Pathways to the Future Grid

Evaluating clean energy and carbon pricing frameworks as alternative market designs to advance the region's clean energy transition

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Background: How we got here

- Starting in 2019, stakeholders expressed an interest in discussing future market frameworks to support the transition to a future grid that better aligns with state environmental objectives
  - This effort evolved into New England's Future Grid Initiative
- Focused discussions on the Pathways to the Future Grid track of New England's Future Grid Initiative began at the Participants Committee's (PC) June 24, 2020 Summer meeting
- Over the summer and fall, a series of speaker panels were held at the PC so stakeholders could identify and discuss alternative pathways/market frameworks to potentially transition New England to its future grid
- As part of this discussion, the ISO has agreed to analyze the impacts of two of these frameworks: a forward clean energy market and a carbon pricing market

PRELIMINARY PROJECT OVERVIEW, SCOPE, AND SCHEDULE

ISO to evaluate two frameworks

- Retained a team from the Analysis Group to model the impact of two market frameworks that have been discussed as potential pathways to a future grid:
  - **Forward clean energy market**: Procure "clean energy" via a centralized auction several years forward
    - One outstanding question is whether the procurement occurs separately from or integrated with the Forward Capacity Market (FCM), where this impacts various design considerations raised later in the presentation
  - **Net carbon pricing**: Suppliers are charged for their carbon emissions and, therefore, incorporate this cost into their energy market offers
  - This Analysis Group team has prior experience with ISO-NE and NEPOOL engagements
- The ISO plans to study both frameworks simultaneously and issue a final report that addresses the impacts of both designs

Scope of analysis

- Evaluate how market outcomes for both potential market designs compare to current market rules and state policies, where the environmental objectives are met using long-term Power Purchase Agreements (PPAs) with specific resources, among other programs
- Key metrics will include:
  - Total carbon emissions
  - Total production costs
  - Total consumer costs
- Study may also consider how each market design affects the resource mix and/or revenues for various resource types
- The analysis will not focus on reliability outcomes
  - Such analysis will be a part of the Future Grid Reliability Study (FGRS)
  - However, this Pathways study may align certain input assumptions with those used in the FGRS

Welcome stakeholder feedback on model assumptions shared across policies

- What study year (or years) should be evaluated?
  - Frameworks are being evaluated as pathways to the future grid, but they should also sustain this future resource mix
- What are the regional and state carbon emissions targets for the study year(s)?
  - How does this interact with each of the policies modeled?
- What are the assumed load levels and shapes?
- What are the assumptions regarding the MOPR?

Anticipated stakeholder schedule

- **Q1 2021**: Discussion of study scope to discern the key elements of the market designs to be studied
- **May 2021**: Finalize study scope of market designs to be evaluated
- **Q2-Q3 2021**: Build model; discuss and define model inputs and assumptions; get feedback on specific scenarios to evaluate
- **Q4 2021**: Finalize and run model, present preliminary model results
- **February 2022**: Final report presented to stakeholders

Welcome stakeholder feedback on model scope and schedule

- The ISO and its consultant will make every effort to be responsive to stakeholder feedback on model scope and schedule
  - Regular touch points will occur along the way to ensure mutual understanding of the proposed designs and model options, decisions and tradeoffs
- Feedback can be shared during stakeholder discussions, or written comments for posting should be provided by email to Chris Geissler (cgeissler@iso-ne.com) and the Chair of the Participants Committee (or designee)
- We will be best equipped to fully consider feedback that is provided early in the stakeholder process

FRAMEWORK OVERVIEWS AND OUTSTANDING DESIGN QUESTIONS

The frameworks have outstanding questions and “gaps” that must be addressed

- We have identified design question relating to the frameworks based on our review of available materials
- We outline some of these major design questions in the following slides that are most critical for building models of the frameworks
- The ISO does not expect that these questions will be fully resolved during today’s discussion
- However, they will need to be answered to build the models necessary to run simulations of market outcomes under each framework

Addressing outstanding questions and “gaps”

- We seek continued stakeholder input on these and other questions today and throughout the March-April timeframe
  - Welcome this input in many forms including during meetings, via written responses, and through bilateral discussions
- Plan to provide more detailed summary of the frameworks that incorporates stakeholder feedback
  - Initial summary in March, will update as frameworks are refined
- ISO and its consultant will make every effort to reflect stakeholder feedback in the models, but there may be instances where we have to make modeling decisions about design elements for any number of reasons, including:
  - Lack of stakeholder consensus
  - Feasibility concerns
  - Time constraints

Addressing these questions will allow for more informative quantitative modeling

- ISO and its consultant must clearly understand key design elements in order to quantitatively model expected resource bidding behavior, market clearing, etc., in a manner that will inform stakeholders about market outcomes
- In the following slides, we briefly discuss the frameworks to be modeled and outstanding questions pertaining to each
  - Forward clean energy market framework, including consideration of integrated clearing with the FCM
  - Net carbon price framework
- Before diving further into these frameworks, we turn to stakeholders to summarize their work on the FCEM concept to date

