

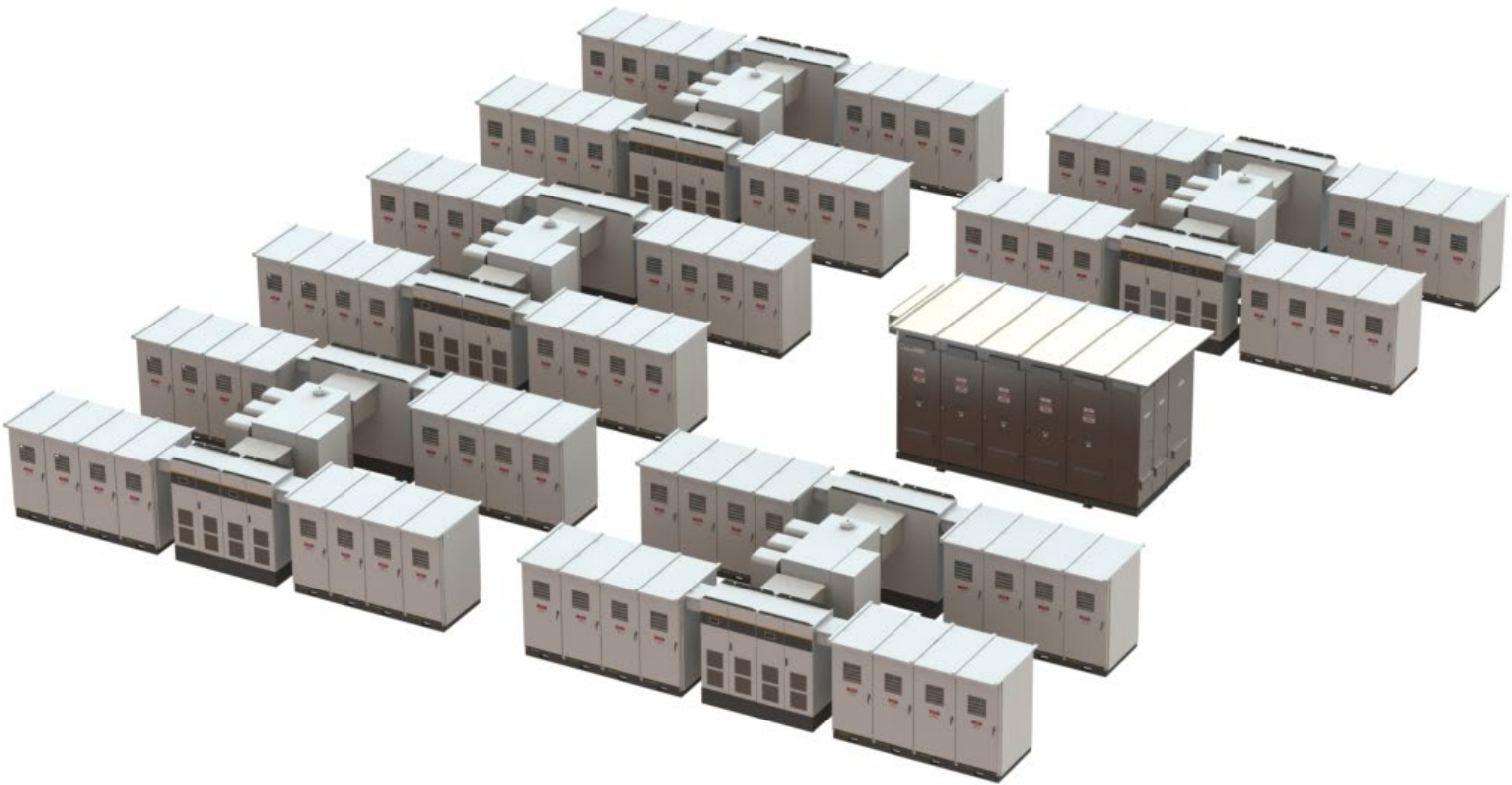


RIC
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CleanGrid™

Grid Stabilization &
Battery Energy Storage System



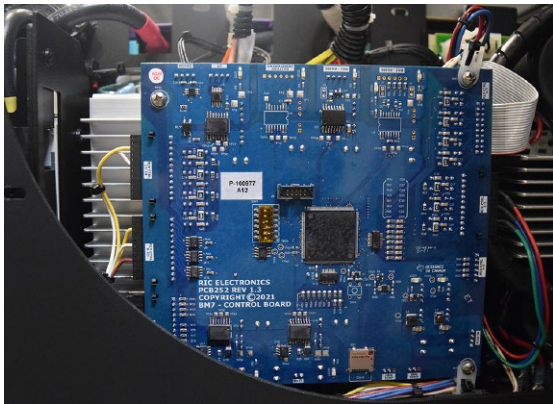
CLEANGRID™

Battery Energy Storage System

The electricity industry is facing significant and rapid changes that present new challenges and opportunities for reliability, security, and resilience. Dependency on electricity as an energy source will be greater than ever and electrification is a focal point of policy moving forward.



