

Resilient Community Microgrid Energy (2023)

Issue

Microgeneration through various clean energy sources is an excellent solution to self-supply electricity for business and consumers. This would result in lower local carbon emissions and costs, while contributing back to a safe and reliable electricity grid. There are several barriers that prevent wide-scale adoption and implementation in Alberta, and we recommend that the Government of Alberta take immediate steps to remedy these barriers.

Background

Energy is considered the life blood of buildings and local economic growth. People and businesses require secure access to affordable energy as a foundation to their prosperity. As decarbonization and electrification work intensifies, the reliability of the grid system has suffered, with more frequent advisory warnings to reduce consumption or incur rolling brown outs. The current grid system incurs energy losses of over 65% from generation to consumption; these inefficiencies are not only staggering but expensive. A single monopolized energy source leaves consumers vulnerable with few options but to pay volatile and increased electricity utility bill costs.

Microgeneration is the ability for a single business or consumer, or a group, to produce localized energy from sources like geothermal, solar, hydrogen, and more to meet their needs.

The Micro-Generation Regulation, enacted in 2008, was highly publicized by government, to simplify the process by which Albertans can use renewable resources or alternative energy to generate their own electricity and receive credit for the electricity they generate but do not consume.

When the regulation was passed, the Alberta Utilities Commission (AUC) oversaw the implementation of the regulation and *Rule 024 (Rules Respecting Micro-Generation)*.

"Micro-generation generating units are sized to offset all or a portion of the customer's total energy consumption. Albertans who want to generate electricity to earn revenue, and not for their own use, are considered commercial generators and do not meet the requirements to be a micro-generator."¹⁵⁹

Overview of Electricity Grid

Because of the various stakeholders and regulations that are involved to protect the existing grid system, decentralized energy solutions have failed to be implemented successfully on a consistent basis.

- Distribution Facility Owners and Wire Service Providers are hesitant because they see a requirement to upgrade their network technology to manage two-way energy flows.
- The Alberta Electric System Operator (AESO) that oversees the high voltage grid electric system primary concern is ensuring that the large remote generation plants, with signed Power Purchase Agreements (PPA), and over built transmission lines are utilized to Meet the pre-established commitments by both sides. A reduction in grid consumption would reduce revenues for these three parties involved.
- Alberta Utilities Commission (AUC) regulates the utilities sector, natural gas, and electricity markets to protect social, economic, and environmental interests of Alberta where

¹⁵⁹ <https://media.www.auc.ab.ca/prd-wp-uploads/2022/01/MicrogenerationNoticeSubmissionGuideline.pdf>

competitive market forces do not.

The Alberta Electric System Operator's (AESO) Delivered Cost of Electricity Report May 2020¹⁶⁰ states that, "Increasingly, grid-connected customers have options to generate some or all of their electricity needs from on-site generation, thereby avoiding a portion of the costs associated with electricity distribution and transmission tariffs and the majority of the costs associated with the commodity of electricity." The report identified key drivers that could negatively influence the incentive and ability to self-supply and for microgrids to develop:

- "Grid cost increases: future increases in distribution and transmission costs
- Tariff treatments: rates which incorporate a larger amount of fixed costs may render some on-site generation options uneconomic...
- Regulatory treatment of self-supply: moves to restrict benefits or ability to self-supply could reduce economic incentive
- Carbon costs: could impact on-site generation options; may increase relative costs for gas generation, while adding potential revenue for renewable or cogeneration options
- Natural gas pricing: may make self-supply options for larger commercial and industrial customers less attractive
- Investment considerations: attractiveness of investment alternatives, cost of capital, operational considerations"

Challenging the Exclusive Control of Energy

There are some key barriers that microgeneration faces. First, the current Micro-Generation Regulation restricts individual site owners to inadequate capacity limits which creates barriers for businesses and communities to becoming resilient local energy sharing microgrids that are powered by local sustainable renewable and low carbon energy generation.

Second, the Alberta Utilities Commission (AUC) regulates the non-competitive utilities natural gas and electricity markets, as well as transmission and distribution delivery charges and services remain fully regulated by the AUC. The lack of a designated regulator for a competitive distribution (below the sub-station) based network presents a barrier that prevents community energy sharing microgrids created by local self-generation under the Hydro and Electric Energy Act and the Electric Utilities Act.

