



Microgrid as a local cluster of loads and distributed energy resources interfaced with the power grid.

Reference

10188

Patent status

Patent Pending

Stage of development

Simulation Results
Prototype under development
Ongoing research

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Microgrid Connector Controller (MGC) An Effective Controllable Grid Interface for Microgrids

Background

As renewable (and usually distributed) energy sources are taking a strong foothold in the market, the interest in the integration of distributed power generation and microgrids into power grids has significantly increased. A microgrid can be a cluster of load/power generator units such as an industrial complex or an Electric Vehicle (EV)/public transportation depot and renewable energy power sources such as wind farms and solar PV. Connecting microgrids to power grids is important as the electric power must flow between the two to assure continuous, safe, and economic supply of electric energy to all loads/consumers. Existing solutions for connecting microgrids to grids, including Back-to-Back (B2B) interfaces, are bulky and costly with limitations on frequency control.

Description of the invention

Researchers at the University of Waterloo have uniquely designed a microgrid connector controller that is capable of automatic control of bidirectional electric power flow between a microgrid and a power grid or two microgrids. This arrangement and topology of electrical components, including AC-DC converters and power flow management, reduces electric ratings/size of the required components which in turn reduces the device footprint/size. The connector therefore can be manufactured at a fraction of the cost of B2B solutions (estimated 10% of the cost of comparable solutions).

Advantages

The proposed solution for connecting microgrids to power grids provides:

- A fully controllable connector at a much lower cost (one order of magnitude lower cost)
- Full control of the system variables including voltage, current and frequency
- Modular structure
- Low volume/small footprint enabling its easy installation in tight spaces

Potential applications

The proposed solution can be used to safely connect microgrids containing all types of loads and renewable power sources such as solar PV, wind turbine, fuel cells, etc. with power grids. Some select applications include:

- Industrial complexes
- Large residential buildings
- EVs/public transportation depots