

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

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control, for instance, 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 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. In 2018, Massachusetts approved [demand charges for net metering customers](#). As utilities around the country consider [extending demand charges to the residential sector](#), 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 policy can help maximize these benefits through a combination of establishing a framework for easy integration of energy storage into the grid and establishing a marketplace that monetizes the benefits of energy storage for cost-effective investment. The recommendations below draw heavily from a 2017 report by the Interstate Renewable Energy Council (IREC) called "[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. The Interstate Renewable Energy Council ([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 will be 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 might want to 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 amount of storage 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. Incentives can be designed to decline as storage values become more readily monetized and/or as the cost of storage decreases. Policymakers could allow utilities that provide incentives to customers to 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 want to start first with a policy that provides grants to pilot projects. Policy might also target solar system owners. Financial incentives should be designed to ensure that the state will meet 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, but can also encourage 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 by third parties. States could establish customer access to energy data through the [Green Button](#) program, for example.

## Example State Programs:

According to the [Pacific Northwest National Laboratory](#), 14 states have energy storage requirements or incentives and 25 states have installed energy storage capacity over 20MW.

- California’s Assembly Bill 10-2514 “Energy Storages Systems”:  
[http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=200920100AB2514](http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100AB2514)  
(The [California Public Utilities Commission](#) continues to implement the Act.)
- 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:

- Department of Energy (DOE): Energy Storage Systems Program:  
<http://www.sandia.gov/ess/>
- DOE: Global Energy Storage Database:  
<http://www.energystorageexchange.org/>
- DOE's Office of Electricity Delivery and Energy Reliability: Energy Storage:  
<https://energy.gov/oe/services/technology-development/energy-storage>
- 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>

For additional information on this topic, please review Chapter 2.3: Energy Storage in the *Clean Energy Policy Guide for State Legislatures* available at: <http://cnee.colostate.edu/cleanenergypolicyguide/>

This information, along with additional resources, is also available on the Clean Energy Legislative Academy's resources page at: <http://cnee.colostate.edu/academyresources/>