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Presentation S2-0:

Energy Storage – Key to a sustainable Power Supply

Due to the world's growing population energy consumption will further increase, especially in the emerging countries. Today's energy supply and power generation is dominated by fossil fuels and nuclear power. Power generation from renewable energies contributes only to a minor part to the electricity supply. Due to climate change concerns the emission of the greenhouse gas CO₂ will be restricted. On the other hand, the use and acceptance of the CO₂-free nuclear power generation are seriously affected by safety concerns. Related to the actual situation of the damaged nuclear power plant in Fukushima an accelerated transformation towards an increased utilization of renewable energies and how to achieve this goal for Germany is widely discussed in the public. However, the integration of a major share of renewable energy sources for power generation is a real challenge to the existing power grid. This is due to the spatial separation between generation and consumption, and the fluctuating character of the renewable energy sources. Smart grid technologies will enable distribution grids to provide a stable and robust energy supply from heterogeneous, distributed and fluctuating power generation. Besides this intelligent feature of the grid, excess energy from the fluctuating renewable sources has to be stored in suitable storage facilities. Among the technologies available for energy storage, the preferred choice depends on application-specific technical requirements but also on economic aspects, such as invest and costs for operation/maintenance.

Based on the actual discussion of the energy policy in Germany, the presentation will describe today's status of the power grid in Germany and ways how to integrate a major share of renewable energies into the existing power grid. As energy storage turns out to be a key issue for the integration of renewable energies, the focus is put on available options for energy storage capacity. An important question to be discussed is: how much storage capacity is needed for the case of up to 100 % renewable energy supply, and if such an option would be feasible? A comparison of the technical and economic aspects of energy storage is illustrated by specific examples based on several energy storage technologies. It will be shown that hydrogen is a flexible and easily storable energy carrier. In combination with the greenhouse gas CO₂, the utilization of H₂ allows innovative solutions for a sustainable energy supply, and could open up new business opportunities and solutions for power utilities and other industrial branches.