Grid-scale energy storage pristina

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Princeton E-ffiliates Partnership, a membership-based program, offers corporations a unique opportunity to engage in big-picture thinking and to find innovative solutions in energy and the environment. Member companies engage in close collaborations with academic experts to pursue transformational innovations.

The future of renewable energy, primarily wind and solar, is intertwined with the development and deployment of energy storage technologies. This Energy Technology Distillate describes the fundamentals of energy storage, including leading technologies and their challenges, key costs, and important regulatory initiatives that are acting to drive commercial deployment.

Power produced from wind and solar has grown quickly over the past decade. Between 2001 and 2011, global wind capacity grew tenfold and solar electricity capacity grew forty-fold. In 2011, the two sources produced 2.4 percent of the total global supply of electricity. However, further integration of wind and solar into the grid will become increasingly difficult because these sources are both intermittent and unpredictable. Unpredictable sources of power present a challenge for the grid: when a customer turns on a light, high-quality electricity must be available to meet the demand.

Energy storage systems offer a possible solution by absorbing electricity from the grid when it is plentiful and providing electricity to the grid at a later time.

Multi-hour energy storage systems could increase the renewable portion of electricity delivered to customers, and thus significantly reduce greenhouse gas emissions associated with power generation using fossil fuels. Storage also could help overall grid performance, allow better management of conventional power plants, and

provide more options for providing power in emergencies.

Power: how quickly a battery charges and discharges, measured in watts (W). A 100W battery could light a 100W light bulb at full brightness but not drive a 1,500W hairdryer.

As a practical matter, the economic comparison of energy storage to other options currently comes down to the price of natural gas. Gas-fired turbines respond quickly to fluctuations in supply and demand, and are thus an obvious choice for pairing with wind and solar.

Using basic math to factor in both capital and operating costs reveals that the second option is cheapest even when natural gas prices are much higher than they are today. As natural gas prices rise, pairing wind and gas becomes economical; at even higher prices, replacing gas with storage becomes attractive. Adding a carbon tax or other incentives could make storage financially attractive at lower gas prices.

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