# Assessing the Effectiveness of Grid-Forming Smart Inverters in Islanded Microgrids

Watch the demo "Innovative Software-in-the-Loop (SIL) Testing Tools for Grid-Forming Converter Control" Click here

The emergence of renewable energy sources has paved the way for the development of microgrids, which offer localized power generation, improved reliability, and increased resilience. In islanded microgrids, where the connection to the main grid is intentionally severed or unavailable, the challenge lies in maintaining stable and reliable power supply. To address this, grid-forming smart inverters have emerged as a promising technology.

Grid-Forming Inverters: The Key to Islanded Microgrid Stability
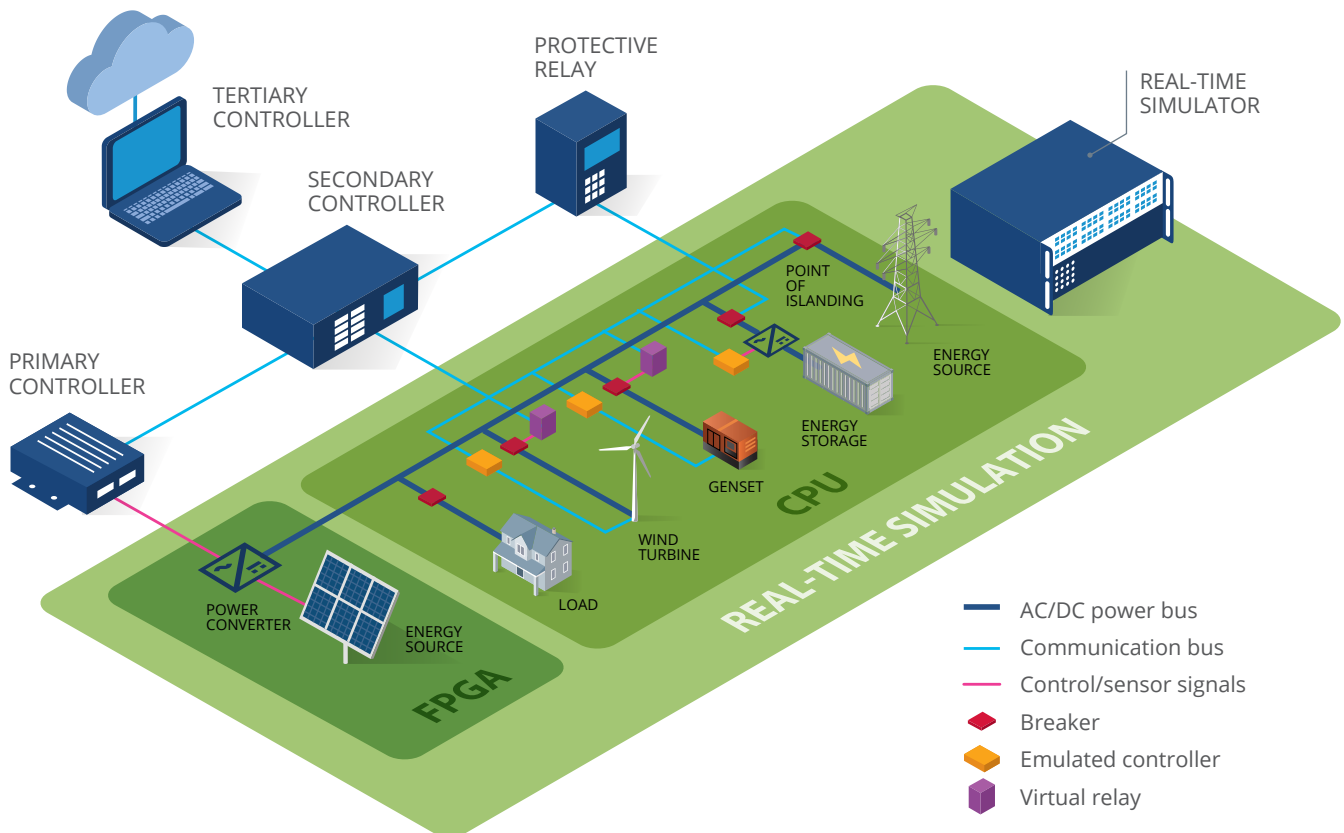
While grid-forming smart inverters offer significant benefits, their integration in islanded microgrids comes with challenges such as compatibility issues with existing infrastructure, standardization of control protocols, and cybersecurity concerns. Proper microgrid design can combine both grid-forming and grid-supporting inverters to provide the necessary grid stability, with voltage and frequency regulation, reactive power control, and fault ride-through capabilities. These need to be thoroughly tested under various operating conditions to enable widespread adoption of this new technology.

