Executive Summary

Energy Storage: The New Efficiency

HOW STATES CAN USE ENERGY EFFICIENCY FUNDS TO SUPPORT BATTERY STORAGE AND FLATTEN COSTLY DEMAND PEAKS

ABOUT THIS REPORT

This report, which describes how states can use energy efficiency funds to provide incentives for energy storage, is a publication of Clean Energy Group (CEG), and includes appendices containing several white papers prepared by the Applied Economics Clinic under contract to CEG. This report explains the steps Massachusetts took to become the first state to integrate energy storage technologies into its energy efficiency plan, including actions to 1) expand the goals and definition of energy efficiency to include peak demand reduction, and 2) show that customer-sited battery storage can pass the required cost-effectiveness test.

The report summarizes the economics of battery cost/benefit calculations, examines key elements of incentive design, and shows how battery storage would have been found to be even more cost-effective had the non-energy benefits of batteries been included in the calculations.

The report also introduces seven non-energy benefits of batteries, and for the first time, assigns values to them. Finally, the report provides recommendations to other states for how to incentivize energy storage within their own energy efficiency plans. The report and accompanying analyses were generously supported by grants from the Barr Foundation and Merck Family Fund. It is available online at *www.cleanegroup.org/ceg-resources/resource/energy-storage-the-new-efficiency*.

BACKGROUND

Energy storage is perhaps the most revolutionary new energy technology since the electric grid was invented over a century ago. It can transport electricity over time, as well as distance; it can act as a generator or as a load; it can integrate renewables into the grid or enable customers to disconnect from the grid entirely.

But states have yet to figure out how to move storage aggressively into various market segments with dedicated incentive programs. Typically, states have supported new clean energy technologies, such as wind and solar, through public benefit funds or utility incentives, which bring down the up-front capital costs and jump-start markets. So far, only a few states have developed incentives that would support energy storage. But that is beginning to change.

This report shows how a new energy storage incentive has been created through the innovative use of state energy efficiency funds.

This report explains how, for the first time, distributed energy storage has been included in a state energy efficiency plan, and what the implications are for other states and the storage industry. It covers the following topics:

- How behind-the-meter battery storage provides efficiencies, both for the customer and for the energy system.
- Why and how Massachusetts included storage in its energy efficiency plan.
- Why this is important to move storage into many markets, including low-income markets where early stage technologies might not otherwise penetrate until years from now.
- Why expanding energy efficiency to include demand reduction measures like energy storage is in keeping with the historical evolution of such funds, to bring new technologies into their programs over time.
- What actions are necessary to enable more states to incorporate storage into their efficiency plans, and to use efficiency funds to jumpstart battery storage markets in those states.
- How to value both energy and non-energy benefits of battery storage, and why this is important if storage is to be incorporated into state policy and programs.

KEY FINDINGS

Distributed battery storage can deliver valuable energy efficiencies, both behind the meter and on the grid. This report presents economic analysis showing that peak demand reduction, an emerging energy service for which battery storage is well suited, provides cost savings to both storage customers and the energy system as a whole. Peak demand reduction, or peak shifting, is a valuable efficiency that cannot be effectively achieved with traditional, passive efficiency measures, but it

can be cost-effectively achieved with battery storage. As more renewables come onto the electric grid, the ability to shift peak loads becomes more important and valuable.

States can open energy efficiency programs to battery storage with one simple step. As shown in Massachusetts, states can redefine energy efficiency to include the peak demand reduction concept. Electricity demand peaks are costly, leading to huge inefficiencies across the energy system. While some states have demand reduction programs, these are not typically as well funded as are energy efficiency programs. Bringing demand programs under the umbrella of energy efficiency makes more resources available to support battery storage deployment and allows consumption-reduction and demand-reduction measures to be installed together, to achieve optimal results.

Battery storage can pass required cost-effectiveness screens, justifying the investment of public dollars. As shown in the CEG/AEC July 2018 report (see Appendix 1), battery storage passes the Total Resource Cost (TRC) test in Massachusetts, meaning it returns savings to consumers that are greater than its cost. This is the threshold requirement for efficiency measures to be eligible for incentives under the Massachusetts Energy Efficiency Plan. Since most state rebate and incentive programs include cost-effectiveness screens, it is important that states develop methods to fairly and thoroughly evaluate the costs and benefits of battery storage.

Battery storage offers more than just energy benefits—and its non-energy benefits are both valuable and important. As shown in the CEG/AEC report on the non-energy benefits of storage (see Appendix 3), battery storage offers many non-energy benefits, including resiliency, reduced outages, increased property values, job creation, and reduced land use. The non-energy benefits of storage must be assigned an economic value, or by default they will be valued at zero in cost/benefit analyses. In this report, we present economic analysis showing the value of seven non-energy benefits of battery storage.

Numerous program design issues should be addressed when states contemplate creating battery storage incentives. These include: Incentive design, Financing, Low-income provisions, Defining peak, Duration of discharge, Measuring benefits, Ownership issues, Stacking incentives, and Transparency.

More work is needed to continue to refine and expand the value of battery storage, including the identification and valuation of more non-energy benefits. Establishing a more accurate benefit-cost ratio (BCR) for distributed battery storage will support its inclusion in state energy efficiency programs and other incentive programs (such as rebates) that require measures to pass a cost-effectiveness screen. If this is not done, storage will continue to be at a disadvantage relative to other technologies, and it may not qualify for state incentive programs.

State energy efficiency programs represent an important potential source of incentive funding for distributed battery storage. Most states have energy efficiency programs, and these programs collectively represent an investment of nearly $9 billion in public funds annually. Qualifying energy storage as an efficiency measure in these state programs would make storage eligible for vastly greater incentive support than it currently enjoys in any state—even early adopter states like California, Massachusetts and New York. Bringing new technologies like storage into state energy efficiency programs is in keeping with the history of these programs and is cited as a best practice in EPA guides.

RECOMMENDATIONS

In the main body of this report, we discuss policy issues and present recommendations for a national audience of state policymakers and regulators. Recommendations and discussion directed specifically toward improving the Massachusetts demand reduction program can be found in Appendix 4.

Key Recommendations

- Other states should learn from the experience of Massachusetts and incorporate demand reduction measures, including storage, into their own energy efficiency plans.
- State energy storage incentives, in general, should include three basic elements: an up-front rebate, a performance incentive, and access to financing.
- State energy storage incentives should include adders and/or carve-outs for low-income customers. These customers need the cost savings and other benefits of new clean energy technologies the most but are typically the last to gain access to them.
- Researchers should build on the economics analyses presented here. Specifically, cost/benefit analyses of storage should be conducted using not only the TRC but also other cost-effectiveness tests commonly in use among states, such as the Societal Cost Test and the Utility/PACT test.
- Non-energy benefits of storage should be identified, analyzed, and valued.

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