Winter conditions in Atlantic Canada can be harsh and the devastating effects of hurricanes and tropical storms that threaten the region throughout the year put a tremendous amount of strain on electricity infrastructure. As customer expectations of their utilities continue to increase – especially in regards to the adoption of clean energy solutions that improve reliability and offer more value for their dollar – Nova Scotia Power has chosen to invest in more distributed energy resources (DERs) to help transform and diversify their fleet of energy generation. The value of these DER assets came to light when Hurricane Dorian, the worst storm the province had ever faced, hit on September 7, 2019. A microgrid project the utility had deployed with Opus One Solutions using Tesla Powerwall batteries provided almost 19 hours of back-up power, highlighting the potential value of these resources to customers and the grid if they were deployed more widely.

What Nova Scotia Power Needed
Nova Scotia Power sought to increase its experience working with technologies such as battery energy storage and DER management software, but its unique reliability challenges and the opportunities presented by DERs led the utility to launch a feeder-based microgrid with Opus One Solutions in 2016, with funding from Sustainable Technology Development Canada.

To implement this project, it was critical that the utility had a solution that could:

- Reduce variance of feeder loading due to wind output
- Manage peak demand
- Improve power quality and reliability of service
- Integrate renewable energy generation to minimize wear and tear on other electricity infrastructure and potentially defer capital investment plans
- Help evaluate non-wires alternative solutions for grid services
What We Offered

Opus One Solutions was able to provide a DER Management System (DERMS) with its GridOS platform that met these needs and offered network security constrained DER dispatch with a custom-tailored permissive engine to ensure stability and operational reliability. At the solution’s core is an optimization engine that allows utilities to integrate microgrids into the distribution network of dispatchable assets and optimize their dispatch with full knowledge of the grid’s conditions to increase resiliency and reliability across the system.

The Microgrid: Assets and Capabilities

Nova Scotia Power’s microgrid consists of a grid-size battery (Tesla Powerpack) and 10 residential batteries (Tesla Powerwalls) on a feeder line partly powered by a 6MW wind farm. Sensors placed along the feeder line monitor and gather information about local system activity and, using Opus One’s GridOS-DERMS, analyze and feed that information back to the utility's control centre.

Along with its real-time monitoring capabilities, GridOS-DERMS can safely optimize battery dispatch based on real-time system constraints, and it provides Nova Scotia Power with key control strategies including feeder-level islanding, peak shaving, voltage management, wind smoothing and power factor correction.

The Results

In the middle of Hurricane Dorian, the Tesla Powerwalls provided 18 hours and 53 minutes of backup power during an outage, valuable time for any utility working diligently to repair infrastructure and restore power to customers.

Lessons learned from implementing this microgrid have contributed to the utility proposing a new project to the Provincial Regulator that would bring the total number of in-home batteries to over 200 from the current 10. Nova Scotia Power is also exploring the possibility of aggregating these DER assets to fulfill grid services.

For more information on Opus One's DER capabilities, please contact us at DERMS@opusonesolutions.com.