

WindEnergy Hamburg, Hall 6, Booth B6.362

Siemens presents thermal storage solution for wind energy

- **Highly economic concept based on tried and trusted main components**
- **FES research project with Hamburg Energie and TU Hamburg-Harburg**
- **Funded by the German Federal Ministry for Economic Affairs and Energy**

Siemens is developing economic storage technology: alongside Technical University Hamburg Harburg (TUHH) and urban utility company Hamburg Energie, Siemens is researching a storage solution in the Northern German city that will set a future standard in efficiency. After having been converted to heat in rock fill, excess wind energy is stored and protected with an insulated cover. When there is a need for additional electricity, a steam turbine converts the heat energy back to electricity. The simple principle of this store promises an extremely low-cost set-up. The project has therefore received research funding from the German Federal Ministry for Economic Affairs and Energy.

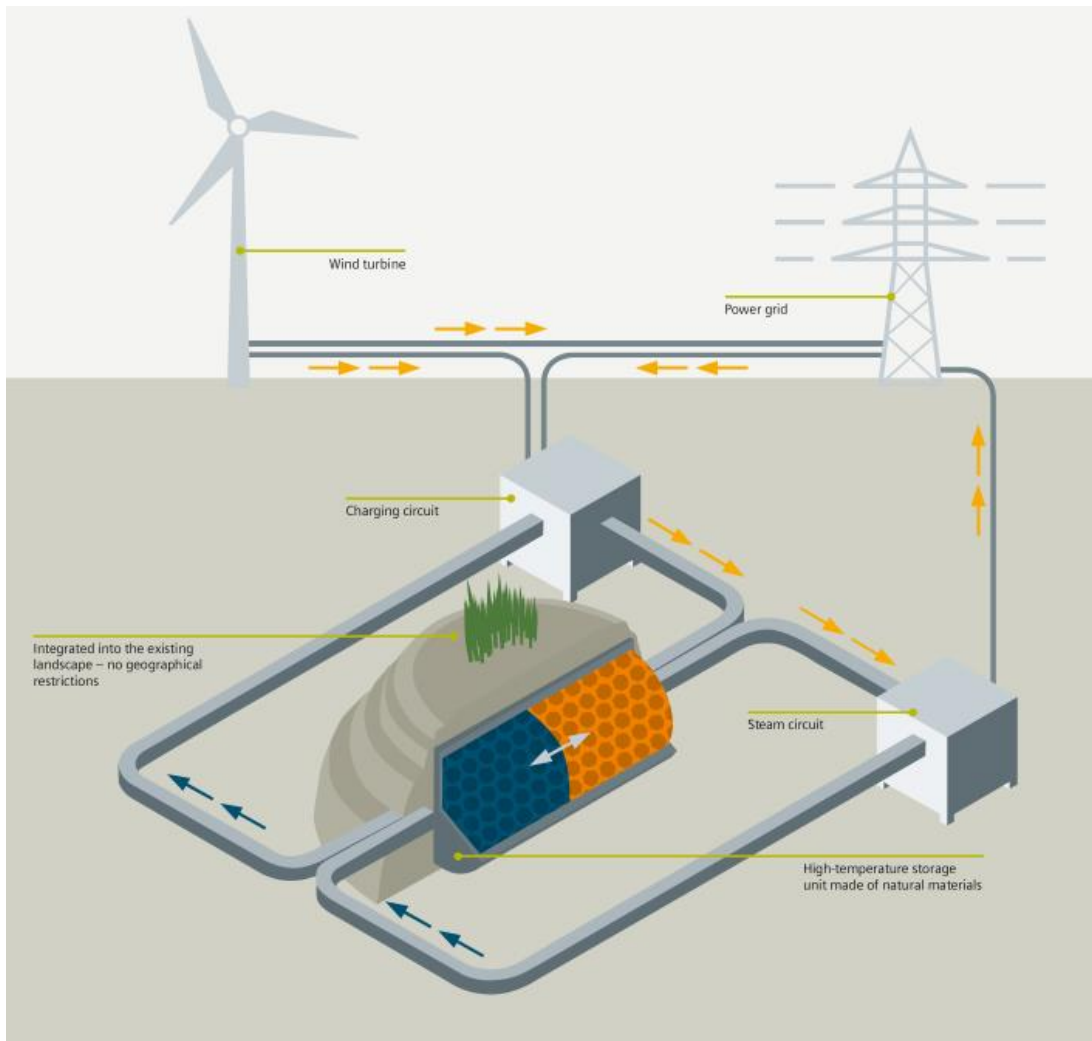
Siemens is currently operating a test set-up for the storage solution, named Future Energy Solution (FES), at Hamburg-Bergedorf. Alongside scientists from the TUHH Institute for Thermofluid Dynamics, the company is researching how to make charging and discharging the store particularly efficient. The arrangement of the rock fill and the form of the surrounding insulating container are crucial. The store is being tested at temperatures over 600 degrees Celsius. Just like a hot air gun, a fan uses an electrically-heated air flow to heat the stones to the desired temperature. When discharging, the hot stones in turn heat the air current, which then heats a steam boiler; its pressure drives a generator via a steam turbine.

