

Press Release

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Researchers at Fraunhofer ISE Receive SEMIKRON Innovation Award

Power electronics for off-grid village power supply in threshold countries

The researchers Dr. Olivier Stalter, Florian Reiners, Michael Eberlin and Sebastian Franz from the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg received the SEMIKRON Innovation Award together with Frank Seybold from KACO new energy GmbH in Neckarsulm. From a total of 19 applicants, the jury selected the innovative power electronics to facilitate a complete off-grid village power supply in developing and threshold countries. With this technology the entire electricity for remote towns can be centrally generated and supplied with renewable energy.

“About 1.6 billion people in the world do not have access to electricity,” says Dr. Olivier Stalter, project leader. “Since most of these countries are located in the Earth’s Sun Belt, solar electricity is an obvious solution that has become more attractive in the past years due to the decrease in the price of photovoltaic (PV) modules. Up to now, such solar PV systems were limited to low powers of about 100 watts. Our system applies the newest technological developments of the industrial nations to meet the needs of remote village communities and larger consumers such as hospitals or smaller firms.”

The system components developed at Fraunhofer ISE consist for the most part of a stand-alone 125 kW inverter and a 51 kW charger for battery voltages up to 1000 volt. The basic idea was to design the system for high voltages and high internal switching frequencies using the newest semiconductor devices like super junction MOSFETs and SiC diodes. This allows low currents and low losses thereby reducing the device dimensions, cooling demand, material

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use and costs. At the same time, the losses can be reduced by 60 percent as compared to conventional units. The inverter operates with an efficiency of up to 98 percent and the charger with up to 99 percent respectively.

Especially for developing countries, it is important to keep the technology simple. Whereas before, units with extensive cables and switching had to be connected in parallel to achieve high capacities, today only one unit is needed. High-tech devices and continuous digital control allow for the highest degree of flexibility. In this way, photovoltaic systems from 350 up to 1200 volts and battery systems with a nominal voltage from 650 up to 1000 volts can be used. In most cases, diesel generators are installed already on site and therefore an energy management system controls the different generators, the battery charging and the electricity supply.

For over 30 years, Fraunhofer ISE has been successfully developing high efficiency power electronics for renewable energy and industrial applications.

The SEMIKRON Innovation Award is bestowed for excellent innovation in projects, prototypes, services and novel concepts in the field of power electronics in Europe. The foundation honors innovations that generate a high potential social benefit and improve energy efficiency, preservation of resources, sustainability and environmental protection. The award ceremony is held annually during the "PCIM Europe" power electronics show in Nuremberg, Germany. The laureates are elected in cooperation with the ECPE European Centre for Power Electronics. The main award is endowed with 10,000 Euro.

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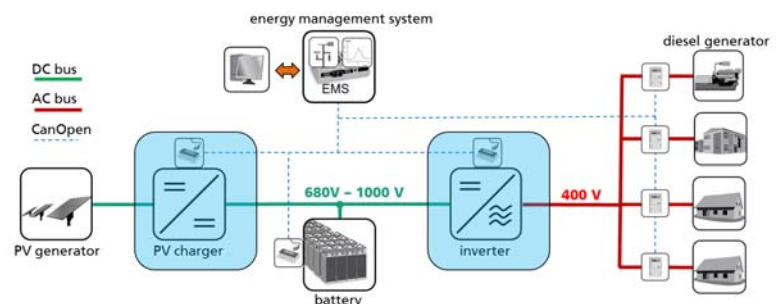
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Schematic of the novel system for off-grid village power supply with photovoltaics (PV) and a diesel generator. The main new developments of Fraunhofer ISE in the field of power electronics are highlighted in blue. ©Fraunhofer ISE

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