

Case note

Battery energy storage PCS solution for EKZ, one of Switzerland's largest energy companies



BESS 1 MW / 250 kWh PCS solution at the Dietikon Power Plant in Zurich, Switzerland.

ABB, together with the Zurich power company EKZ, has successfully installed a 1 MW power battery storage solution at the Dietikon Power Plant. The battery is connected to the grid with ABB's Power Conversion System (PCS) and is the largest of its kind to be installed in the Swiss distribution network. By improving power quality and grid stabilization, the PCS will help preserve 250 kWh of energy – the equivalent consumed by a four-person household in 40 days.

Electricity is a vital part of a nation's infrastructure from industrial operations to general day-to-day living. A reliable and efficient grid is critical to sustaining electrical power to customers. A Battery Energy Storage Systems (BESS) can ensure this goal. ABB's energy storage PCS is providing that security with spinning reserve of power in the event of power plant or transmission line equipment failure. This technology enables power plants, like the Dietikon Powerplant in Switzerland, to operate at their full potential without the interruption of power.

Project highlights

Plant: Dietikon, Zurich, Switzerland

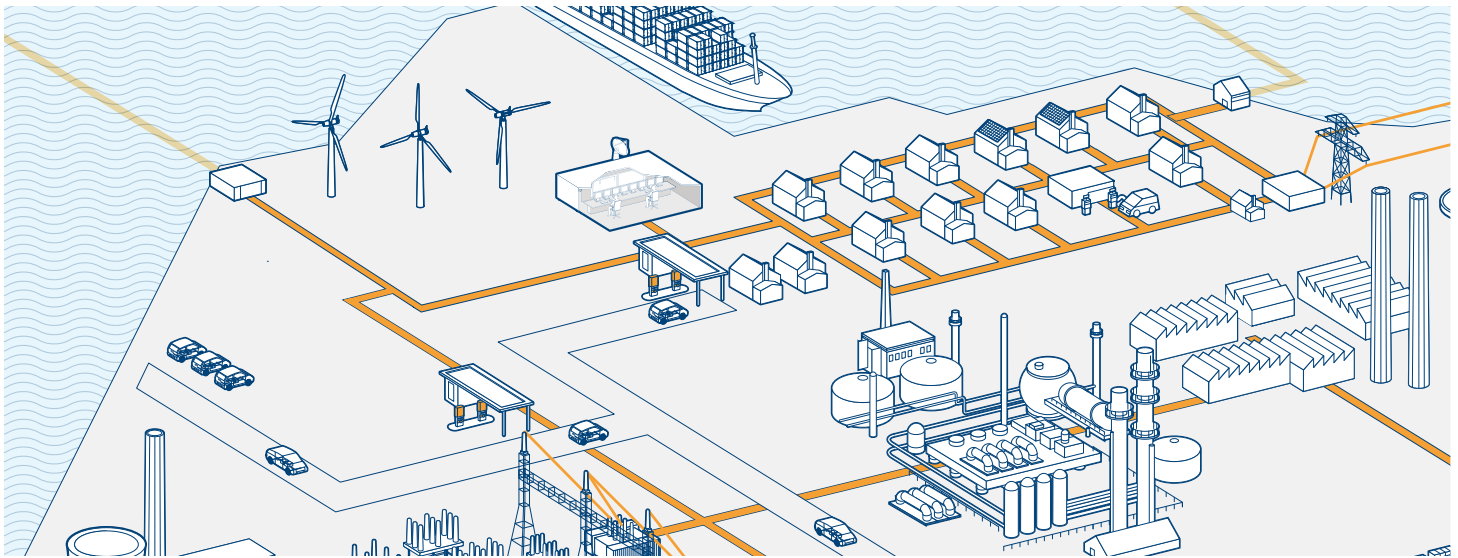
BESS System Power: 1 MW / 250 kWh

PV Smoothing functionality for solar grid integration

Peak shaving for an EV fast charger to manage demand

Island mode with VSI for enhanced power quality and microgrid operation

The system at Dietikon Power Plant was built over a nine-month period, and is now incorporated into the medium voltage network of EKZ. This will allow ABB and the customer to closely monitor the integration and behavior of the battery storage, and providing valuable knowledge for future installations.



Working together across regions

ABB supplied PCS technology and leveraged engineering and operational experience from both the United States and Europe. The PCS, engineered and assembled in New Berlin, Wisconsin in the United States, uses efficient power semiconductor technology to convert the AC supply into DC for use via the battery, and vice versa. The battery system is operated with ABB control and protection systems. Based upon the input parameters and the defined equipment footprint, the PCS was packaged in a freestanding outdoor enclosure, and then integrated with LG Chem batteries and supervisory controls. The battery integration and packaging was performed by ABB in Hungary and ABB's Power Systems team performed the system design and project management.

