

Benefits of Battery Energy Storage with fuel cells

Peak Shaving

- Reduce or Eliminate demand charges from the grid during peak periods. Store excess energy produced by fuel cell during low-need hours so the excess power is available onsite during high demand hours
 - *Grid demand charges are different than typical fees based on total kW hours used. Demand charges are an **additional fee** based on the highest continuous 15-minute power peak each month. The cost is roughly \$20 per kW. For example, drawing 600kW for 15-minutes will cost \$12,000! A battery would offset this cost*

Grid Backup Power / Grid Independence

- Reduce dependence on the grid by providing backup power synchronization reference for fuel cell operation during grid outages and power interruptions
- Reduce reliance on the grid by providing on-site power when demand is greater than fuel cell output
- In the unlikely event the fuel cell is unavailable, battery provides power available to assist in restarting fuel cell from complete off state (black start)

Energy Storage for Solar Expansion

If solar is installed, store excess solar energy during ideal solar production periods to mitigate solar intermittency during unfavorable production periods (evening, cloudy or inclement weather)

Example Battery Selection

The graph below shows the actual power use profile for one-year at one site.

1. On average the fuel cell output power will provide approximately 460kW
2. The site power is 660kW or less 99.91% of the time. A 200kW minimum battery is needed. To cover 660kW for 4-hours, an 800kWh battery and fuel cell is needed.
3. In months where the demand reaches 700kW, based on \$20/kW, the fuel cell and battery save \$14,000
4. The example below shows multiple grid power outages; the fuel cell and battery will mitigate outages