As the current test set-up only tests the thermal requirements for the storage process, no reverse current is generated,. However, researchers wish to test the complete energy conversion in spring 2017: from electricity to heat storage in the

rock fill and back to electricity. They are establishing a complete thermal store on the Trimet aluminum smelter site in Hamburg-Altenwerder to the south of the River Elbe on the German A7 highway. The full-size FES will be able to store around 36 megawatt hours (MWh) of energy in a container with around 2,000 cubic meters of rock. Via a boiler, the heat it contains will generate so much steam that a Siemens compact steam turbine can generate output of up to 1.5 megawatts of electricity for up to 24 hours a day. The researchers expect to generate effectiveness of around 25% even in this early development phase. In the future the concept has the potential for an effectiveness of around 50%. Partner Hamburg Energie will investigate appropriate marketing options for the stored energy.

“The technology of our FES store deliberately uses mainly tried and trusted technology,” says Till Barmeier, Siemens’ project manager. “Because we are working here with tested thermal components and a series-ready steam turbine, we will be able to offer a practical solution within a few years. Our complete experimental system will be operational in just around 15 months.”

Whereas many other stores generate high costs or only permit limited storage capacities, the FES technology can be used in the most varied of sizes and output classes, and therefore always remains extremely economical. The only limit to the concept is the space required for the rock-filled insulated container.



Future Energy Solution research project

The thermal store for wind energy, which is being developed in Hamburg, is a joint project between Siemens, Hamburg Energie and TUHH. The German Federal Ministry for Economic Affairs and Energy is funding the project.

This press release, a press picture and further material is available at:

www.siemens.com/press/PR2016090419WPEN

For further information on Siemens' presented innovations at WindEnergy Hamburg, please see:

<http://www.siemens.com/press/WindEnergy2016>

For further information on Siemens Wind Power and Renewables, please see:

www.siemens.com/wind

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Phone: +49 40 2889-8842; E-mail: bernd.eilitz@siemens.comFollow us on Twitter at: www.twitter.com/siemens_press**About Hamburg Energie**

HAMBURG ENERGIE is Hamburg's municipal utility and - as a 100 percent subsidiary of HAMBURG WASSER - fully owned by the City of Hamburg. The company's goal is a safe and environmentally friendly energy supply for all citizens and businesses in the metropolitan region of Hamburg. Thereby, HAMBURG ENERGIE refuses to use coal and nuclear power, and thus only provides energy from natural, renewable sources. Since its inception in 2009, the company also invests in the regional development of a sustainable energy supply directly in Hamburg and the surrounding area - for example, with own solar and wind power plants, which make use of the potential locally. Thus, the products of HAMBURG ENERGIE provide real environmental benefit and strengthen the business area Hamburg. As of today, the company produces some 90 million kWh of electricity in a total of 53 own plants - equivalent to the requirement of about 32,000 households. Thus, the company increases the proportion of renewable energy in the Hanseatic city, supports the regional economy and creates jobs with a future. In addition, HAMBURG ENERGIE is involved in various research projects, particularly in the areas of virtual power plants, smart grids, balancing energy and energy efficiency, for an intelligent and innovative implementation of the Energiewende in Germany.

Siemens AG (Berlin and Munich) is a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability and internationality for more than 165 years. The company is active in more than 200 countries, focusing on the areas of electrification, automation and digitalization. One of the world's largest producers of energy-efficient, resource-saving technologies, Siemens is No. 1 in offshore wind turbine construction, a leading supplier of gas and steam turbines for power generation, a major provider of power transmission solutions and a pioneer in infrastructure solutions as well as automation, drive and software solutions for industry. The company is also a leading provider of medical imaging equipment – such as computed tomography and magnetic resonance imaging systems – and a leader in laboratory diagnostics as well as clinical IT. In fiscal 2015, which ended on September 30, 2015, Siemens generated revenue of €75.6 billion and net income of €7.4 billion. At the end of September 2015, the company had around 348,000 employees worldwide. Further information is available on the Internet at www.siemens.com.