

FERC, HYDROPOWER AND ENERGY STORAGE RESOURCES: OPPORTUNITIES AND CHALLENGES

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UNDERSTANDING CONCEPT FRAMEWORK

- FERC regulates interstate transactions; FERC jurisdiction extends to energy storage generators interconnected to transmission system at higher voltages; generally 115 kv and above
- State entities such as Public Utility Commissions (“PUCs”) regulate utility management, operations, electricity rate structures, and capacity acquisition within their State’s jurisdiction. Applicable to energy storage generators interconnected at lower voltages, generally 69 kv and below
- In some regions, Independent System Operators (“ISOs”) provide oversight of transmission and generation. This multi-level oversight impacts the growth of the storage industry because policies can create or inhibit market opportunities for electricity storage and may determine how, and if, they will be compensated.

BENEFITS OF ENERGY STORAGE

- Energy storage is “Dispatchable”
 - Advanced energy storage resources are capable of dispatching electricity within seconds
 - Do not produce direct air emissions so do not have to complete significant modifications to comply with air quality standards
 - Permitting process is simpler than more complex infrastructure projects and construction timelines are considerably reduced
 - Advanced energy storage projects require a much smaller footprint than conventional power plants and can be easily added to local areas to provide grid stability, eliminating the need for new gas-fired or transmission to solve these local reliability needs.
- Energy storage can be modular in design
 - Energy storage systems are often modular in design, so the components to operate and interconnect the storage resource can be enclosed in simple containerized structures.

Opportunities for Investors and Developers

- Energy Storage is essential to the continued expansion of distributed energy resources.
- It is the key to balancing energy generation and consumption and thus maintaining grid stability.
- New renewable generation systems are increasingly likely to have energy storage built in
- Further expansion of energy storage capabilities is receiving increased regulatory support
- There is support for new incentives to attract investors and help developers
- For example, Massachusetts recently awarded grants totaling \$20 million to 26 projects for the purpose of further developing the State's energy storage market.

Challenges

- While the energy storage technologies are evolving rapidly, many market practices and regulatory standards have not begun adapting for the changes in structures and conventions that energy storage will require.
- Energy storage faces commercial obstacles, including building energy storage of sufficient scale and finding finances for nascent energy storage technologies.
- Another major category of significant obstacles includes regulatory barriers and market structures that have been slow to accommodate the new potential of energy storage.
- Markets must be structured in a way to allow these new technologies and approaches to provide grid management services.
- Energy storage can both inject and withdraw electricity from the grid, transcending traditional division of generation/transmission/distribution.
- U.S. rules on how to connect energy storage to the electricity grid are largely poorly defined and based on technologies that are markedly different from energy storage.

Understanding Federal and Massachusetts Regulatory Framework

Hydropower – Eligibility

- The applicant's facility must be licensed by the Federal Energy Regulatory Commission (FERC), have an order from FERC indicating that it is non-jurisdictional to FERC, or have a determination from FERC that it is a "qualifying conduit hydropower facility."
- Facilities must either be qualified for the [Massachusetts Renewable Energy Portfolio Standard](#) (MA RPS), or demonstrate a high likelihood of qualifying for the MA RPS, as further explained in the Commonwealth Hydropower solicitation. The Massachusetts Department of Energy Resources (DOER) is the agency that grants MA RPS qualification. Applications for MA RPS Class I and Class II (either or both of which may apply to a hydro facility) can be found here, on DOER's website: [MA RPS qualification applications](#). Class I applies to new facilities, Class II applies to existing facilities.

CURRENT FERC LICENSING EXEMPTIONS

- **Small/Low Impact Hydropower Program**
<https://www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact.asp> “Under the Federal Power Act (FPA), FERC regulates the nation's non-federal hydropower resources. FERC issues three types of development authorizations: conduit exemptions, 10-megawatt (MW) exemptions, and licenses”.
- **5-Megawatt (MW) Exemption** – Issued in perpetuity. Must be located at the site of an existing dam or use a natural water feature. Must propose increased capacity. The exemptee must own all lands and facilities other than federal lands to be eligible.
- **Conduit Exemption** – Issued in perpetuity. Must use the potential of a conduit constructed primarily for non-hydropower purpose. The exemptee must own the proposed powerhouse and the lands upon which the powerhouse will be located. A conduit exemption may not use federal lands.

