SMA Solar Technology AG press release

PV-Pack Research Project Successfully Completed: Reducing Costs in Photovoltaics with New Highly Integrated Inverter Concepts

Niestetal, March 8, 2017 – SMA Solar Technology AG (SMA), the Fraunhofer Institutes for Solar Energy Systems ISE and for Manufacturing Technology and Advanced Materials IFAM, and Phoenix Contact GmbH & Co. KG have completed the PV-Pack research project that focused on inverter concepts after three years of successful collaboration. The goal of the project was to develop alternative solutions in cooling and structure and connection technologies, characterize new materials and optimize these concepts in interactions with inverter system power electronics. With the project results achieved, significantly more compact and cost-effective PV inverters will be possible in the future. The collaborative project was backed by around €1.4 million from the German Federal Ministry of Education and Research (BMBF) as part of its "Power Electronics for Improved Energy Efficiency (LES) Part 2: Electronics for the Energy of the Future" initiative. SMA was responsible for coordinating the project.

Technologically, inverters are the most important components of PV systems. They determine the efficiency and reliability of the entire system. To further strengthen the international competitiveness of the German photovoltaic industry, the technology used in inverters must be continuously improved while innovations in a wide range of relevant areas are also needed to expand the technological advantage of the industry.

Today, mechanical and electromechanical components of connecting, supporting and cooling structures make up 70% of a PV inverter. The goal of the PV-Pack research project was therefore to deal specifically with these elements of structural, connecting and cooling technology to facilitate significantly more compact and cost-effective PV inverters by means of new technologies, materials and optimization methods.

In the close collaboration between science and industry, a wide range of innovations were developed within the context of PV-Pack, and evaluated in a 50 kW technology demonstrator as well as an inverter experimentation platform with innovative silicon carbide semiconductor components. With new approaches to technology and methods, efficient ways for doubling the power density while also considerably reducing costs and maintaining the tried-and-tested SMA device reliability were successfully demonstrated.

Initial partial results of the project, such as the innovative device structure concept, will be incorporated into series-manufactured solar inverters from SMA as early as this year. The knowledge gained about new technological approaches and methodology, and how these can be optimally combined, constitute an important foundation for further preparatory research and future series products created on this basis.

The project has impressively shown that, particularly in mechanical-thermal optimization based on new materials and technologies, there is still considerable untapped potential for further development and the urgently required cost reduction in inverter technology. In addition, the compactness and performance of the devices can again be considerably increased through the use of new silicon carbide components. This, coupled with the new technological solutions created in the project, was evidenced through the resulting fully-functional laboratory inverter. The outcomes achieved in the interdisciplinary PV-Pack research project will thus help German industry stand its ground against increasingly tough international competition and maintain Germany as a production site.

Participating Partners

SMA Solar Technology AG

The SMA Group with anticipated sales of about €1 billion in 2016 is the global market leader for solar inverters, a key component of all PV plants, and offers innovative key technologies for future power supply structures. It is headquartered in Niestetal, near Kassel, Germany, and is represented in 20 countries. The Group employs more than 3,000 people worldwide. SMA has an extensive range of products, which offers the right inverters for all module types and plant sizes; for small residential systems as well as large-scale plants, grid-connected photovoltaic systems as well as off-grid and hybrid systems. Moreover, SMA offers system technology for various battery technologies and system sizes and collaborates with renowned battery manufacturers and companies from the automotive industry. The SMA technology is protected by about 700 patents and utility models worldwide. The range of services is supplemented by comprehensive services and operational management of large-scale PV power plants. Since 2008, the Group's parent company, SMA Solar Technology AG, has been listed on the Prime Standard of the Frankfurt Stock Exchange (S92) and is currently the only company in the solar industry that is listed in the TecDAX index.

Fraunhofer Institute for Solar Energy Systems ISE

With a staff of some 1,100, the Freiburg-based Fraunhofer ISE is the largest solar energy research institute in Europe. Fraunhofer ISE is committed to promoting sustainable, economic, safe and socially responsible energy supply systems based on renewable energies. With research focusing on energy efficiency, energy generation, energy distribution and energy storage, it creates the technological foundations for supplying efficient and environmentally sound energy in

industrial, emerging and developing countries. To this end, the institute develops materials, components, systems and processes in a total of five business fields. In addition, the Fraunhofer ISE has multiple certified test centers and other service facilities, and is a member of the Fraunhofer-Gesellschaft, the largest organization for applied research in Europe.

Fraunhofer Institute for Manufacturing Technology and Applied Material Research IFAM

The Fraunhofer IFAM is actively involved in research and development in the areas of shaping and functional materials as well as adhesive bonding technology and surfaces. The institute employs more than 550 people, over 90% of them work in scientific and technical fields. The institute divisions "Shaping and Functional Materials" and "Adhesive Bonding Technology and Surfaces" are among the largest neutral, independent facilities in Europe. The Fraunhofer IFAM belongs to the association of 69 independent research facilities that make up the not-for-profit Fraunhofer Gesellschaft company.

Phoenix Contact GmbH & Co. KG

Phoenix Contact is a global market leader in components, systems and solutions for electrical engineering, electronics and automation. The family-owned company currently employs 14,800 people worldwide and generated €1.97 billion in sales in 2016. It is headquartered in the North Rhine-Westphalian town of Blomberg, Germany. The Phoenix Contact Group comprises 12 companies in Germany and 50 sales subsidiaries all over the world. The company's global presence is also maintained by 30 agencies throughout Europe and overseas. It services the specific needs of the automotive, renewable energy and infrastructure markets through integrated solution concepts that include engineering, service and training. In close collaboration with higher education and research institutions, future technologies such as e-mobility and environmental technologies are researched and then transformed into commercially viable products, systems and solutions.

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