

ESS Simulation

Peak Load Support & Black Startup

CLIENT CHALLENGE

The grid purchasing costs of an industrial consumer in Nova Scotia comprises of hourly energy price, demand charge and delivery charge. The local utility provider has been encouraging consumers to sell-back their behind-the-meter generation. However, the sell-back policy is not applicable for the client as the factory building has high power requirements and the high demand charges in their energy bill reflects consumption during peak hours. Energy storage along with renewable generation can be implemented to solve the clients pain points.

Based on load profile, the average demand for the building is usually 70 kW but during peak demand hours it stays well above 100 kW. A diesel generator is being used to support the peak load and black startup. The daily load profile is steady while the peak consumption lasts just 15 mins each time and 4 times a week. However, the seasonal load profile varies a lot.

The client is planning to integrate solar PV with energy storage system to eliminate a significant portion of the building's grid purchasing costs and sell back excess energy generated. Client also plans to do black start-up with the BESS, subsequently getting rid of the diesel generator.



BACKGROUND

TROES is a Canadian company specializing in advanced distributed energy storage technologies, product and solutions. TROES supports its client in identifying the optimal configuration of Battery Energy Storage System (BESS) and solar PV, to ensure a cost-saving project with minimum payback years.

For this, TROES requests project related information from the client, including but not limited to load profiles and utility electricity prices to avoid over- or under- sizing, while meeting current & future project requirements.

SYSTEM SPECS

The system comprises of a 151 kWh/60 kW BESS integrated with a 417kW solar PV array and the grid. The solar array will occupy a total of 2200 m² area.



SOLUTION BENEFITS

The PV is 417kW, BESS is 60kW/151kWh, demand peak is 90kW, grid sell-back is 340kW/264MWh per year. The system cost is US\$583,602. The overall energy cost for the building at present is around \$0.036/kWh, so the payback will be 11 years. The savings and related benefits with the new system are given below. The annual O&M costs of solar are at US\$10 per kW and BESS at US\$33 per kWh.

The simulation model requires client's load profile and utility rates amongst other information as inputs. For this project, the maximum allowable installed PV was 500kW, and the diesel generator was 75kW. The simulation model has taken into account analysis of these different configurations:

- Diesel augmentation scenario
- Maximum off-grid ratio scenario
- Maximum PV generation scenario
- With/without BESS scenario
- With/without grid sell back scenario
- Balanced solution

	Grid Purchase	Balanced Solution	Saving
Off-grid capacity	1%	58%	-
Energy cost (USD)	\$102,307	\$43,525	\$58,782
Unit costs	\$0.12/kWh	\$0.036/kWh	\$0.084/kWh
Grid sell-back	0	264MWh	-
GHG Emission	533,820 kg	225,577 kg	308,243 kg