Forward clean energy market: overview

- Run auction for “clean energy” roughly three years before delivery period to determine forward positions and price
  - This may be standalone (FCEM) or integrated to occur jointly with the determination of capacity awards (ICCM)
- States (and other entities) submit priced demand bids for “clean energy,” as measured in MWh of energy production
- Suppliers submit priced offers to provide “clean energy”
  - These offers may also include costs to sell capacity under ICCM
- Suppliers with forward positions produce “clean energy” during the delivery period
  - Suppliers that fail to meet their forward position may incur a cost associated with this shortfall
- Costs associated with the sale of “clean energy” are allocated to real-time load obligation (RTLO)

Forward clean energy market is a novel concept and requires key questions to be answered

- This concept requires the development of several complex market design elements, including:
  - The product definition
  - Development of spot settlement methodology
  - Determination of forward positions and prices
- This complexity increases if the procurement is integrated with the FCM
- It is, therefore, natural that at this stage there are a number of outstanding design questions; some of which are discussed further in the following slides

Forward clean energy market: product definition

- What resources can sell “clean energy?”
  - Does it include imports?
  - Does this definition apply to resources that do not produce electrical energy, but can store it (e.g., pumped-storage hydro, batteries)?
  - Would credits be “dynamic” (e.g., varying with marginal GHG emission rate)? If yes, how would this work?
- Is there a cap on the quantity of “clean energy” a resource can sell forward?
  - If yes, how would this cap be determined?
  - Is there a qualification process?
- Is there a single “clean energy” product, or are there potentially multiple products (and if so, what are they)?

Forward clean energy market: settlement

- What are the settlement implications of producing more or less “clean energy” during the commitment period than was sold forward?
  - Is there a “penalty” for the non-delivery of “clean energy”? If so, how is it determined?
  - Are there opportunities to buy/sell credits during the commitment period so that a resource can align its forward and spot positions?
  - Can a resource without an FCEM obligation buy/sell credits?
- Are there any exemptions that would allow resources to avoid covering their forward position during the commitment period?
- Can credits be banked across commitment periods?

Forward clean energy market: interaction with existing state REC/RPS programs

- Can a resource provide “clean energy” under the FCEM and also qualify for credits/certificates under current state programs?
  - If yes, does it receive credits for both programs?
  - If not, does the resource choose which credit it is awarded, or does one program supersede the other?
- The answer to the above question may have important implications for other design elements, including:
  - If/how suppliers price “clean energy” offers
  - Whether the FCEM replaces (or reduces) certain state policy requirements

Forward clean energy market: pricing and cost allocation

- The design appears to allocate “clean energy” costs to RTLO in the states that buy this product
- If it allows non-rationable “clean energy” MWh offers (or demand bids), there may not be a single price for “clean energy” that is acceptable to all buyers and sellers
  - In such cases, the design would require side payments
  - This is similar to how minimum offers in the energy market can create uplift
- In such cases, how would the “clean energy” price be determined? How would the costs associated with any side payments be allocated?

Forward clean energy market: integrated clearing with FCM

- Stakeholders have discussed an approach that would jointly optimize forward capacity and "clean energy" positions
  - https://nepool.com/uploads/FGP_NPC_20201001_Spees_Integrated_Clean_Capacity_Market.pdf
- Would resources offer capacity and "clean energy" jointly?
  - How would such offers be formulated?
  - Do participants submit separate offers for each product, or a joint offer for both? If separate offers, could an offer clear for one product but not the other, or would the products be bundled?
- Are offers non-rationable? If yes, how would prices be determined? Are side payments required?
- *Outstanding question*: Is such a joint optimization feasible?
  - Requires further assessment of product space and the auction's bid and offer parameters

Net carbon pricing: overview

- Charge a price per ton of carbon emissions to energy suppliers that emit carbon when generating electricity
- Energy suppliers modify (increase) their energy offer price to account for any costs associated with carbon emissions
- This carbon price may thereby change the energy supply stack, making lower emitting resources more likely to be dispatched (because their offer price is relatively lower), and higher emitting resources less likely (because their offer price is relatively higher)
- Revenues associated with the carbon price are distributed to load

Net carbon pricing is a more well understood design concept

- Emission pricing is not a novel design, and thus there is already a general framework upon which to draw
  - For example, New England electricity suppliers already experience a carbon price via the Regional Greenhouse Gas Initiative (RGGI)
  - This concept was discussed at length at the FERC Technical Conference, held on September 30, 2020
- Net carbon pricing does not raise similar questions about the product definition (the product is simply carbon emissions) and does not require a forward procurement of this product

Yet a number of outstanding questions about net carbon pricing remain

- How is the applicable carbon price determined?
- How are revenues from this carbon price distributed? To RTLO or in some other manner?
- How does the design address geographic leakage?
- Does the design interact with RGGI, other state programs?
- Plan to work with stakeholders to flesh out this framework and address these questions, as well as others that are likely to emerge as work progresses
  - Expect to provide more details on a potential net carbon pricing framework at March meeting

ISO looks forward to working with stakeholders to evaluate Pathways to the Future Grid

- With help of stakeholders and the Analysis Group, ISO will evaluate market outcomes under forward clean energy market and net carbon pricing frameworks
- Welcome stakeholder feedback on the model assumptions and outstanding questions related to these frameworks to facilitate modeling efforts
- Share final report on modeled market outcomes associated with these frameworks in February 2022