

REGULATORY BARRIERS TO ENERGY STORAGE TECHNOLOGIES

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Overview

Under Directive 2009/28/EC, binding goals are set for 2020, in which renewable energy will have to hold a 20 % share in the final European energy demand, in which electricity generation is expected to bear the largest burden with 34.3 % of total electricity demand with renewable energy sources (RES). Annual installations of RES, being wind, PV, hydro, and biomass, have increased significantly over the past decennia in Europe, resulting in a total installed capacity of respectively 101.6 GW, 67.5 GW, 159.6 GW and 19.1 GW at the end of 2012. The presence of variable renewable power generation technologies increases the need for system flexibility, due to the large variability of their power output profile. As flexibility providers, electricity storage facilities are currently under discussion in Europe to facilitate this large-scale integration of variable RES. The status of storage infrastructure in Europe shows that currently there is only a limited amount of storage available, of which the majority are pumped hydroelectric storage units located in mountainous areas. Besides issues regarding the status of the storage technology and the financial business case, an important factor influencing the deployment of electricity storage facilities is its regulatory framework. Studying the regulatory framework for energy storage is of fundamental importance as the very existence of markets can entirely depend on regulatory decisions. This work analyzes the current general European framework relevant to electricity storage, and discusses this in comparison with the most important country-level regulatory decisions influencing the energy storage business case.

Methods

Assuming the need for electricity storage facilities, the search for viable business models starts by analyzing the current regulatory context. Therefore, the aim of this work is to identify the regulatory framework and possible regulatory barriers to the effective implementation of energy storage technologies. This is first done at a broader European level and afterwards at a more national level, by analyzing official European documents (e.g. Communications and Directives) and European, industrial, academic, and governmental reports on this matter. After having analyzed the current EC framework for electricity storage, the main insights and conclusions are discussed to a deeper extent. Afterwards, these insights and conclusions from the current EC framework regarding energy storage are compared to the regulatory situation for energy storage on a more national-level in Europe, in order to identify mismatches between the EC and national frameworks, and possible gaps and barriers obstructing the widespread integration of energy storage technologies into the power system.

Results

When analyzing the EC framework for electricity storage, two important observations can be made. First, electricity storage is treated as generation capacity, which has consequences for the storage ownership according to the unbundling principle. Second, electricity storage is viewed upon as a key mean to accomplish Europe's RES goals, as it is one of the flexibility providers, but is not a goal as such.

At the national level, four regulatory-based topics were analyzed, with each having an impact on the business case for energy storage technologies. First, disadvantageous grid fees may hamper the profitable operation of storage plants. Second, certain technical specifications of ancillary services' products can pose barriers for electricity storage plants. Third, market design also influences the business case of storage technologies. Fourth, capacity mechanisms can prove to be a source of revenues for storage systems if allowed to participate, but the implementation of capacity mechanisms can also pose a significant threat. Fifth, existing support schemes for energy storage are discussed as some storage projects lack commercial viability but contribute to the lifting of energy isolation, security of supply, innovative technological solutions, and other benefits for society.

Conclusions

After having analyzed the EC and national regulatory frameworks, multiple possible barriers and gaps contributing to the explanation why storage is not widely available yet in European power systems can be identified. Although there undoubtedly also exist techno-economic difficulties, the regulatory status has to be taken into account when analyzing the business case for new energy storage plants, as it has the ability to influence the possible applications and profitability of the storage technologies.

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