



Markets and Environmental Policy in New England

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Key Questions in Grid Decarbonization

- Question 1: How can we efficiently facilitate the transition to a decarbonized grid?
- Question 2: How can we design electricity markets to ensure that once we have a decarbonized grid, we can continue to operate it reliably?



HOW CAN WE EFFICIENTLY FACILITATE THE TRANSITION TO A DECARBONIZED GRID?



Status Quo: State Contracts

- New England states have ambitious policies to decarbonize the electricity sector by 2030, 2040, etc.
 - Some policies more specifically focus on other attributes or technologies (e.g., offshore wind)
- To satisfy these policies, states negotiate long-term contracts with developers to build new green projects
 - Not technology neutral
 - Fixed price for energy delivered
 - Some of these projects are being renegotiated or postponed due to a range of factors (economics, supply chain, etc.)
 - Produces increasingly negative prices as more contracts are signed
- Revenues from RGGI and Renewable Portfolio Standards (RPS) help offset the out-of-market costs



Alternative Approaches Discussed

- Region has expressed interest in assessing alternate market-based approaches to meet their decarbonization objectives
- Net Carbon Pricing
- Forward Clean Energy Market (FCEM)
- *Next:* Discuss each alternative approach



Net Carbon Pricing Overview

- Assign a cost to each unit of carbon emitted
 - Can be done with fixed price, or via a cap-and-trade
 - Revenue collected can be rebated to consumers, used to fund other environmental programs, etc.
 - Tends to increase energy prices (does not produce negative prices)
- Set the price or quantity target to align with the policy goals
 - Price/quantity target can be updated based on past outcomes, etc.



Key Net Carbon Pricing Observations

- Carbon & energy prices increase with decarbonization target
- As carbon price increases to very high value, effectively enforces 100% decarbonization target
- Economic logic is sound, but support has been limited
 - Requires a high degree of regional coordination on carbon price/target
 - Concerns about ratepayers in one state paying for the more ambitious environmental policy of its neighbor



FCEM Overview

- Resources sell CECs forward through a centralized market to states or other entities with clean energy goals
- Resources are then awarded CECs to satisfy these forward positions by producing clean energy
 - 1 CEC for each 1 MWh of clean energy produced
- Resources that produce less clean energy than CECs sold forward must buy CECs from competitors that produce more clean energy than CECs sold
- Similar to state RPS policies, but has a centralized (and regional) forward market and defines clean energy broadly



Key FCEM Observations

- Produces increasingly positive CEC prices and increasingly negative energy prices as decarbonization target increases
 - Clean resources want to generate electricity in order to be awarded CECs
- Achieves decarbonization objectives less efficiently than carbon pricing
 - Does not provide incentives to invest in ‘cleaner’ technologies
- Requires regional coordination on what constitutes clean energy
 - Efficiency benefits of a centralized market diminish as more products introduced (e.g., different CECs by technology/vintage)
 - Does not require close coordination on regional decarbonization targets



Pathways to a Future Grid Study: Overview

- ISO-NE worked with the Analysis Group, an economic consulting firm, on a study assessing the market outcomes under various decarbonization approaches
- Focused on an 80% reduction in carbon emissions in the electricity sector in 2040 relative to 1990
- [Study is available on ISO New England's website](#)



Pathways to a Future Grid Study: Key Findings

- With current commercially available technology, and expected increases in load, decarbonization under any policy will be very expensive
 - Costs grow further when decarbonization increases beyond 80% target
- Net Carbon Pricing is the lowest cost approach studied
 - Cost savings relative to FCEM are modest (1%), though this may be an artifact of New England's resource mix (e.g., limited non-gas generation)
 - The Status Quo is more expensive (9%)
- Status Quo and FCEM produce negative energy prices in significant number of hours, whereas Net Carbon Pricing does not



**HOW CAN WE DESIGN ELECTRICITY MARKETS TO ENSURE THAT
ONCE WE HAVE A DECARBONIZED GRID, WE CAN CONTINUE TO
OPERATE IT RELIABLY?**



Decarbonized Grid Creates New Sources of Uncertainty

- Many new non-emitting resources' electricity generation depends on the weather (e.g., solar, wind)
- These resources may not be dispatchable in a manner similar to many fossil resources
- How can we set up the system to be able to manage the increased uncertainty associated with such changes?



Long-Term Market Signals: Capacity Market Reforms

- Currently, the capacity market is set up to procure enough capacity to meet the summer peak
 - Historically viewed as the time when the system was most stressed
- Going forward, it will need to meet load across broader range of stressed system conditions, including during periods with limited weather-dependent energy production
- ISO-NE is reforming its capacity market so that resources are compensated based on their contributions across broader set of stressed system conditions



Short(er)-Term Market Signals: Flexible Response Services

- ISO-NE is evaluating the system's sources of uncertainty in the operational timeframe, and how these may evolve (grow) as we see more weather-dependent resources come online
 - Magnitude of uncertainty as a function of observable conditions
 - How uncertainty resolves over time (e.g., how much larger is this uncertainty 4 hours out than 1 hour out?), as this may inform the types of products we may wish to procure
- Assessment will help inform the types and quantities of new ancillary services that the system may require in the future

