

Policy Update: Energy Storage

In 2014, there were a total of 4.1 billion Megawatt-hours (MWh) of electricity produced in the United States. This figure includes electricity produced from coal, petroleum, natural gas, nuclear hydroelectric, wind, solar, and geothermal and has remained relatively steady since 2005, with a low of 3.95 billion MWh in 2009 and a high of 4.16 billion MWh in 2007. How energy is produced, however, has changed dramatically over this time period.

For example, in 2005, coal accounted for nearly 50 percent of electricity generation, while renewable resources (excluding hydroelectric) made up only two percent. In 2014, Coal accounted for 39 percent of electricity generation, while natural gas increased from 19 percent in 2005, to more than 27 percent, and non-hydroelectric renewable resources climbed to seven percent, more than tripling its contribution. As renewables generate a larger share of the energy pie and generation capacity continues to increase, storage and distribution technology needs to keep pace, ensuring these resources are used to their fullest potential.

The Challenge

Wind and solar power generates energy on an intermittent basis. If there is no wind for a particular period of time in the vicinity of a wind farm, the turbines do not rotate and generate electricity. Similarly, in the dark of night, solar panels are unable to use the sun to generate electricity. These resources are fully capable to generate enough energy to contribute a large portion of energy to our nation's total need. The challenge, then, is to find a reliable battery that can store all of the energy produced during hard winds and peak sunshine and distribute that energy when and where the grid needs it most.

Aside from the large-scale need, better storage and a smarter grid would reduce overall energy waste by allowing individual property owners to invest in energy independence. Currently, those who invest in personal net energy independence are still reliant on the grid, because even if enough total energy is produced to maintain their energy needs, it is not produced at the right time. Advanced battery storage systems could resolve this issue and allow landowners to become truly energy independent.

Similarly, in the absence of on-site energy storage, a smarter grid would enable individuals who independently generate enough total electricity to maintain their homes to potentially sell their excess energy back to the provider during peak generation and receive power when generation is not as strong – in essence a neutral swap. But, if the grid is unable to receive and redistribute the property owner's excess energy, this concept is no longer feasible.

The Solution

In the short term, states such as California have found creative ways to best take advantage of intermittent renewable generation. For example, the president of the California Public Utilities Commission recently reported to Bloomberg Business that by strategically placing renewable generation resources and selling off excess power to neighboring states, renewable generation in California is set to be the largest source of energy production in the state. In addition, California generated \$4 million dollars in January and February of this year from selling excess wind and solar power to Nevada.

However, in the longer term, technological advancements are necessary to store power generated

through renewables in commercial quantities and distribute it to the grid as needed. The nation is also in need of a smarter grid that is able to integrate this power when it comes online. The combination of better storage, distribution, and integration will allow the U.S. to fully take advantage of our vast renewable generation capacity, allowing renewables to contribute as more than an intermittent or supplementary energy resource.

Understanding that renewable generation, if only offered on an intermittent basis, is not a viable alternative to fossil generation, scientists, researchers and investors have poured billions of dollars and countless hours of work into building better batteries in hopes of being the first to market. According to Bloomberg Business, \$50 billion per year is being invested worldwide in battery storage technology. With continued investment, innovation, and supportive government policies, renewable energy can and will diversify domestic and global energy generation and consumption.

The Alliance for Innovation and Infrastructure (Aii) is an independent, non-profit alliance focusing on infrastructure innovation through awareness and education.