The PCS was designed to be primarily controlled via an external SCADA system, and operated in five primary control modes. These were scheduling (P/Q), peak-shaving, PV smoothing, frequency regulation and islanding. The peak-shaving mode is used to allow an electric vehicle fast charging station to operate without increasing system demand. The PV smoothing function integrates solar power onto the grid.

One of the control modes, island mode functioning, operates in VSI mode (voltage source inverter) to provide enhanced power quality and protection. The island mode is used when the system is disconnected from the main grid / power supply. In this case, the PCS creates and maintains a microgrid of defined voltage and frequency, allowing independent operation. It supplies the connected loads from the battery and can also integrate renewable sources and use additional energy to charge the battery storage. This has the advantage of supplying loads when the main grid is not available, and defines how much power will flow in and which unit will be operational.

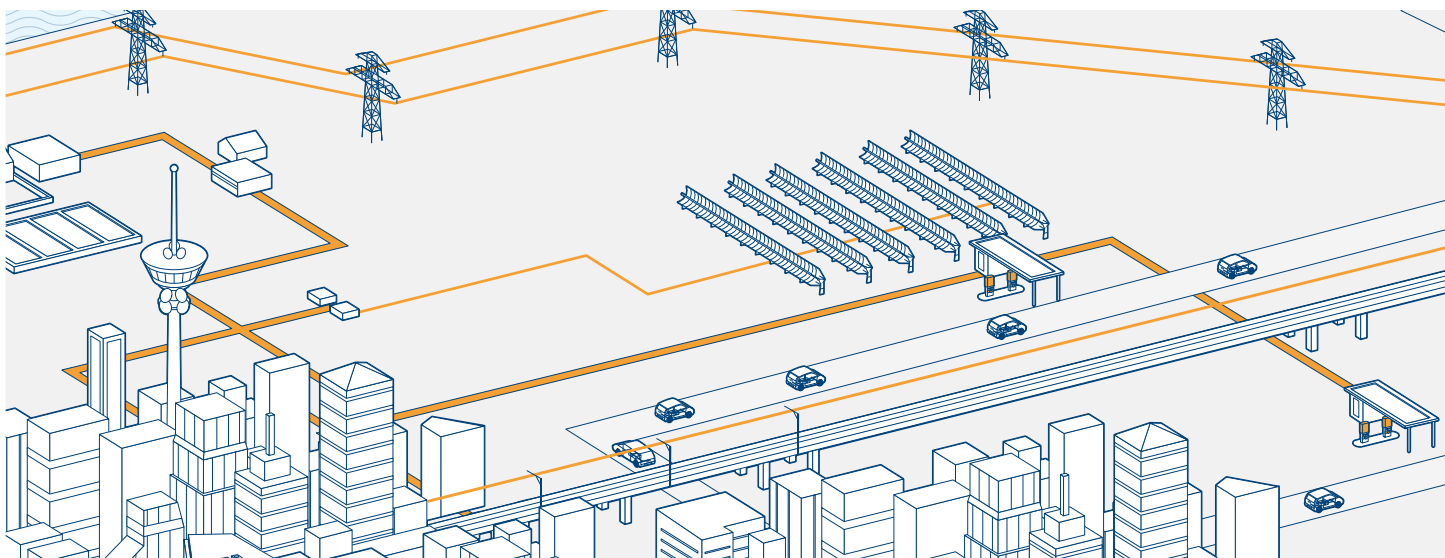
By using power electronics and advanced control, the PCS looks like a traditional synchronous machine to the power system. There are no large spinning masses. Even inertia can be modeled within the system, enabling it to deliver or draw power to and from the grid, dependent on the system frequency and rate of change. Should the grid supply be lost the PCS can detect this, disconnect from the grid and shut down.



The complete package: PCS package, LG battery, switchgear and transformer



Inside the battery container.



“We are very pleased that we were able to implement this pioneering project here in Dietikon,” Peter Franks, head of Energy Distribution at EKZ, said. “This compensates for battery memory, short-term load changes in the distribution grid and serving locally produced electricity that again, can bring interesting new approaches to the distribution network operators. The knowledge we gain with this system contributes to securing the future of energy.”

ABB's PCS technology for energy storage

Available in load capacities from 50 kVA to 30 MVA, ABB's PCS package allows control of both real power (P) and reactive power (Q) based on system requirements. Advanced control features in the “Generator Emulation” mode of operation make this storage system look like a true power system component. The PCS100 ESS offers power system load leveling, grid stabilization, grid compliance for renewable and generation systems, and power quality improvement.

The PCS provides wide bandwidth performance with a flexible and highly modular power electronic configuration. New energy storage devices, such as latest generation batteries, flywheel and super capacitors, provide the opportunity to store energy from the electricity grid and return it when required. This offers a range of options to strengthen and enhance the performance, quality and reliability of smart electricity grids.

About EKZ

EKZ is one of Switzerland's largest energy distribution companies. An estimated one million people benefit from a safe, environmentally friendly power supply generated by the company. EKZ is involved with numerous measures to increase energy efficiency and promote renewable energies.



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