



Rapid Transformation of the New England Power System and Implications for the Region's Wholesale Electricity Markets

New England Restructuring Roundtable

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ISO New England's market rules are adapting to the region's changing energy landscape.

- ✓ Strong financial incentives for capacity resources to perform when needed
- ✓ Enhanced participation framework for batteries and other emerging storage technologies
- ✓ Accommodating state-sponsored policy resources into the Forward Capacity Market
- Addressing short- and long-term energy security challenges



Pay-for-Performance (PFP) Incentives in Place Since June 1, 2018

Capacity Scarcity Conditions Triggered on Labor Day, September 3, 2018

- The PFP design allows for transfers of capacity revenue from under-performing resources to over-performing resources during capacity scarcity conditions, providing **strong incentives** for resources to perform when needed
 - Charges for underperformance are paid by underperforming resources, not electricity ratepayers
- Underperforming resources are penalized at a rate of **\$2,000/MWh** for failing to meet their obligation, while resources that over-perform, including resources that have no obligation, receive \$2,000/MWh of additional revenue
- The performance payment rate is scheduled to increase to **\$5,455/MWh** over the next five years



ISO New England's Enhanced Storage Participation Rules Go Into Effect April 1, 2019

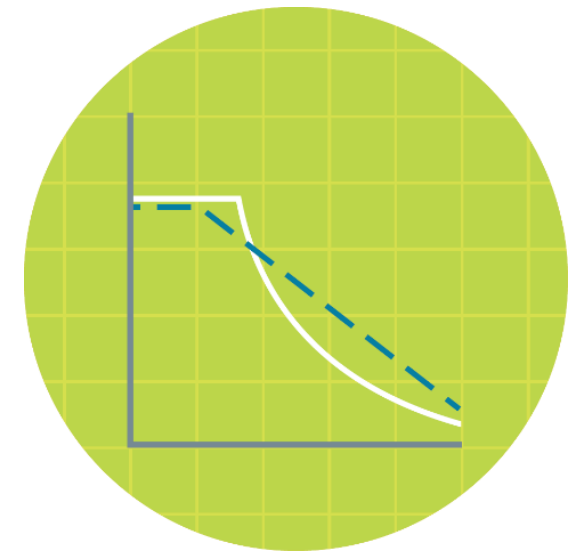
- In February, the Federal Energy Regulatory Commission (FERC) accepted revisions to the ISO's market rules that enable **batteries** and other **emerging storage technologies** to more fully participate in the region's wholesale electricity markets
 - Allow storage technologies to be dispatched in the real-time energy market in a way that recognizes their ability to transition **continuously** and **rapidly** between a charging state and a discharging state
 - Provide a means for **simultaneous participation** in the energy, reserves, and regulation markets
- Still pending before FERC is the ISO's December 2018 filing that demonstrates full compliance with **FERC Order No. 841** on electric storage participation in the markets



For more information, visit the ISO Newswire: <http://isonewswire.com/updates/2019/2/26/ferc-accepts-energy-storage-tariff-revisions-changes-become.html>

ISO New England Administered the Thirteenth Forward Capacity Auction (FCA #13) in February

- FCA #13 was held in February 2019 to procure the capacity resources needed to meet demand for electricity, plus reserve requirements, during the **June 1, 2022 to May 31, 2023** capacity commitment period
- The auction concluded with **sufficient resources** to meet the installed capacity target of 33,750 MW, with the *lowest clearing price in six years*
- The **clearing price** in the auction was **\$3.80/kW-month** across all of New England, compared to \$4.63/kW-month in last year's auction
- FCA #13 featured the first substitution auction for state-sponsored policy resources under the new CASPR design
 - **Vineyard Wind** assumed a **54 MW** obligation



Growing Provision of Long-Term, Above-Market Contracts to Clean Energy Resources



- The states are seeking to develop (or retain) more than 5,000 MW of clean energy resources through large-scale procurement efforts to meet public policy goals

