

PRESS RELEASE

A new smart grid laboratory for the Electrical Energy Research Center CEPEL in Brazil

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An important technical step for a new smart grid laboratory at Cepel in Brazil has been successfully designed by Cepel together with the German Fraunhofer Institutes IWES in Kassel and FOKUS in Berlin. This laboratory will be able to assess the interoperability between all system components and compliance with relevant standards. Several test areas have been developed for equipment and hybrid systems with decentralized energy resource components. The setup of this national reference laboratory in the region of Rio de Janeiro can now go ahead.

In order to increase the shares of renewable energy (RE) and decentralized energy resources (DER) in electricity grids, the characteristics of new grid structures and the behavior of required components need to be evaluated. A powerful laboratory is required in order to do this, which needs to be capable of assessing the interoperability between all system components as well as the compliance with relevant standards.

To implement such a smart grid laboratory in Brazil at Eletrobras Cepel, the Electric Energy Research Center in Rio de Janeiro and the Fraunhofer-Gesellschaft agreed in 2016 to cooperate both technically and scientifically. The service has been provided by the Fraunhofer Institute for Wind Energy and Energy System Technology IWES in Kassel and the Fraunhofer Institute for Open Communication Systems FOKUS in Berlin and the cooperation has been funded by the Brazilian Energy and Mineral Sectors Strengthening Project (META project).

Within this cooperation between Cepel and Fraunhofer, a new smart grid laboratory has been designed. Based on an analysis of requirements, several application areas for the smart grid laboratory such as component testing, hybrid and micro grid system testing as well as experimental research were all considered in the design phase. The planning phase of the laboratory has been successfully concluded. As a result of several workshops, the scope of testing services and research activities were able to be defined and the required laboratory infrastructure and equipment specified. Thus fulfilling an important prerequisite for the technical setup of the laboratory, which will be in the region of Rio de Janeiro.

The new smart grid laboratory in Brazil is planned to be the national reference laboratory. In order to introduce new technologies into an electrical system, it is necessary to anticipate possible malfunctions and to verify the compliance of components and systems with applicable standards and grid codes. At the same time, the laboratory can be used for research and development of new technologies.

The new laboratory will provide a component test area for equipment up to 2 MVA in the final stage (e.g. photovoltaic inverters). Furthermore a test environment for hybrid systems has been designed with various DER components (e.g. photovoltaics and battery inverter together with diesel generators). The behavior of individual components in system context can be investigated within a

power hardware in the loop (PHIL) test stand. Finally communication standards and protocol implementations used in smart grids can be evaluated in a dedicated information and communications technology (ICT) test environment.

Cepel is the largest electrical energy research institution in South America and part of the Brazilian company »Eletrobras – Centrais Elétricas Brasileiras S.A.«. Cepel's mission is to deploy and develop sustainable technology solutions for the transmission, generation and distribution of electricity for the Brazilian electricity sector. Cepel maintains 34 laboratories, performing a variety of experiments and tests.

The Fraunhofer-Gesellschaft is the leading organization for applied research in Europe. Its research activities are conducted by 69 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of 24,500, who work with an annual research budget totaling 2.1 billion euros. Of this sum, 1.9 billion euros is generated through contract research. More than 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

The institute **Fraunhofer IWES** in Kassel mainly researches on energy economics and energy system technology. It develops solutions for the challenges faced by the transformation of energy systems. The Institute has extensive testing and experimental facilities, laboratories, and state-of-the-art equipment mainly in Germany and supports system technology developments in renewable energy worldwide.

The institute **Fraunhofer FOKUS** in Berlin develops solutions for the digital networking, with the requirement to make the networked world safe, reliable, scalable and trustworthy. Fraunhofer FOKUS is developing methods and tools for ascertaining the requirements of the ICT-based solutions, as well as their design, specifications, implementation and quality management for effective technical systems in the city of the future.

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»Control room of the high-current laboratory at Cepel«

Source: Fraunhofer IWES | Norbert Henze