How grid-interactive buildings can become prosumers

By Thabang Byl

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According to the World Green Building Council, construction and operation represents nearly 40% of global energy-related CO_2 emissions today, with a projected 230 billion square metres (of new buildings) to be constructed during the next 40 years.

Thabang Byl, buildings segment lead at Schneider Electric. Source: Supplied

Each of these buildings exists within a larger energy system, making it a passive consumer, if you will.

If one considers the various roads to a net-zero future, building owners and industry will have to take a broader systemic approach, rethinking how it can become active participants in reducing energy consumption.

The good news is the continued move towards building electrification, renewable energy microgrids, energy storage, and digitally automated load control gives building operators the means to become a prosumer.

Grid interactive buildings

In a recent Schneider Electric whitepaper, *Integrating smart building control systems to enable GIB*, it is said these prosumer buildings will produce and consume energy based on real-time conditions of the grid and the operational needs of its occupant. These buildings are called grid interactive buildings (GIB).

Simply put, GIBs are structures capable of integrating renewable energy sources such as solar arrays, wind turbines, and energy storage systems into the grid.

These network-connected technologies support data processing for decision-making and automated controls that are essential in ensuring buildings are in sync with the real-time conditions of the grid.

GIBs support grid-scale, efficient operations by employing on-site distributed energy resources (DER) and curtailable loads. The key to enabling grid interactivity lies in the interoperability between the building management system (BMS), microgrid management system, and electrical power management systems (EPMS).

This interactivity also requires the standardised exchange with grid automation systems such as advanced distribution management systems (ADMS) and distributed energy resource management systems (DERMS).

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GIBs can support the grid and the environment

Grids across the world, including South Africa, are under tremendous pressure to deliver building electrification and urbanisation whilst keeping pace with innovation. This pressure can be reduced by utilising buildings that are capable of flexible load operations such as load shedding and load shifting.

With energy data from power meters and load controls via the BMS, a grid interactive building can shed its load from the grid. The building can opt to compensate by using on-site generation assisted by the microgrid controllers. In turn, this can reduce demand on the grid during peak hours.

Conversely, load shifting is dictated by planned schedules that allow the building to use or power major loads at a different time. For example, if there is a predicted demand charge at 9am, a building can choose to turn on its heating or cooling systems an hour earlier and allow coasting.

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Reducing energy use

From a carbon footprint perspective, with solar tempering, thermal enveloping, and optimised energy modelling, buildings can reduce energy use. For example, by adding solar PV to the roof, it can make the building net-zero energy or even net-positive.

Ultimately, GIBS are designed to integrate renewable energy generation sources into the grid, relying heavily on data generation capabilities, digital metering, controls, and IoT sensor systems to process data for decision-making and automated controls.

GIBs support grid-scale efficient operations by employing DERs and reduceable loads, and require interoperability between the building management system, microgrid management system, and power management systems for real-time grid interactivity.

ABOUT THE AUTHOR

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