, can avoid transmission and distribution system expansions. It can also provide a benefit in the form of avoided greenhouse gasses (if the grid uses fossil fuel generation). If the costs of the grid are not getting paid for, however, it presents a big problem for the longevity and reliability of the system. Because of this, we are seeing more and more the process of mutually assured disruption described above. Regulators and legislators are looking more closely at rate structures that will allow distributed generation to continue to proliferate, but in a way that won't jeopardize distributors' ability to recover their costs. Structures like Value of Solar Tariffs, fixed distribution and transmission charges, and specific rate classes for net metered customers are popping up throughout the United States, and even here in Canada. The Ontario Energy Board, for example, has moved distribution charges for residential customers to a fixed

basis. This means that net-metered customers will no longer be able to avoid the distribution charge regardless of how much electricity they generate themselves.

These rate structures seek to accomplish different things, but are similar in that they generally impact the business case for net-metered generation negatively. Hurting the business case for net metering is certainly not the goal of regulators, who are instead trying to ensure that distributors can remain viable, and that distributed generation is being compensated in a way that reflects the value it provides – both of which are very good things. Solar companies and net metered customers have enjoyed full retail rate compensation for their projects, but must learn to work within these revised regulatory frameworks if they want to continue to do business. The disruptors are becoming disrupted themselves.

The Boom in Large Scale Renewables

The disruptive influence of renewable energy has not just been felt on the smaller scales of rooftop solar and residential rate classes. Over the past 10 years, Canada has seen a corresponding boom of renewable energy development at much larger scales. Traditionally, the electricity system has followed a standard model based on centralized generation located outside of urban centers, fed by a controlled supply (think nuclear, natural gas, coal, and hydroelectric dams). System operators had a limited number of large players to manage, all of which were focused on the business of energy supply, and electricity prices would fluctuate in step with the price of the natural resources used to supply the power.

Enter the disrupting actor of large-scale renewable energy development. Backed by government climate change goals and supporting policies, the diaspora of renewable energy has broken into the traditional model of electricity generation. It is much more distributed, with streams of power feeding into the grid from urban areas, rural communities, and previously untapped run-of-river sources; and from non-traditional developers such as community co-operatives, Indigenous communities, municipalities, and large corporations that are trying their hand at electricity generation for the first time. Not only are these wind, solar, waterpower and bioenergy sources intermittent, requiring regular management through flexibility products like regulation services and fast-ramping back-up generation, but their fuel supply is free, or nearly free, meaning they can bid into electricity markets at zero, or close to it. The introduction of zero marginal cost generation (not to mention the various procurement incentives and long-term contracts) has introduced a new business model into the mix, and has had the disruptive impact of lowering market prices for incumbent generators with higher marginal costs.

Zero marginal cost generation has introduced a new business model.

This also is a case of mutually assured disruption. The disruptors have sufficiently shaken up the market, but the market pendulum swings back and we are starting to see the push back disruption to the disruptors. Electricity market overhauls are being considered by system operators in an attempt to rebalance the playing field for all generators,

as is the case in Alberta and Ontario where capacity markets are being implemented. Similarly in the United States we are seeing zero emission credits for nuclear facilities and notices of proposed rule-making for additional compensation for facilities that have sufficient available fuel resources. While still in nascent stages, we believe we will soon also see a proliferation of new operability and connection requirements, to which renewable generators are not currently subject, to force them to provide grid services for reliability.

Each of these actions taken by regulating authorities are essentially intended to value and pay for products that the system used to receive from incumbent centralized generators (capacity, reliability, ancillary services) simply by virtue of their existence. With the disruptive force of large scale renewable deployment, the longevity of those incumbent generators is threatened and regulatory bodies are searching for ways to make sure they can survive. New models, like capacity markets, could prove difficult for intermittent renewable generators to utilize while requirements to provide grid services will likely hurt their bottom line (at least initially). Combined with a shift away from long term contracting as the central means of procuring renewable generation, we see a market oriented future that is less than clearly beneficial for disruptive large scale renewable generators.

Seeking a Stable Equilibrium

Large-scale renewable energy development and net metering are two examples of disruptive forces that have spurred regulatory reactions with mutually disruptive results. Other disruptors such as energy literate consumers, the sharing economy, technology advancements in storage, blockchain, the internet of things, and electric vehicles are also on the scene. Despite some rhetoric of the assured destruction that will result, the double-edged sword is that these advancements too will likely lead to mutually disruptive outcomes. The models that are initially used to deploy these forces and technologies will not likely be the models that exist five years from now. Regulation and market forces catch up and require disruptors to modify how they do things. The hope is that these second waves of disruption will result in a more stable equilibrium between both sets of actors based fundamentally on mutual sustainability, and importantly, that this more stable state will be better for ratepayers and the grid.

Robyn Budd held senior advisory roles with the Ontario Ministry of Energy and the Independent Electricity System Operator during the boom of renewable energy in Ontario, and was the project manager for the policy development of the Large Renewable Procurement program. She is currently a Senior Consultant with KPMG's Infrastructure Advisory practice, and lives in Vancouver.

Ben Weir is a Senior Policy Analyst with the Ontario Ministry of Energy working on renewables policy. He has worked previously for the Canadian Solar Industries Association as Director of Policy and Regulatory Affairs, and with the Ontario Independent Electricity System Operator and Ontario Power Authority on renewables procurement initiatives.