SMA Solar Technology AG – Press Release

Giga-PV Research Project Successfully Concluded: Cost Reduction for PV Power Plants in the Earth's Sun Belt

Niestetal, May 4, 2016 – SMA Solar Technology AG (SMA), TÜV Rheinland and the University of Kassel have, after four years of successful research, completed the collaborative Giga-PV project initiated to optimize large-scale PV power plants for installation in the Earth's sun belt regions. Achievements include optimum adaptation of individual components to extreme ambient conditions, a new basis for testing and certifying PV inverters and additional cost reductions for PV power plants. Results of the SMA coordinated research project have already been incorporated into new products and form the scientific basis for future innovations.

The Giga-PV research project was supported with approximately €2 million by the Federal Ministry of Education and Research. SMA, TÜV Rheinland and the University of Kassel collaborated closely with PV module manufacturer Hanwha Q.CELLS as an associate partner. Together, they collectively worked to achieve a significant reduction in costs for large-scale PV power plants installed in the Earth's sun belt and to optimize system concepts, PV modules and inverters. The project is one of many collaborative research projects supported by the Federal Ministry of Education and Research and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety within the framework of the "Innovationsallianz Photovoltaik" (Alliance for Innovation in Photovoltaics). The project's success helps strengthen the German photovoltaics industry's lead in innovation, increase the country's export potential and develop future growth markets.

"SMA has already applied results from the research project to the development of an innovative, robust 2.5-megawatt PV inverter for direct voltage of 1,500 V," said Jürgen Reinert, SMA Board Member for Operations und Technology. "The Sunny Central 2500-EV inverter is distinguished by its high power, exceptional robustness and climate-resistance for locations in the Earth's sun belt. The innovative 1,500-V approach also offers additional system cost advantages compared to conventional 1,000-V PV power plant technology and creates substantial cost reductions."

Background: The Earth's sun belt offers superb conditions to harvest solar power. Large-scale PV power plants with power in the gigawatt range that span several square kilometers and feed electric current directly into the high-voltage grid are especially well-suited for this purpose. However, the often extreme climate conditions on-site present a challenge to the plants and their components. These PV plants must be optimized to withstand extreme heat, monsoon rains and desert storms, and at the same time remain economically viable. Against this backdrop, the project oversaw the development of fundamental insights for future, large, cost-optimized and robust PV central inverters in the

megawatt class, which were redesigned to accommodate to the specific demands of this application area; comprehensive, optimized large-scale PV power plant system concepts; and testing and certification procedures for the corresponding inverters. A functional inverter model was also developed as a demonstration and tested in the laboratory and in the field.

Participating Partners

Project Management: SMA Solar Technology AG

The SMA Group with sales of €1 billion in 2015 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 3,500 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.

TÜV Rheinland

Founded more than 140 years ago, TÜV Rheinland is a global leader in independent inspection services. The group employs 19,300 people in 69 countries around the world. They generate an annual turnover of €1.7 billion. The independent experts stand for quality and safety for people, technology and the environment in nearly all aspects of life. TÜV Rheinland inspects technical equipment, products and services, oversees projects and helps shape processes for companies. Its experts train people in a wide range of careers and industries. To this end, TÜV Rheinland employs a global network of approved laboratories, testing and education centers. Since 2006, TÜV Rheinland has been a member of the United Nations Global Compact to promote sustainability and combat corruption. Website: www.tuv.com.

University of Kassel

The University of Kassel was founded in 1971. Currently 23,800 students are enrolled in 10 faculties with a total of 3,500 employees. Its academic profile is characterized by a specific combination of competencies concentrated on topics in nature, technology, culture and society. The University of Kassel boasts a distinctive profile in the area of research and education in the environmental field. The Centre of Competence for Distributed Electric Power Technology

(KDEE) of the University of Kassel, founded by Prof. Peter Zacharias in 2009, deals with device-oriented energy system technology for use of renewable energy, with a special focus on power electronics in hybrid systems, the distribution grid, decentralized energy conversion and on mobile energy supply systems. KDEE's Faculty of Electrical Energy Supply Systems (EVS) currently employs 20 staff members and numerous student assistants. The Center for Environmental Systems Research (CESR) was founded in 1994 and deals with topics relevant to the environment, specifically in relation to climate change issues. Theoretical approaches as well as model building and simulation methods form the focus of research at the center.

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