Recent Significant Proposed Rules and Policy Statements

- In November 2016, FERC proposed to amend its regulations to remove barriers that prevented electric storage resources and distributed energy resources aggregators to participate in the capacity, energy and ancillary services markets operated by the six RTOs and ISOs subject to the FERC jurisdiction.
- In January 2017, FERC issued a policy statement to the effect that an electric storage resource may provide services at both cost-based (e.g., transmission) and market-based (generation) rates at the same time so long as (1) there is no double recovery of costs to the detriment of the cost-based ratepayers , (2) the potential for cost recovery through cost-based rates does not inappropriately suppress competitive prices in wholesale electric markets to the detriment of other competitors who do not receive such cost-based rate recovery; and (3) The level of control in the operations of the electric storage resource by an RTO/ISO do not jeopardize its independence from market participants
 - See also How FERC Is Streamlining Hydropower Licensing Nov. 17, 2017 as reflected in a late 2017 FERC Policy Statement at <https://www.ferc.gov/whats-new/comm-meet/2017/101917/H-1.pdf> 1

Role of Regional Transmission Organizations/Independent System Operators

- Most RTOs/ISOs have made efforts to allow energy storage resources to participate to some degree in their markets.
- Some RTOs/ISOs have added explicit language to their tariffs regarding energy storage's ability to participate in frequency response markets as a consequence of FERC's Order No. 755, but have not added explicit language addressing energy storage's participation in other capacity, energy and ancillary service markets.
- New capacity market rules in PJM and ISO-New England provide enhanced revenue streams for capacity resources that "clear," and significant penalties on capacity resources that fail to dispatch during emergencies or shortage events.
- ISO-NE recently issues a report entitled "How Energy Storage Can Participate in New England's Wholesale Electricity Markets" which acknowledges that if a battery system has sufficient storage capacity, solar energy can be charged around midday, at lower electric rates, and discharged during peak evening hours, at higher rates.

Financing Renewable Energy/Battery System Combos

- Grant funding from the US-DOE
- Grant funding from states with Clean Energy Development Funds
- Federal investment tax credit that can be used to offset state and federal taxes due on other utility operations
- Sale of Renewable Energy Credits (RECs) to out-of-state entities to reduce the cost of generating renewable energy
- Assuming 10-15 year expected life of the batteries, the whole project can be written off in 10 to 15 years, which also reduces state and federal taxes
- Project could pay for itself in 5-6 years.

Operational Details

- Steady output (e.g., 1 mw spread over 3.4 hours during peak hours (5:00 p.m. to 9:00 p.m.) is required by ISO-NE upon penalty of being precluded from feeding into grid.
- The ISO-NE grid operator performs the accounting of the grid capacity costs and transmission costs. The utility pays the grid operator for its share of capacity costs (the money paid to power plant to make sure sufficient plant capacity is available during peak load periods.
- The utility's share of the capacity cost is based on its demand during one peak hour.
- The utility's share of the transmission cost is based on its demand during 12 monthly peak hours.

Principal Drivers For Energy Storage Development

- FERC efforts to integrate electric storage projects into jurisdictional wholesale markets
- Market rules that enable advanced energy storage technologies to sell wholesale market service to the regional grid operator (e.g., PJM and CAISO have rules for advanced storage participation)
- State policies and programs that promote the use and development of new energy storage technologies in their state.
- New electricity storage technologies (in addition to batteries)
 - Fly wheels
 - Compressed air energy storage
 - Electrochemical capacitors that store electricity in an electrostatic charge
 - Thermal energy storage that uses either (1) heat sinks, or (2) electricity to freeze water into ice which can be used to provide air conditioning later.

Legislative and Policy Objectives

- The House recently advanced legislation that would streamline the licensing process FERC uses on closed-loop pumped storage projects.
- It creates potential opportunities for development of closed-loop pumped storage projects at abandoned mine sites.
- FERC has signaled that it may look for ways to minimize Section 203 requirements for transactions that do not involve meaningful changes in control over day-to-day management and operations.
- Congress is considering a bill that would exempt all transactions involving facilities valued at less than \$10 million from Section 203 review.
- FERC could also create a blanket authorization for transfers of new interconnection transmission assets from the companies that construct them to the intended owners.
- FERC already has streamlined its Section 203 approval review process by waiving detailed competitive analysis screens for transactions that result in de minimis changes in market power.