OPAL-RT's Innovative Smart Inverter Control Library

The simulation world facing a lack of standardized modular control and protection capability, OPAL-RT was proud to partner with CanmetENERGY to be the first to provide engineers with a cutting-edge solution, a Smart Inverter Control Library, available both with RT-LAB and HYPERSIM. Based on the requirements of IEEE Std. 1547-2018, it enables the development of control and protection algorithms for both grid-forming and grid-support inverters, and can be used both for offline and real-time simulations.

LIBRARY CONTENT

- Wave reference
- Secondary control
- Protection system
- Primary control
- Signal conditioning

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APPLICATIONS

- Rapid control prototyping and validation of islanded microgrids
- Interaction studies
- Frequency/voltage stability assessment in islanded microgrids
- Transient response
- IEEE 1547-2018 standard compliance
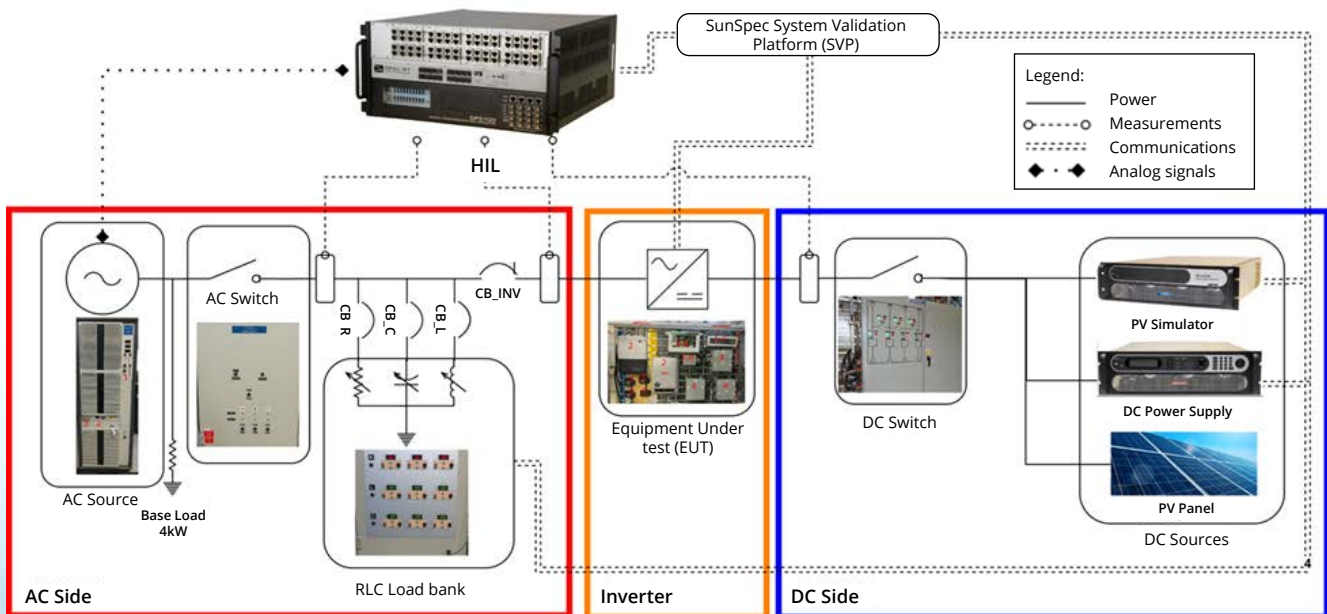
ABOUT OPAL-RT TECHNOLOGIES

OPAL-RT is the world leader in the development of PC/FPGA Based Real-Time Digital Simulator, Hardware-In-the-Loop (HIL) testing equipment and Rapid Control Prototyping (RCP) systems to design, test and optimize control and protection systems used in power grids, power electronics, motor drives, automotive industry, trains, aircraft and various industries, as well as R&D centers and universities.

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