Commission to Study the Economic, Environmental and Energy Benefits of Energy Storage to the Maine Electricity Industry - Member Takeaways and Findings
November 19, 2019

Lesson #1: Energy Storage can Reduce Costs and Improve Reliability	
1.1	Energy storage has the potential to help Maine decrease the cost of electricity by decreasing need for (high cost) "peaker plants" to meet peak demand (Sen. Vitelli)
1.2	Energy storage can result in cost savings for ratepayers through: reducing electricity prices, lowering peak demand, deferring T&D investments, reducing greenhouse gas pollution compliance costs, deferring capital investments in capacity, and increasing grid reliability and resiliency. (Rep. Grohoski)
1.3	Energy storage can improve the overall efficiency of the grid and reduce costs for all consumers by shifting load and reducing peak demand. Behind-the-meter storage can aid commercial electricity customers by decreasing demand charges and reducing electricity costs. (Wood)
1.4	Storage can help shave demand peaks which are major divers of both generation and T&D spending/investment (Mueller)
1.5	Energy storage applications and preferred locations/functions can be identified through distribution system planning and used to address system overloads and defer new distribution infrastructure costs to the benefit of ratepayers. (Zuretti)
Notes/Decisions	

Lesson #2: Energy Storage Complements and Supports Renewable Energy	
2.1	Energy storage has the ability to help Maine increase its use of clean renewable energy that can be intermittent in supply, i.e. wind and solar. (Sen. Vitelli)
2.2	Energy storage can play a key role in addressing intermittency in renewable energy production, supporting the grid as Maine drives toward its renewable energy targets. (Wood)
2.3	Increasing penetration of variable, renewable generation increases need for system flexibility; developing policies to fully account for the benefits of energy storage in planning and procurement targets will help build flexibility in the system to accommodate a high-renewable future. (Pease)
2.4	Many benefits of storage can be complemented with intermittent renewable energy (solar and wind) and vice versa. Storage will be necessary for higher and higher penetrations of renewable energy and could be very beneficial to distributed energy resources. (Klein)
2.5	The importance and value of storage will only grow as low cost but variable renewables make up a higher fraction of the total generation on the grid; opportunity to use longer duration storage (of which power to gas is one option, but certainly not the only one) to take advantage of locked-in renewable generation (wind and solar) potential in the northern and western parts of the State. (Mueller)
Notes/Decisions	

Lesson #3: Energy Storage Technology is Diverse and Advancing	
3.1	Energy storage technologies are continually advancing; it is important to ensure our policies are flexible enough to take advantage of the benefits of these advancements--decreasing (technology) costs; increasing storage capacities and lifespans. (Sen. Vitelli)
3.2	Advantages and applications of energy storage can vary by technology type, size and location; long-duration storage such as pumped hydropower may be complementary to short-duration advanced storage technologies given differing capabilities and grid requirements. (Zuretti)
3.3	The greatest and most efficient storage is pumped hydro storage (US 94% pumped water storage); brings up the question of do we have potential in Maine for pumped storage and if so, what policy would be required to develop it; option seems to be the cleanest long-term solution for Maine. (Birney)
3.4	Power to gas (Summit presentation) also seems to be a positive use of power we already have and do not use to store energy for demand peaks. (Birney)
3.5	Demonstration projects are likely not as relevant (at this stage) as more technology is already proven. (Bishop)
Notes/Decisions	

Lesson #4: Issues with Market and Regulatory Signals for Storage	
4.1	The biggest challenge to increasing storage deployment is lack of clear market mechanisms to transfer some portion of the system benefits (e.g. cost savings to all ratepayers) to the storage project developer. (Masssachusetts State of Charge report, page xiii) (Rep. Grohoski)
4.2	Proper valuation of energy storage requires identifying and optimizing all value streams. Although the ISO-NE market can accommodate energy storage, it does not fully value all energy storage capabilities. The ISO-NE markets that allow energy storage participation are not large enough to incent significant new energy storage investment, and ISO-NE planning and modeling cannot currently accommodate all market functions. These are significant barriers to expanding the energy storage market in Maine. (Zuretti)
4.3	Upfront cost is the key barrier to deploying more energy storage; key policy opportunity to monetize the values that energy storage provides to consumers and the grid (to overcome the upfront cost hurdle) for developers/owners. (Wood)
4.4	Rate structure and deregulated nature of electricity industry (utilities not allowed to own generation) provide a disincentive for utilities to support distributed energy resources and energy storage on a large scale. Because utilities earn revenue by building out T&D capacity and customers buying more electricity, there is not an incentive to defer/prevent T&D build out or encourage customers to reduce consumption, switch to renewable generation, or add storage. (Klein)
Notes/Decisions	

Lesson #5: Opportunities for Cost-Effective Energy Storage

5.1 Recent trends of declining storage technology costs and the growing body of research and experience contributing to a greater understanding of storage technology benefits, are creating increased opportunities for cost-effective energy storage solutions. (Pease)

5.2 Storage is cost-effective today in many applications. (Mueller)

5.3 Many of the most attractive near term markets for storage are behind the customer meter (BTM), because in those cases the benefit (value) to the individual customer (e.g. demand charge management, resiliency) offsets a significant portion of the capital costs, even though a lot of the benefits extend to all ratepayers (lower capacity costs, reduced T&D investment, demand response induced price effect, etc). (See also Lesson #4) (Mueller)

Notes/Decisions

Lesson #6: Other Observations

6.1 Grid information and modernization seem particularly relevant as we move to more distributed generation and need to respond to and reduce peak load; for example, info on most effective storage siting, time of use metering, ability for utility or ISO-NE to control storage discharge to get greatest benefit. (Rep. Grohoski)

6.2 While many of the results from the Massachusetts State of Charge report are applicable to Maine, there are certain differences between the states (lower demand charges compared to Mass, small islands with resiliency issues, transmission bottlenecks at Keene Road, etc.) that lead to different economic outcomes. (Bishop)

6.3 There are items that could could help open the market for energy storage and create little cost to net benefit for Maine ratepayers (additional parameters around nonwires alternatives and transmission rate design). (Bishop)

Notes/Decisions