OPENADR UTILITY CASE STUDY

Virtual Power Plant

Swell Energy / Hawaiian Electric

PROJECT GOALS

Hawaiian Electric is adding Virtual Power Plants (VPPs) as a smart, clean and cost-effective way to manage electricity supply and demand on an evolving US grid. A VPP is an aggregation of Distributed Energy Resources (DERs)—such as batteries, EVs, smart plugs and thermostats — that can be controlled by the grid operator in place of a large, central power plant. VPPs built with aggregated solar powered battery storage can address a variety of utility and grid needs without building new carbon-intensive infrastructure or transmission lines; can balance energy supply and demand on the network by adjusting or controlling the load during periods of peak demand; conduct fast frequency response supporting the overall health of the grid; absorb excess renewable energy for delayed consumption; and more.

Swell Energy's VPPs are based on an aggregated network of distributed energy resources that provide a variety of benefits to utilities and their customers. This large-scale commercial Virtual Power Plant (VPP) in Hawaii represents an important advance in battery technology and capability. The project contemplates linking batteries in 6,000 different homes to create a decentralized power plant for the local utility. The Hawaii program will deliver more than 25 megawatts of solar power paired with over 80 megawatts of batteries and 100 megawatt hours of stored energy, delivering capacity and fast frequency response to the three island grids while also reducing bills for participating customers.

The contract was awarded in response to Hawaiian Electric's request for dispatchable energy storage and renewable generation through distributed energy resources along with capacity and ancillary services to ensure adequate supply and power system reliability across the Hawaiian Electric service territory. The project tackles several challenges simultaneously. Hawaii passed a law requiring 100 percent renewable electricity by 2045. That law in turn requires shutting down fossil-fueled plants and replacing them with suitable alternatives. And while solar is a plentiful resource, island grids quickly became saturated with solar production at midday, prompting the need for batteries to store the surplus and make it available after the sun goes down.

For more information
please visit
www.openadr.org

PROJECT IMPLEMENTATION

Swell Energy will augment Hawaiian Electric's energy supply by relieving the grids of excess renewable energy as production spikes and absorbing excess wind energy when needed, thereby reducing peak demand and providing 24/7 fast frequency response to balance the grids. The renewable energy storage systems will collectively respond to grid needs dynamically, moment-to-moment.

Once complete, the portfolio will supply 25 megawatts of solar power and 80 megawatts of battery capacity, which Hawaiian Electric can use as electricity during hours when grid demand surges, as well as delivering rapid-fire fast frequency grid response.

The virtual power plant model benefits homeowners with backup power and power bill savings from self-supplying electricity for more hours of the day. The battery capacity is also available to the utility to deal with the systemwide challenges associated with the transition to cleaner energy. This requires balancing grid needs while ensuring that customers are backed up and fairly compensated.

TECHNICAL INTEGRATION AND PARTNERS

Utility DERMS providers typically integrate the OpenADR protocols on behalf of their utility customers. Those DERMS providers test and certify that integration with the OpenADR Alliance, to ensure interoperability with the systems managed by the utility's program partners.

Swell utilizes an OpenADR based integration to provide grid services to Hawaiian Electric while offering significant financial incentives to participating customers. Each of the three islands has a Virtual Top Node (VTN) connected to three Swell Energy Virtual End Nodes (VENs) serving the three grid services (capacity build, capacity reduce, and fast frequency response), for a total of three VTNs and nine VENs.

About OpenADR Alliance

The OpenADR Alliance brings together system operators, utilities, aggregators, controls vendors and solution providers to support the growth of this international standard (IEC 62746-10-1) Industry stakeholders worldwide work to foster the development, adoption and compliance of the OpenADR standard through collaboration, education, training testing and certification. There are currently over 250 certified OpenADR products. Collaboration includes technical working groups – most recently the creation of an Electric Vehicle Interest Group.