

**Grid Connected Solar PV and Battery Energy Storage System  
Peak Shaving & System Balance in an EV Charging Station, Ontario, Canada**

**Background**

TROES is a Canadian company specializing in advanced distributed energy storage technologies, product and solutions. TROES has completed a grid connected **EV Charging Station (Level 2/3)** project with **Solar PV and Battery Energy Storage System (BESS)**. This setup will serve as a power source for electric vehicles in commercial & residential buildings in urban areas. It will be pivotal in relieving the burden of excess power demands on the grid by charging the BESS during off-peak time & using the BESS to charge EVs during peak period.

**CLIENT CHALLENGE**

The demand for EV charging infrastructure is growing rapidly. With this, electricity consumption costs and transformer overloading have become big concerns to infrastructure owners. Our client in Ontario, Canada sought to utilize solar PV and energy storage system to reduce the demand stress on grid and make bill savings by reducing grid usage during peak periods.

The charging station has Level 2 and Level 3 DC EV chargers that can charge EVs in a short period of time due to high charging power. The power demand of a Level 3 charger is normally higher than 30 kW and in cases above 100 kW as well. So, usage of Level 3 charger during peak hours has significant impact on electricity bills of the client. The integrated solar PV and BESS has given a smart charging solution to our client without overloading the existing system and eliminated the inconvenience of charging EVs during peak hours.

**FINANCIALS AND BENEFITS**

The system cost is US\$95,000. Assuming 2066 hours sunshine in Toronto, Level 3 EV charger usage fee as US\$0.21/min (US\$0.25/kWh), and Level 2 EV charger usage fee as US\$0.01/min (US\$0.1/kWh), the annual charging cost will be US\$14,286.

Initial cost	Daily usage	Yearly revenue	Payback
US\$95,000	8 hours	US\$23,966	~4 yrs

**About the system:**

The system comprises of a **100 kWh BESS** charged by a **10-kW solar PV array** and the grid, **powering Level 3 and Level 2 EV chargers** in the station. The Level 3 charger in this setup charges an ordinary EV upto 80% in just 30 minutes. The BESS allows EV charging, avoiding the peak hour costs of grid electricity.

