

Demand Response Inverter

Sandia National Laboratories, Princeton Power Systems, Inc.

Problem

Reducing the nation's dependence on petroleum for power production is a priority. Promising sources of alternate energy currently under development include sunlight, wind, tides, and geothermal heat. One of the most predictable is solar – the sun rises and sets everyday. However, solar energy also faces a classic problem: the sun is not always shining. A passing cloud can reduce a one-megawatt solar array from 100% to 10% in a matter of seconds. Because of this intermittency, integration of solar power into today's electricity grid is limited. In an effort to alleviate these issues and improve throughput for solar-based renewable energy solutions, Sandia and Princeton Power Systems have teamed up to develop the Demand Response Inverter (DRI).

Innovative Edge

The DRI is a power flow control system that integrates renewable energy sources with buildings and the electric grid. By increasing renewable energy throughput, this technology dynamically manages the generation and dispatch of solar energy. The added flexibility and responsiveness of this approach mitigates renewable energy intermittency, providing very high conversion efficiency and reliability. Recognized with an R&D 100 award in 2011, the DRI provides valuable grid-support functionality. It encourages high penetration of photovoltaic power systems into the electrical grid, adding value both for the system owner and local utility.

Commercialization & Industry Impact

Guiding and reviewing Princeton Power Systems Inc.'s product design from technical development to commercialization, Sandia

helped ensure the DRI's commercial viability. Success required acute attention to details such as performance, cost, and manufacturability. As a first-of-its-kind product, the DRI was made commercially available in 2010. "What we tried to do with the DRI is make it a real turnkey, one-box solution that arrives on site and is flexible," states Princeton Power Systems' co-founder Darren Hammell in the September/October 2011 edition of *Solar Today*. "The DRI is a promising technology that can provide a paradigm shift in the field of Renewable Energy Systems," says Ward Bower, Sandia's developer. It sets a new bar in the state of power electronics systems by facilitating the transition from passive, dispersed installations to highly-integrated, utility-supported behind-the-meter photovoltaics deployments.



100kw Demand Response Inverter (shown with optional disconnects).