Innovative ways to keep the lights on.

Unique testing for distributed components and sustainable energy systems.

The key issue in Europe at the outset of the 21st century is energy security. Against a background of climate change, a deregulated electricity market and increasingly complex grids, the question whether the lights will go out or not is a very real one. At present, power electronics are rarely used in the grid. However, it is precisely these components that can enhance the control and management of power flows and lead to smarter uses of grids to prevent instability and failure. Power electronics will be indispensable in the grid of the future.

Manufacturers do, of course, produce power electronics, but grid operators are reluctant to include them in their networks, because they are an unknown quantity when it comes to reliability and safety. Operators simply can't afford to risk introducing a component with inverters which generate harmonics that may cause a blackout or brownout. What's more, grids are becoming increasingly complex, due to distributed generation, including wind power as well as micro and mini-combined sources of heat and power.

Advance Testing

The new Flex Power Grid Lab offers a solution to this dilemma. This advanced research facility makes it possible to test an extremely wide range of power electronics. With it you can build a live representation of a real grid, with real components, plus all of the features that you want to test them against.
Once equipment has been tested under complex realistic conditions, manufacturers and grid owners can have absolute confidence that it will work in a real-life situation. For example, the short-circuit behavior of distributed generators can be tested in a grid with added harmonics, voltage dips as well as frequency and voltage variations.

Unique Facility

There are plenty of labs that are able to test low-voltage equipment or components at high power for (milli)seconds. However, the complex and sophisticated Flex Power Grid Lab can test equipment continuously at industrial medium voltages (10 times higher than at other labs), and the converter acts as a giant 1 MVA amplifier with a capacity 10 times that used at the biggest pop concerts and available at other labs. The Flex power Grid Lab will house a wide range of capacitors, resistors and reactors for use as loads. However, it is the intelligent control equipment – used for sophisticated matching – that makes the lab unique worldwide.

High Power

The lab will be able to test components in the power class 1-3 MW, a voltage level of 4 kV and a bandwidth of 3 kHz. The programmable converter that forms the heart of the lab can create virtually any predefined poor-quality network. Distributed Energy Resources (DER) tests can then be carried out to meet the needs of a wide range of clients in accordance with standards such as IEEE 1547 and EN 50160. For instance, companies that make rail traction systems, large wind turbines and converters for distributed generation equipment. But equally a yacht manufacturer with a power requirement in excess of 100kVA in a boat grid environment.

Future Systems

As part of the transition to smart, intelligent grids, smart power electronic components can sense the voltage in the grid and make automatic adjustments as needed. However, if two such components are located close to each other, unstable oscillations may develop and eventually shut down the grid. The new lab will be able to simulate such a situation and allow researchers to find ways to keep the power flowing. This capability will be essential for investigating and testing the distributed systems of the future.

A sustainable grid in 2050 will need to be clean, affordable, practical, energy-efficient and secure. The Flex Power Grid Lab opens up a transition path towards such a sustainable system in which grid operators can ensure that the lights will continue to burn.

Public-Private Partnership

The new Flex Power Grid Lab is a 50/50 public-private partnership between the Technical Universities of Delft and Eindhoven and the Dutch Energy Research Center ECN and KEMA. It will be run by a foundation that will ensure equitable use of the facilities.

Whereas the universities will engage in pure research projects, such as smart grids, intelligent distributed substations, short-circuit behavior of distributed generators and developing new semiconductor switches, KEMA will be able to provide its clients with a unique testing environment in which power supply efficiency as well as long-term scenarios for sustainable energy systems can be tested. A simulator at Delft University that will be linked to the lab will in future have the capability to manage sophisticated, diverse grids.

For more information:
KEMA
P.O. Box 9035
6800 ET Arnhem
The Netherlands
T +31 26 3 56 22 00
F +31 26 3 89 24 77
contact@kema.com
www.kema.com

KCE.8016
R&H.04