1MW, 2MWH CLEANGRID Battery Energy Storage System (BESS)



Battery monitoring card for lithium iron phosphate batteries

RIC Electronics has designed and manufactured battery monitoring system for lithium iron phosphate (LiFePO₄) batteries.

This proprietary design allows for active and passive charging as well as safe and consistent power delivery.

Critical Use Cases

CleanGrid can be used to help:

- Electrical grid support (capacity, congestion, resiliency)
- Time of Use (TOU) management
- Diesel generator reduction
- Capex Deferral



LiFePO4 batteries inside BESS

Use Case

Description

- Capacity
- Congestion
- Resiliency
- Capex Deferral

- Energy storage improves the efficient operation of the grid, reducing congestion on the grid at peak periods which causes line losses.
- Cost avoidance of extra transmission charges from neighboring independent System Operator (ISOs) during times of congestion by deploying strategically situated energy storage resources.
- Battery ensures critical loads stay energized during outages and transients (resiliency).
- Energy storage can also reduce the need to build additional infrastructure to meet rare system peak demand situations.

- Energy Arbitrage
- Voltage Support
- Frequency Regulation
- Spinning Reserve

- Stores energy when grid prices are low, then sells when prices are high (real-time markets).
- Fast frequency stabilization in real-time.
- A dynamic source of reactive power – ability to inject or absorb Reactive Power (Volt-Amp Reactive or VARs) to sustain voltage within limits.
- With its ability to provide grid services within milliseconds, a battery storage system can effectively replace spinning reserve generators through so-called “synthetic inertia”.

Use Case

Description

- Local Feeder Capacity
- Resiliency
- Capex Deferral
- Demand Response (Capacity)

- Utility owned feeder level energy storage can increase the capacity at a local level allowing peaks to be met without the disruption and cost of building new infrastructure. Energy storage provides capacity, resiliency, and deferral of capital.
- Energy is stored allowing customers to participate in BC Hydro Demand Response programs

- Power Quality

- Energy storage systems can be an incredibly effective tool for achieving power quality needs (i.e. voltage, frequency) on the distribution network and respond to fluctuations in power quality much more rapidly than most alternative means.

- Diesel Reduction

- Storage batteries can be used in place of diesel backup generators in commercial buildings, schools, and hospitals. On a larger scale, a storage solution can be implemented as a mechanism to reduce or eliminate diesel consumption in Non-Integrated Communities when they are part of a "micro-grid" installation (using solar, wind, small hydro or other source of renewable generation).

- TOU / Demand Charge Time Shift

- Domestic electricity storage used to time shift energy usage. As Time of Use (TOU) is introduced, electricity storage will give customers the opportunity to buy energy at periods when the cost is low, rather than consuming energy from the grid when the cost is high. Similarly, stored energy can be used at a time of high demand to minimize Demand charges.

- Demand Response

- Customer roof-top solar coupled with a storage battery is in use today (net metering program).

- Solar + Storage

- Backup Power Supply

- Energy storage behind the customer meter is useful as an emergency power supply during extreme events or storms.

- Secure Supply for public charging sites (capacity)

- Reduces the amount of T&D capacity needed on-peak to serve the Electric Vehicles (EV) charging-portion of the total peak demand.

- Electric Vehicles to Grid/ Home

- Utilize the stored energy in the fleet of electric vehicles to supply the grid at times when it is required for peaks or as a supply for behind the meter needs (similar to Time Shift use case).

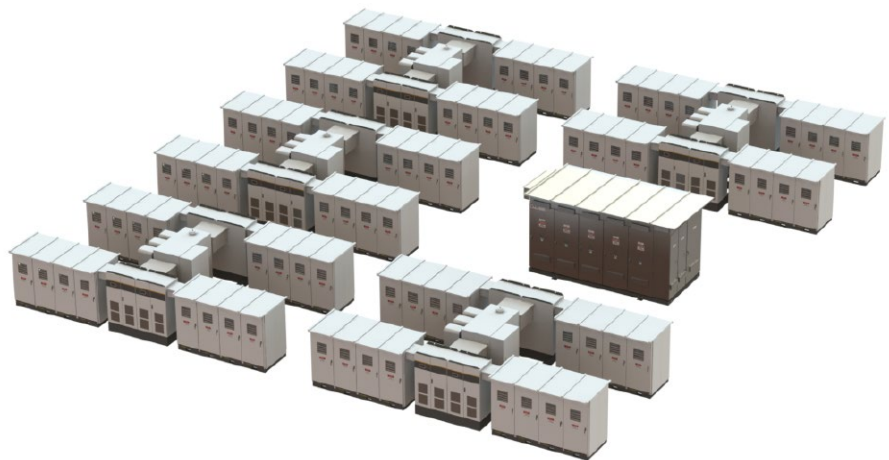
- BC Ferry Energy Supply

- Use a large battery bank to charge BC Ferries while in port, and in turn, battery bank is charged from grid or solar/wind when not in use.

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CLEANGRID Farm - 5 MW, 10 MWH