Smart software for self-regulating smart grid

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Siemens and the utility company Allgauer Uberlandwerk (AUW) in the city of Kempten, Germany, are testing the smart grids of the future. The tests focus on optimized power distribution and the use of a self-organizing energy automation system for efficient network operation. To test a smart grid in practice, Siemens, AÜW, the RWTH university in Aachen, and Kempten College have together agreed to conduct a two-year project called "Irene" (Integration of renewable energies and electric mobility), which receives funding from Germany's Ministry of Economics.AÜW's plans call for incorporating many photovoltaic systems, wind turbines, and biogas facilities into its distribution network northeast of Kempten, and for creating a charging infrastructure for electric vehicles. The electric vehicles will serve as energy storage systems that can offset peak loads by feeding electricity into the grid if necessary in order to stabilize the power network.

Siemens' role in this smart grid pilot project involves installation of software developed by its global research Corporate Technology. The solution increases the share of green electricity in the grid by simplifying the process of feeding renewable energies into the network. Electricity was previously supplied for the most part by large power plants, with centralized distribution by means of a relatively simple grid structure. The inclusion of a growing number of small, decentralized power stations such as photovoltaic units and biogas facilities, however, is making the load control structure and the system for maintaining network stability more complex. Self-organizing energy automation systems will be used for this purpose in the future, which will make it possible to profitably operate even very intricate power grids.

The software from Siemens helps to balance the electricity supply and demand. Key components of this solution are special embedded systems that support all of the energy producers and consumers in the network and simplify the control process. The software must be able to communicate with not only the electric vehicle charging infrastructure, but also with a very wide array of equipment, including generators, converters, and controls, which often use different protocols. The smart grid solution integrates all of the electricity market players by regulating the interplay between power generation, storage, network management, and consumption. The system uses market-like control mechanisms to balance the electricity supply and demand, enabling the grid to sensibly offset peaks in supply and demand on its own. As a result, energy suppliers can market electricity efficiently, network operators can smooth load distribution, and electricity customers can cut costs because their consumption patterns become transparent and they benefit from lower rates.

Provided by Siemens AG