State(s)	State Procurement Initiatives for Large-Scale Clean Energy Resources	Resources Eligible/Procured	Target MW (nameplate)
MA, CT, RI	2015 Multi-State Clean Energy RFP	Solar, Wind	390 MW
MA	2017 Section 83D Clean Energy RFP	Hydro Import	Approx. 1,200 MW (9,554,000 MWh)
MA RI	2017 Section 83C Offshore Wind RFP	Offshore Wind	1,600 MW (MA) 400 MW (RI)
CT	2018 Renewable Energy RFP	Offshore Wind, Fuel Cells, Anaerobic Digestion	252 MW
CT	2018 Zero-Carbon Resources RFP	Nuclear, Hydro, Class I Renewables, Energy Storage	Approx. 1,400 MW (12,000,000 MWh)
RI	2018 Renewable Energy RFP	Solar, Wind, Biomass, Small Hydro, Fuel Cells and Other Eligible Resources	400 MW

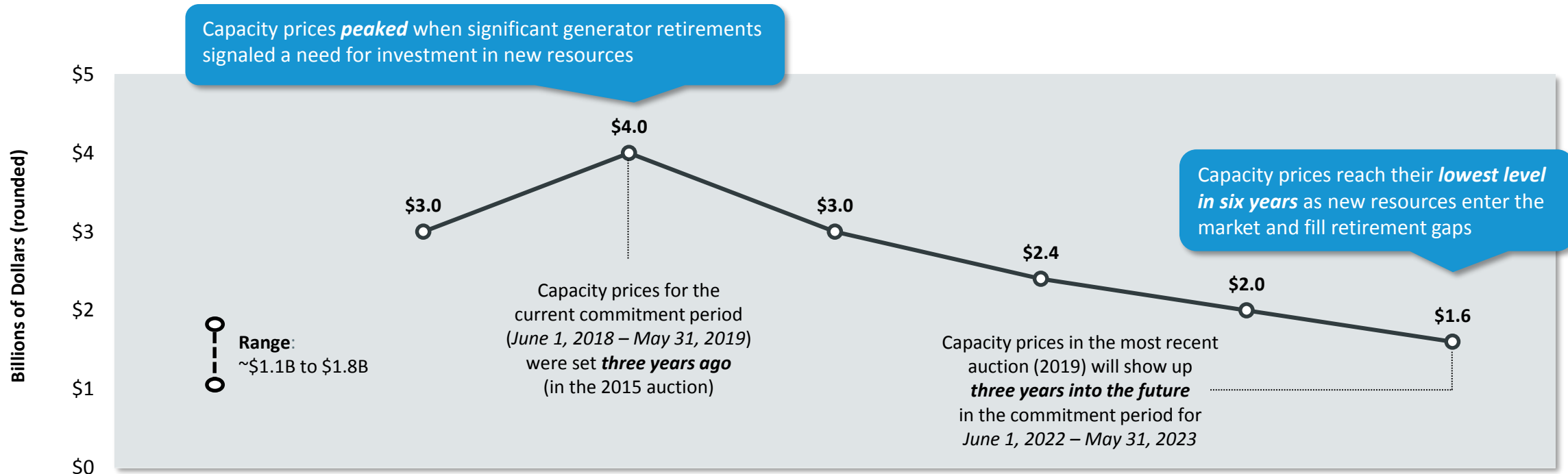
Note: Nameplate megawatts (MW) may be higher than qualified Forward Capacity Market (FCM) capacity MW.



Capacity Market Costs Reflect Changing Supply Outlook

As a “forward” market, consumers can anticipate future changes in capacity costs

Total Capacity Market Costs



	FCA 1–7	FCA 8	FCA 9	FCA 10	FCA 11	FCA 12	FCA 13
Commitment periods:	2010–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023
Auction years:	2008–2013	2014	2015	2016	2017	2018	2019
Est. dollars per kilowatt-month:	\$2.95 – \$4.50	\$7.03*	\$9.55*	\$7.03	\$5.30	\$4.63	\$3.80

* Prices may be higher for some capacity zones.

