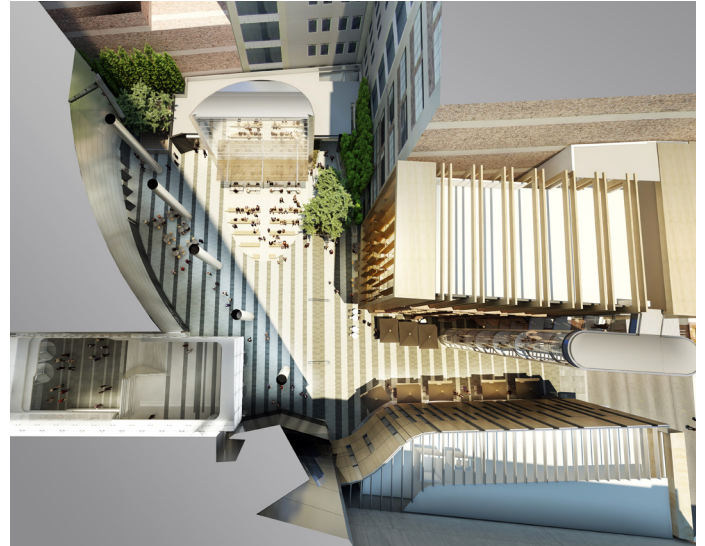


Article

PCS100 ESS - Microgrid technology turns heritage building into a green pioneer



ABB's power solution has helped Grocon achieve an Australian first for a CBD office building. 'Legion House' is the first heritage listed building to be carbon neutral and capable of operating completely independently of the mains electricity grid and all without sacrificing the comfort of the tenants.

Legion House, which was originally built in 1902 by the YWCA operated as a women's hostel and outreach service for 60 years, is heritage listed and protected due to its social significance. It is located in the heart of Sydney's CBD and forms part of the Grocon flagship development at 161 Castlereagh Street which includes a 50 storey building, retail space, office tower and a large open plaza.

The newly refurbished six-storey Legion House project has formally committed to achieve a 6 Star energy rating under the National Australian Built Environment Rating System (NABERS) and subject to regulatory approvals will soon create its own renewable electricity on-site through biomass gasification fuelled by waste paper collected from the 50 storey office tower.

To ensure the building tenants have continuous access to a reliable and renewable electricity supply, ABB's unique and versatile PowerStore grid stabilizing technology has been installed to stabilise the buildings' internal power network and to serve as an PCS100 Energy Storage Systems (ESS).

One of the PowerStore's main tasks is to dampen the effects of significant instantaneous step loads, which can occur in modern commercial buildings. Instantaneous step load are normally managed by the mains grid connection.

In the case of Legion House, ABB's technology stabilizes the internal (islanded) power network against fluctuations in frequency and voltage that can be caused by essential building services such as elevators and air conditioning systems. The solution uses advanced control algorithms to manage real and reactive power that is rapidly injected or absorbed to control the power balance, voltage, frequency and general grid stability.

Legion House can run in 'island mode' which means it can operate fully from on-site power generation. The building location meant it was not able to rely on traditional solar or wind for renewable power generation. The power is generated via two synchronised gas fired generators connected to the PowerStore, which serve a common power bus to provide electricity to both buildings.

The generators serve as the buildings' base electrical load while the PowerStore battery system, which utilizes lead acid batteries, dampens the effects of instantaneous load steps. The system exports spare electrical power to the adjacent tower building. The battery power system is also used to serve the overnight electrical load as well as minimise the generator operating hours.

The building is unique in that fuel gas (syn gas) is generated on site to run the generators. The gas is produced with the use of both delivered wood chips and briquettes made from recycled paper. This syn gas is created inside the gasifier which heats the wood/briquettes in a low oxygen environment and breaks it down into gas and char - the syn gas is then used to power the generators.

"We are pleased that our microgrid technology has made such a significant contribution to Grocon setting a new benchmark for the revitalisation of historical buildings," said Michael Jansen, manager for power generation at ABB in Australia. "ABB's microgrid stabilization solution is ideally suited for this type of commercial building application as it is grid compliant and provides the technology needed for reliable grid-connection and off-grid power generation for the carbon neutral buildings of the future."

Grocon's electrical contractor, KLM Group, in consultation with Umow Lai the electrical services design engineers, appointed ABB to design the PowerStore battery system. The engineered solution involved the supply of ABB's PowerStore control software, PCS100 inverter technology, which provides key benefits allowing for dynamic active and reactive power control.

The PCS100 features also support grid stabilization with (synthetic inertia and active damping) for applications where frequency regulation is critical. Other unique features of the PCS100, within the PowerStore system, are its islanding capability when functioning in virtual generator mode, which enables it to control its own voltage and frequency, thus enabling it to create a microgrid. For the Legions House application, corrective droop mode that allows power sharing between other generators has been employed. The equipment is combined with the AC grid connect and DC battery connect circuit breaker panel together with a grid coupling transformer.

The energy monitoring control system and battery monitoring system monitor and control valve regulated lead acid batteries to provide 100 kVA/80 kW power for up to four hours of electricity supply. The system monitors and controls various battery parameters such as battery temperature to maximise the battery service life. The system also includes remote access capability for monitoring, fault diagnosis, parameter and software upgrades.

While Legion House can be referred to as a Carbon Neutral building, it is technically classified as an 'Autonomous Zero Carbon Life Cycle Building' under the Australian Sustainable Built Environment Council definitions. This essentially means the building is disconnected from the electricity grid and uses renewable energy to offset carbon emissions from its operations and embodied energy over the life cycle of the building.

Grocon, who lists safety, sustainability and innovation as core values, is the largest privately owned development, construction and investment management company in Australia.

Michael Jansen concluded, "We're proud that Grocon believed in the design and service ability of our PowerStore battery solution which has now played such a vital role in the development of this world class and highly impressive sustainable city precinct."

For further information please visit:

www.abb.com/converters-inverters

(Converters for energy storage and grid stabilization)

