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RWE`s former, current and possible future energy storage applications

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Abstract

Energy storage provides a wide range of beneficial services and cost savings for an electric grid. We at RWE deploy storage technologies for a number of different purposes. Moreover, energy storage allows electrical systems to run more efficiently, and greater efficiency often means lower prices, less emissions and more reliability.

Conventional power stations such as lignite, coal or gas have to be turned on and off as the demand fluctuates, and are not likely to operate at optimum efficiency. This means that energy does not only costs more, but also produces more greenhouse gases than necessary to meet our energy needs. Therefore energy storage is a very good solution to interact in conjunction with conventional and renewable energy resources.

Some of the storage technologies in the RWE portfolio will be further discussed during the panel discussion.

Pumped Hydro utilises elevation changes to store off-peak electricity for later use. Water is pumped from a lower reservoir to a reservoir at a higher elevation during off-peak periods. Subsequently, water is allowed to flow back down to the lower reservoir, generating electricity in a fashion similar to a conventional hydropower plant. RWE`s pumped hydro sites include Herdecke (153 MW) and Schluchseewerk (1,836 MW).

Power to Hydrogen storage uses hydrogen as an energy carrier to store electricity, for example through electrolysis. Electricity is converted, stored, and then re-converted into the desired end-use form (e.g. electricity, heat, or liquid fuel). RWE`s demonstration project is located at Ibbenbüren (150 kW_{el}, production of 30 Nm³/h).

Power to Heat is a generic term used to describe technologies, which are using electricity to generate thermal energy. These technologies can be small scale heating rods in residential use or even electrode boilers in industrial scale. Consortium including Innogy and Kraftwerke Mainz-Wiesbaden run an electric boiler rated 40 MW_{el}.

Compressed air energy storage (CAES) systems use off-peak electricity to compress air, storing it in underground caverns or storage tanks. This air is later released to a gas expansion turbine to generate electricity during peak periods. The Huntorf power station in Germany is rated 321 MW / 640 MWh.

Lithium-ion Battery is an energy storage system based on electrochemical reactions that occur between a positive electrode (anode) containing some lithiated metal oxide and a negative electrode (cathode) made of carbon material or metal oxide. Such battery storage is a 6 MW lithium-ion battery installed at Herdecke pumped hydro site.