ENERGY SECURITY



The Emergence of an Energy Constrained System

Retiring and Emerging Resources Exhibit Very Different Characteristics

- Resources with **onsite fuel storage** are being replaced by resources that cannot always get fuel or are entirely weather-dependent
- The remaining **nuclear power stations** are at risk for retirement, until policymakers price carbon at the level implied in renewable energy contracts, or provide them power purchase agreements
- Regional **energy storage** is important; current electric storage technology is limited in the quantity of energy stored and is useful only for short-duration events (hours)
 - Gas pipeline constraints and the variability of renewable energy create a need for “**seasonal**” energy storage that can provide services over a period of multiple days and weeks
- Addressing energy security will become increasingly important as the New England power system shifts toward resources that face **constraints on energy production**



ISO New England Is Pursuing Short- and Long-Term Solutions to Address Energy Security Challenges

- **Short-term:** In December 2018, FERC accepted the ISO's proposed tariff changes to **retain** resources seeking retirement on the basis of a **fuel-security reliability need** (in place for FCA #13, 14 and 15)
- The ISO committed to addressing the impacts of retaining resources for fuel security and is, therefore, proposing an **interim compensation mechanism** to provide similar compensation to similarly situated resources
 - Payment rate for **inventoried energy** during cold winter conditions during the capacity commitment periods associated with FCA #14 and 15
 - **Eligible resources include:** batteries, biomass/refuse, coal, demand response (if distributed generation with eligible technology), hydro (if on-site or upstream reservoir/pondage controlled by participant), natural gas (if supply contract for firm delivery of gas to New England), nuclear, and oil



The ISO's Long-Term Energy Security Improvements Are Designed to Address *Three Inter-related Problems*

- **Problem 1. Incentives and Compensation (P1)**
 - Inefficiently low market incentives for resources that face production uncertainty to make advance fuel/energy supply arrangements
- **Problem 2. Operational Uncertainty (P2)**
 - There may be insufficient energy available to withstand an unexpected, extended (multi-hour to multi-day) large generation/supply loss during cold conditions, particularly if that energy supply loss is non-gas generation
- **Problem 3. Inefficient Schedule (P3)**
 - Premature (inefficient) depletion of energy inventories for electric generation, absent a mechanism to coordinate and reward efficient preservation of limited energy supplies



The ISO's Long-Term Solution Focuses on Energy Optimization

Market-based solution optimizes use of limited energy over extended periods at least cost

1. Change the Current Day-Ahead Energy Market to a **Multi-Day-Ahead Market (M-DAM)**.

Procure resources over a rolling, multi-day-ahead horizon to provide a forward price signal for resources to replenish fuel inventories when prospective supplies are tight and to avoid prematurely depleting limited energy (Focus: P3)

2. Three New Ancillary Services Co-optimized with a Multi-Day-Ahead Market for Energy.

- Replacement Energy Reserves – if a day-ahead cleared resource is unable to perform
- Generation Contingency Reserves – for fast-start/fast-ramping generation contingency response
- Energy Imbalance Reserves – when forecast load exceeds day-ahead cleared physical supply

These services, combined, provide the 'margin for uncertainty' in an increasingly energy-limited system and model the types of actions system operators need to take to ensure reliability over a multi-day horizon (Focus: P1 and P2)

3. New (Voluntary) Forward/Seasonal Market Ahead of the Winter Period.

Procure replacement energy commitments, providing incentive for resources to arrange firm energy inventory logistics and a means to recover the costs of doing so



Next Steps: Further Stakeholder Discussions, Quantitative and Qualitative Analysis, Filing with FERC

- ISO New England will continue **stakeholder discussions** on its long-term solution
- The ISO is completing a **discussion paper** on the proposed design, scheduled for release in April
- The ISO is launching a formal **quantitative and qualitative analysis** this summer, with completion expected this fall
- The ISO plans to file a **formal proposal** with FERC for review by October 15, 2019
 - This is a multi-year implementation effort with a targeted **implementation schedule** of 2024-2025, which aligns with the capacity commitment period for FCA #15



Questions