There are additional barriers that inhibit further expansion of microgeneration. For example, while the province has stated support for microgeneration, it has been reported that micro-generation units that produce more energy annually than has been historically consumed at the customer site are not eligible and will be denied by the wires owner.

Often cited technical challenges affecting transmission grid stability have and are the primary argument to discourage large wind and solar farms displacing MW of electricity. However, microgrid systems are different as they operate on the distribution network below the substation with multiple sources of generation that can support each other reinforcing the network with no disruption to the main grid. The distribution network only suffers from a lack of the necessary upgrades to their network technology to manage two-way energy flows to discourage microgeneration connections.

¹⁶⁰ <https://www.aeso.ca/assets/Uploads/AESO-Delivered-Cost-of-Electricity-Report-FINAL-31May2020.pdf>

Finally, for the homeowner or business, sizing a microgeneration system to be able to operate in case of a grid failure (islanded mode), the system must be designed for “peak load.” Peak load is usually defined as 2-3 times the operating load. This is determined by a short interval where multiple high consumption equipment (washer, dryer, stoves, ovens, and air conditioners) operate at the same time along with the regular operating demand of lights, computers, TVs, etc. As described by the regulation, all connected microgeneration cannot be designed to manage peak loads and must be sustained on only partial loads. The enforcement of this rule not only handcuffs any potential for the development of more resilient home, business, and neighborhood microgrids but has the ability to penalize a homeowner whose only motivation is to create energy security while supporting the environment and the local neighborhood.

Removing Barriers

To resolve the barriers created by the centralized energy grid, a more methodical approach must be taken to connect and protect the highly efficient community renewable and alternative energy networks and assets. Today, the prosumers who export this renewable energy onto the grid are feeling under-rewarded for their contribution.

We need to create local community energy markets so that people can get serious about trading their electricity. These markets will start to reflect the true value of the energy that is being created every day, by solar and microgeneration owners. We need dynamic pricing, based on time and place, that responds to the precise value at that moment and location on the grid. When the markets are there, a closer true value will emerge, in both spot terms and as an annual average.

Local community energy market solutions can be readily adopted and integrated into currently regulated electric and thermal distribution networks under the Utilities Consumer Advocate (UCA) mandate to resolve disputes between Consumers, Prosumers, Active System Operators and Retailers.

Consumers and prosumers can then become nodes with the opportunity to buy and sell excess renewable and alternative energy through the Retailer. An ideal scenario is where a prosumer realizes a return for their green energy by selling to their neighbour, and the neighbour receives green energy, locally generated. The financial benefit must come from the Retailers having the ability to source the energy from not only the grid, but any local green prosumer in the microgrid energy pool to sell to local consumers.

Combining technologies can create more resilient energy networks that are less susceptible to catastrophic natural or man-made disaster events. Community microgrids and decentralized energy networks can provide the security of uninterrupted energy and safe shelters for local communities. It is not just about controlling the cost of energy consumption, it reflects peoples’ desires that their energy supplies are sustainable, socially responsible, local, and resilient.

The new paradigm for energy will see ever increasing levels of automation and resilience led not by a small number of large-scale centralized investments, but by millions of micro-investments located across local distribution networks creating community microgrids. This not only addresses the challenges of reliability and security within the community, but it also eliminates the significant Transmission line losses and reduces GHG emissions.

The Alberta Chambers of Commerce recommends the Government of Alberta work with relevant stakeholders and departments to:

1. Amend or remove the micro-generation Rule 024 to allow qualified technologies to generate electricity to meet the site peak load rather than the annual operating load so that the Site capable

of full capacity islanded operation;

2. Designate the Utilities Consumer Advocate (UCA) to enforce competitive energy market regulations for the local distribution (below the substations) microgrid network which include Consumers, Prosumers, Retailers, Wire Service Provider (grid connection), and Active System Operator (microgrid connections), and;
3. Amend the Electric Utilities Act to recognize the Active System Operator (non-profit corporation or co-operative) that can monitor and coordinate growth of the microgrid virtual infrastructure with the Active System Operator (ASO) and Distribution Facility Owner (DFO).