

Smart Grids

Smart grids are needed to meet climate protection objectives

Munich / Mannheim, February 17, 2009 – Renewable energy sources are supposed to cover 35 percent of the European Union's energy demand by 2020. Even though wind power has been greatly expanded in the last 15 years, sources of renewable energy still only supply about 15 percent of the electricity in Germany today. This ratio is an impressive illustration of how much work is left to be done in the form of changes to the electrical power supply if the objectives of the European Union are to be met. For this reason, "smart grids" are an important part of the solution to meeting climate protection objectives.

In addition to increasing energy efficiency, cogeneration – preferably distributed - and renewable energy sources are the most important tools in reaching climate protection goals. Both types of power generation are similar in that, in contrast to conventional power generation, they are not primarily driven by electrical load, but rather by the need for heat on the one hand, and the sources of renewable energy on the other. Therefore, to keep operation as efficient as possible, the aim is to ensure that any electric power generated is also consumed.

However, to be able to increase the share of renewable energy sources in the amount of power generated, e.g. by wind power, the installed power must be so high that the load more frequently will not be sufficient to take in the generated energy. With a very high percentage of external subsystems, measures are required to ensure the utilization of the generating plants:

- The generated power is initially distributed regionally. This has been the case in Germany up until now; meanwhile, nearly 25,000 MW of installed wind power is not needed by the consumers in their area. However, the limits of power transmission capacity on the existing grid have also been reached now and expansion is unavoidable.
- The next step to ensure the balance between load and generation could be energy storage. At least in the case of wind power, an important factor for the current development of the power supply systems, energy can only be stored in the form of electrical energy. However, technologically and economically suitable solutions are not yet available to the extent that is needed.
- The third option is to step away from the principle of following the load in the electrical power supply systems. Electrical equipment in many cases has energy storing capacity, e.g. all devices for heating or refrigeration, or even all electronic devices with rechargeable batteries and eventually electric cars. The power input to these devices can take place with delay or in advance. With further expansion of renewable energy sources, the integration of the load into the system management will likely be the most economic solution for balancing load and power generation. For this reason this is the core element of smart grids, the electrical power supply systems of the future.

Smart grids will be able to integrate all types of distributed generating systems. They will offer transmission capacity for large power plants based on renewable energy sources and directly integrate devices to balance load and power generation. This development will increase the importance of communication and information technology – even down to the individual appliances and devices. In the future, instead of system management based on historical empirical values, real-time data coming from many more information sources will be more relevant. Here, “smart metering”, i.e. equipping appliances and devices with meters that have bidirectional communication capabilities, will take on a key role.

In Germany, and in many other countries as well, work is currently being done to set up this infrastructure. New system management concepts based on this will be developed and tested in the coming years so that by 2020 the grid-side requirements for reaching the climate protection goals will have been met. ABB is participating in numerous pilot and research projects in this area across the globe. One example of this is the MEREGIO (Minimum Emission REGION) project. With MEREGIO, ABB, EnBW, IBM, SAP and the University of Karlsruhe aim over the next four years to show how system operation in a distribution network can be possible, with minimum CO₂ emissions, in the integration of decentralized power generation and renewable energy sources by using modern information technology such as that seen in real-time price signals to consumers.

Images:

Vor-PK 2009_02A.jpg:

Schematic representation of traditional grids with centralized power generation.

Vor-PK 2009_02B.jpg:

Schematic representation of smart grids with centralized and decentralized power generation.

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