SELF-GENERATION AND DIESEL REDUCTION

There has been increasing interest in self-generation[1] in the Non-Integrated Areas (NIAs) and the role that it can play to reduce reliance on diesel generation. BC Hydro is supporting the adoption of self-generation and is monitoring to ensure the microgrids remain stable and reliable.

This document provides an overview of the limits BC Hydro applies to self-generation, the diesel reduction potential of self-generation, and our plans to monitor and potentially adjust limits in the future.

WHY ARE THERE LIMITS ON SELF-GENERATION IN ELECTRICITY GRIDS?

Like other utilities, BC Hydro limits the total amount of self-generation in the standalone microgrids. Staying within this limit ensures reliable service for all customers. Maintaining stability in standalone microgrids is challenging because a small customer base means that changes to individual customer demand and self-generation output can have a relatively large and sudden impact to the microgrid.

To keep the microgrid stable, BC Hydro's generators ramp up and down in real time to match the community demand (load). With individual self-generation installations, the utility infrastructure has no visibility to the status or availability of the self-generation and cannot 'control' it in real-time. For instance, when there is self-generation in a microgrid and a cloud comes over the local area, its generation output can drop by as much as 80% within seconds and the balance of customer load will then need to be quickly met by the utility's generator. In a scenario where a large percentage of load is being met by self-generation, a running utility generator (diesel or hydro) may not be able to ramp up fast enough to pick up a sudden and large fall in self-generation and the result will be a brownout on the microgrid. If the utility's generator is running close to maximum capacity, the generator may trip before a second or larger generator can come on-line resulting in a wide-scale community outage. Running additional generation (spinning reserve) to be ready for sudden falls in self-generation will reduce diesel fuel efficiency and would cause damage to the generator(s) from underloading which can lead to reliability impacts for the microgrid.

HOW DOES BC HYDRO'S LIMIT COMPARE TO OTHER UTILITIES

In the past, BC Hydro's limit on self-generation in the NIAs was generally 10% of the mid-range of the previous year's load profile in each NIA. In 2024, with the goal of enabling more self-generation while continuing to ensure grid stability, BC Hydro had discussions with other North American utilities with standalone microgrids regarding their limits. In total, we received eight responses from these utilities which had different limits and methodologies to calculate the limit. For example:

- NTPC in the Northwest Territories has a higher limit of 20% of average community load; and
- Hydro Quebec has a more stringent limit that is based on 5% of the capacity of the smallest generator.

Based on these findings, and recognizing that this is a nascent and evolving area for all utilities and communities, BC Hydro decided to raise the limit on self-generation to 15% of average annual load in the respective microgrid.

[1] Self-generation refers to privately generated renewable energy most often through rooftop solar installations.

CURRENT AVAILABILITY FOR SELF-GENERATION

There has been high interest in self-generation in the NIAs. Based on the applications received, the 15% limit has been reached in about half of the NIAs. However, new applications come in and not all applications result in installations. BC Hydro updates and publishes the current availability for self-generation applications on a monthly basis[2].

SELF-GENERATION AND THE POTENTIAL FOR DIESEL REDUCTION

The potential for self-generation to drive diesel reduction in the NIAs is somewhat limited due to the following factors. Some of the NIAs are already fully or partially served by hydro generation which means that in these NIAs, self-generation is not replacing diesel but other renewables. This will also be the case in NIAs that are planning to add solar or hydro Community Renewable Energy Projects. In these NIAs, during times that the community load will be fully served by renewable energy from community projects, self-generation would displace community renewables and not diesel. Calculations show that even if self-generation was installed to fully utilize the 15% limit in all NIAs, the potential diesel reduction beyond the Community Renewable Energy Projects is estimated to be less than 2% of current diesel usage.

FUTURE PLANS AND CONSIDERATIONS

BC Hydro is supporting the adoption of self-generation while ensuring grid stability and reliability. The 15% limit is a starting point and may be adjusted as we, and other utilities, gain more experience. BC Hydro plans to monitor microgrid performance as the amount of self-generation installed and operating increases. Over time, we intend to move from the same limit applied to all NIAs to unique limits for each NIA based upon specific characteristics and performance of that microgrid.

Generally, BC Hydro expects that after a microgrid has had self-generation installed and is operating at the current limit for at least one year (so grid performance can be monitored across all seasons and load profiles), we will make a decision on whether the limit can be increased and by how much without compromising reliability. The following are examples of considerations that would be used when making that assessment:

- Geographic spread of installed self-generation that may mitigate the risk of sudden solar output drops due to local cloud movement;
- Size and configuration of utility generators and the amount of spinning reserve; and
- Other power quality issues that will be exacerbated if the limit is increased.

BC Hydro and the NIA communities need to consider the balance and interplay between individual self-generation solar and large solar Community Renewable Energy Projects that are being advanced in some of the NIAs. We will need to monitor how the microgrid performs with the community solar project operating at maximum levels and self-generation solar at the 15% limit, before increasing the self-generation limits.

[2] Available at: Solar panel and battery storage rebates for remote microgrid communities