**US Congressional Action Could Help Advance Energy Storage Technologies**

*by Kelly Kogan, Chadbourne & Parke* | January 24, 2014

Energy storage may be the next big thing on the energy horizon. Energy storage technologies provide for multiple applications, ranging from the integration of renewable energy into the grid to maintaining grid stability and reliability. Yet challenges to achieving the full potential of these technologies remain. Two bills currently pending in Congress could go a long way in addressing some of those challenges.

**Renewable Energy Integration**

The most frequently touted benefit of energy storage is its potential for integrating power generated from renewable energy into the grid. Electricity derived from renewable sources, such as wind and solar, is intermittent — the amount produced varies from moment to moment depending on the time of day and the prevailing weather conditions.

Maintaining grid stability, on the other hand, requires that the amount of electricity generated and delivered to the grid remain roughly equal to end user demand (also called load) at all times. One way grid operators maintain this balance is by ramping up and down fossil fuel-based electric generation in order to offset the rise and fall of electric generation from renewable energy sources. Energy storage can achieve this smoothing effect without the use of fossil fuel-based generation by “time-shifting” the delivery of renewable energy: it can absorb excess electricity that is generated when the wind is blowing or the sun is shining and then discharge that electricity when the wind stops blowing or the sun disappears behind a cloud.

**Ancillary Services**

Energy storage can provide similar benefits to the grid independent of its role in renewable energy integration. Constant fluctuations in power supply and demand require various “ancillary services” to maintain grid stability and reliability even in the absence of electricity generated from renewable energy sources. For example, frequency regulation service corrects for moment-to-moment mismatches in supply and demand. Load following is characterized by a steady ramping up or down of generation to match larger load changes throughout the day. Reserve service is unused generating capacity that can quickly be called upon to supply power when another generating source unexpectedly goes offline.

Grid operators have traditionally relied on different types of power plants to provide these ancillary services, with the type of plant used dependent on how quickly it can ramp up or down to achieve a particular power level, how long it can maintain a particular power level, and its operating efficiency. Hydroelectric power plants are often used to provide load following service, since they are able to start within minutes and, depending on their water supply, may be able to operate for an extended period of time. Natural gas-fired power plants are used to provide ancillary services that require a more rapid response, such as frequency regulation, since they can rapidly change output but are also among the more expensive to operate. Plants that are operating at partial (rather than full) capacity as well as plants that are offline but can be restarted quickly have generally been used to provide reserve service.

Energy storage has the potential to provide these services as efficiently and cheaply as traditional fossil fuels-based generation but without the corresponding CO2 emissions. Some types of energy storage (*e.g.*, capacitors, lithium-ion batteries, and flywheels) can release or absorb power quickly, making them well suited to provide frequency regulation service. Others (*e.g.*, sodium sulfur batteries and hydrogen storage) are able to maintain a more prolonged discharge of power, making them appropriate for load following and even reserve service.

**Other Benefits**

Finally, energy storage has benefits that can contribute to the overall efficiency of the grid. For example, energy prices can be lowered overall by using energy storage to time-shift inexpensive energy generated during periods of low demand to periods of high demand and correspondingly high prices. Energy storage can also provide extra capacity to regions that are approaching the maximum level of daily or annual load that can be accommodated by the existing infrastructure. This, in turn, can defer the need to upgrade existing grid infrastructure until such expansions are more economically justified.

**Grid Energy Storage Report**

While it is clear that energy storage has the potential to provide numerous benefits to the grid, realization of those benefits still faces many challenges. In a December 2013 report entitled “[Grid Energy Storage](http://energy.gov/oe/downloads/grid-energy-storage-december-2013),” the U.S. Department of Energy (DOE) identified four of these challenges: (1) a limited portfolio of cost competitive energy storage technologies; (2) the lack of processes for evaluating and reporting the performance of existing storage systems on a unified basis; (3) inequities in the regulatory environment, which tend to mute the case for investment in energy storage; and (4) the lack of industry acceptance due to uncertainty about how storage technologies will perform over time in applications. DOE then discussed several steps that it proposed for addressing these challenges. These included supporting R&D and demonstrations of energy storage programs and partnering with State and local governments and other federal agencies to promote equitable regulatory treatment of energy storage technologies.

**STORAGE 2013 Act**

The Grid Energy Storage report focuses on DOE’s contribution to the energy storage landscape, but Congress can also play a part. Two bills promoting energy storage are currently pending in Congress. The first is the STORAGE 2013 Act, which offers tax credits for three categories of energy storage facilities. (The House version ([H.R. 1465](https://www.govtrack.us/congress/bills/113/hr1465/text)) was introduced in April 2013, and a nearly identical version ([S. 1030](https://www.govtrack.us/congress/bills/113/s1030/text)) was introduced in the Senate in May 2013. Earlier versions of both bills ([H.R. 4096](https://www.govtrack.us/congress/bills/112/hr4096/text) and [S. 1845](https://www.govtrack.us/congress/bills/112/s1845/text)) were introduced in the 112th session of Congress, but they died in committee when that session ended at the end of 2012.)