Energy Storage

Description:

Energy storage can be described in two ways: power capacity and duration. Power capacity is expressed in kilowatts (kW) or megawatts (MW) and duration is expressed in hours. Different energy storage technologies provide different benefits and services to the system because they vary in terms of capacity and duration. This is important when looking at potential applications of energy storage technologies. Storage has distinct roles when providing services on the utility's side of the meter or on the customer side (behind the meter).

Energy storage offers a unique opportunity to manage supply and demand dynamically while also maximizing the value of grid resources. By deploying storage to strategic locations, utilities can more effectively manage their energy portfolios. First, storage allows utilities to manage intermittent demand – helping to flatten peak demand requirements. Second, the responsiveness of energy storage can allow utilities to implement voltage regulation and other ancillary services, which are useful for improving system efficiency. Third, storage can dispatch power to better integrate intermittent power generation resources like renewable energy to the grid.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to a number of economic and environmental gains.

Energy storage can also help the commercial sector avoid demand charges. Demand charges establish an incremental cost above energy usage based on the highest period (highest 15 minutes, for example) of demand during the month. Eliminating spikes in demand with storage can reduce these costly charges for businesses. As utilities around the country consider implementing or extending demand charges to other sectors, energy storage will become more relevant as a customer cost-saving investment.

Discussion of the Policy:

Two major trends have enabled increased deployment of energy storage: declining costs and technological advances. State policies can help maximize these benefits by establishing both a framework for easy integration of energy storage resources onto the grid and a marketplace that monetizes the benefits of energy storage for cost-effective investment. The recommendations below draw heavily from the Interstate Renewable Energy Council's (IREC) 2017 report, by "Charging Ahead – An Energy Storage Guide for Policymakers."

1. Amend existing interconnection and net metering policies to ensure that storage can connect to the grid through a transparent and simple process. IREC has produced a series of interconnection protocols that states can easily adopt. States can establish best practices for interconnection and net metering in statute, or legislation can provide an instruction to the utilities commission to implement these best practices.

2. Clarify the classification of energy storage to encourage utility investment in restructured markets. Most states that have restructured utility markets exclude utility ownership of generation.

3. Instruct the utilities commission to evaluate the value of energy storage in multiple strategic locations across the utility system and consider a requirement to deploy storage where it is cost-effective, or identify the price point at which it will be cost-effective.

4. Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required that utilities evaluate the cost effectiveness of non-wires alternatives (NWAs) to large transmission and generation investments. States can require that utilities evaluate energy storage in their integrated or long-term resource plans. Alternatively, states could require utilities to develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the greatest value.

5. Consider creating a mandatory energy storage procurement target or requirement for energy storage with a documented process for periodic review of progress towards that goal. Procurement targets can include provisions limiting the amount of utility owned storage to be procured, requiring that a certain percent of the storage procurement goal be targeted to low-income customers, and creating carve-outs for specific amounts of storage to be procured at the transmission, distribution, and customer levels. Procurement targets can jump-start market creation, spur fast learning, and guide the development of a regulatory framework.

6. Add energy storage as an eligible technology under existing clean energy policies like renewable portfolio standards or energy efficiency programs. Massachusetts became the first state in the nation to include energy storage in its three-year energy efficiency plan in 2019.

7. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment for storage. These incentives can also be designed to decline as the value of storage becomes more readily monetized, and/or as the cost of storage decreases. Policymakers could allow utilities that provide storage incentives to customers to also recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This should signal to customers the value of leveraging storage while better aligning customer costs with system costs. Financing energy storage installations for commercial customers could help reduce their demand charges. Policymakers might start first with a policy that provides grants to pilot projects, and/or that targets existing solar system owners. Financial incentives should be designed to ensure that the state meets other goals including emissions and peak demand reductions, and equitable access to clean energy.

8. Clear data access policies that allow third parties to provide energy management services based on signals from the utility can greatly increase the value of efforts to monetize the value stream offered by energy storage. State policy should include measures to protect customer data, while also encouraging the use of this information to facilitate additional improvements to grid management and customer services. To address this, policymakers can develop legislation or rules that clarify who owns the energy data associated with customer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data possible. For example, states could establish customer access to energy data through the Green Button program.

Example State Programs:

According to the Pacific Northwest National Laboratory, seven states have set energy storage procurement targets, 13 states offer financial incentives for storage, and 14 states have installed energy storage capacity over 20MW.

- California's Self-Generation Incentive Program (SGIP): https://www.cpuc.ca.gov/sgip/

- Colorado's Senate Bill 18-009 "Allow Electric Utility Customers Install Energy Storage Equipment": https://www.aeltracker.org/bill-details/16311/colorado-2018-sb009

- Maryland's Energy Storage Income Tax Credit: https://energy.maryland.gov/business/Pages/EnergyStorage.aspx

- The New York Battery and Energy Storage Technology (BEST) Consortium: https://www.ny-best.org/

More Information:

- U.S. Department of Energy (DOE): Energy Storage Systems Program: http://www.sandia.gov/ess/

- DOE: Global Energy Storage Database: https://www.sandia.gov/ess-ssl/global-energy-storage-database/

- DOE's Office of Electricity: Energy Storage: https://energy.gov/oe/services/technology-development/energy-storage

- International Renewable Energy Agency: Electricity Storage and Renewables: Costs and Markets to 2030: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Oct/IRENA_Electricity_Storage_Costs_2017_Summary.pdf?la=en&hash=2FDC44939920F8D2BA29CB762C607BC9E882D4E9

- National Renewable Energy Laboratory (NREL): Energy Storage – Possibilities for Expanding Electric Grid Flexibility: http://www.nrel.gov/docs/fy16osti/64764.pdf

- NREL: The Potential for Battery Energy Storage to Provide Peaking Capacity in the United States: https://www.nrel.gov/docs/fy19osti/74184.pdf