

Energy storage

Company Core Technology

Background

The growing contribution of renewable energies to the production of electricity worldwide is playing a significant role in cutting CO₂ emission levels across the globe. The challenge we now face is making our energy system flexible enough to cope with this transition. One possible solution is to use energy storage systems. By storing electricity in times with adequate wind and sun, and then feeding this power into the grid on windless and cloudy days, such energy storage systems can bring about a balance between production and demand and remove any rigid temporal connection between the two.

Importance for Siemens

Storage technologies are differentiated according to the amount of energy that can be stored and the length of time it can be stored for. Batteries and flywheel storage systems are examples of conventional methods used to store energy for short-term periods of minutes or hours. When it comes to mass storage of energy for longer periods, pumped-storage power plants are employed or hydrogen produced as an energy vector.

Siemens is working on the development of various storage technologies, and is focusing on three main areas:

- PEM hydrogen electrolysis (based on the Proton Exchange Membrane) converts water to oxygen and hydrogen using electrical energy. The resulting hydrogen can then be used as a storage medium, as CO₂-neutral fuel or as a basic material for many industrial applications.
- Carbon monoxide electrolysis exploits the potential of hydrocarbon storage. It uses electrolysis technology powered by renewable electricity to convert carbon dioxide to carbon monoxide – to be employed as "green" fuel or as a material in the chemical industry.
- The third approach is to convert nitrogen and hydrogen into ammonia. As well as being burnt as a fuel, ammonia can be employed in the fertilizer industry or used for transporting hydrogen over long distances.



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Success stories and research focus

These development activities at Siemens have already delivered encouraging results. Several PEM hydrogen electrolysis plants are already in continuous operation at customer sites across Europe. The currently largest PEM electrolysis plant is operating at an oil refinery in Hamburg, with an output of 5 megawatts. In Austria, Siemens is partnering with several other companies to construct the first facility of the new Silyzer 300 product generation, producing 6 megawatts.

In the area of carbon monoxide electrolysis, Siemens researchers are working on creating materials out of harmful greenhouse gas, so furthering environmentally-friendly mobility. They have built a pilot plant that requires 5 kilowatt-hours of electricity to create 1 kg of carbon monoxide.

Near Oxford, UK, Siemens has set up a full-scale demonstration plant for the creation and utilization of ammonia. Nitrogen and hydrogen are created using renewable energy. These are then synthesized to ammonia and reconverted to electricity using an innovative gas engine.

Further information

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