Inventions & Innovation Project Abstract

Commercialization of a 2.5 kW Utility Interactive Inverter for Distributed Generation

Advanced Energy Conversion, LLC is developing its inverter technology based on the zero-voltage transition (ZVT) converter used for dc-dc conversion. This technology offers the opportunity to create a high-efficiency, low-cost, compact inverter for utility interface applications. Fundamentally, the ZVT inverter makes use of parasitic inductances and capacitances within the power circuit to support high efficiency operation.

There are a number of significant benefits of adopting the ZVT inverter for utility-interactive inverters. By operating with essentially zero switching loss, the switching can take place at very high frequency. This allows the isolation transformer and all filter components to shrink in physical size. While it is not anticipated that the physical size of the inverter is necessarily more desired by the market, it supports using less expensive components and a lower manufactured cost, since manufacturing cost often tracks physical size. Second, by operating with high efficiency, it is possible to eliminate the cooling fan, a significant reliability factor. Third, by operating at high frequency, bulk energy storage is substantially reduced. This allows reduction in the number of electrolytic capacitors within the power stage, substantially improving inverter reliability and reducing cost. Electrolytic capacitors are notoriously one of the least reliable and more costly components in a power electronic inverter. Fourth, the ZVT inverter has very clean switching waveforms, reducing issues associated with electromagnetic compatibility.

Using New York state as an example, the daily electrical energy consumed per household is 17.1 kWhr. Output of a 2.5kW inverter for an average day is 2.5kW x lOhr x 50% x 96% = 12.0 kWhr, below the energy consumption of an average household. Because the energy produced is less than the total energy consumed, the incremental savings to the consumer would be at the prevailing residential electricity rate, not the avoided cost of electricity generation. The annual energy production by a 2.5kW inverter system is 12.0kWhr/day x 365day/year = 4380 kWhr/year.

Contact

Advanced Energy Conversion, LLC
10 Hermes Rd., Suite 500
Malta, NY 12020

Contact: Dr. David Torrey
Telephone: 518-289-8020 ext. 11
Email: davidtorrey@advanced-energy-conv.com