

New England Forward Clean Energy Market

PROPOSED MARKET RULES, VERSION 1

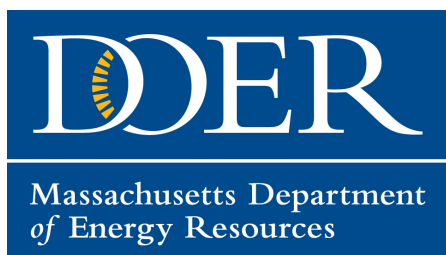
PROPOSED BY

Massachusetts Department of Energy Resources

WITH CONTRIBUTIONS FROM

The Brattle Group and
Sustainable Energy Advantage

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NOTICE

This New England Forward Clean Energy Market (FCEM) Market Rules document is proposed by the Massachusetts Department of Energy Resources (DOER or MA DOER) as a regional market design that will empower states, local governments, companies, and consumers across the New England region to reflect policy and sustainability requirements through a competitive regional marketplace. Massachusetts views the FCEM as a critical, and presently missing, institutional pillar that will be required to support equitable, affordable, and reliable clean energy transition.

This FCEM Market Rules document builds on the work of state agencies and stakeholders over the past several years, including chiefly: the states' New England Energy Vision initiative and resulting report to the New England governors; the New England Power Pool (NEPOOL) Pathways process including the associated FCEM market design proposals and analysis; and the New England States Committee on Electricity (NESCOE) staff and member states' working engagement.

Massachusetts DOER thanks the staff of NESCOE for their critical role in facilitating the development of an FCEM for the New England region for the past several years and throughout the effort to develop this design proposal. Massachusetts DOER further thanks staff and policymakers from the states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont for participating in several rounds of interviews, comments, and discussions during the effort to develop this FCEM Market Rules document. The collective expertise and input provided by NESCOE and member states throughout this engagement have shaped the primary elements of this FCEM-design proposal, enabled the Massachusetts DOER and its consultants to refine the proposal into a comprehensive market structure, and clarified areas requiring future legal analysis and implementation feasibility analysis. Throughout the development of this design proposal, Massachusetts DOER and its consultants have attempted to reflect and align with the policy preferences, regulatory structures, and implementation mechanics that will make the FCEM a viable tool for all states and consumers across the New England region. Massachusetts looks forward to continued engagement with NESCOE and member states, as well as with other stakeholders and the public to refine and implement the FCEM.

SPONSORED BY

Massachusetts Department of Energy Resources, Patrick Woodcock, Joanna Troy, Marian Swain
Massachusetts Executive Office of Energy and Environmental Affairs, Judy Chang

WITH CONTRIBUTIONS FROM

The Brattle Group, Kathleen Spees, Joe DeLosa, Linqun Bai, John Higham
Sustainable Energy Advantage, Bob Grace, Jason Gifford, John J. Keene

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Overview of FCEM Design Proposal

This is a proposed draft rules document for a New England Forward Clean Energy Market (FCEM), a new regional marketplace that can be used by states, local governments, companies, and consumers to meet environmental policy requirements and sustainability goals. The FCEM offers a voluntary, market-based platform through which buyers and state policymakers can shape their future resource mix and drive clean energy transition at scale and on pace with climate commitments. The competitive FCEM platform will offer a robust financial commitment sufficient to attract large-scale investments in new clean energy projects, utilize a forward auction structure to drive competition and innovation, and secure clean energy supply at affordable prices.

DESIGN OBJECTIVES OF THE FORWARD CLEAN ENERGY MARKET

The FCEM will leverage competitive market forces to select the lowest-cost combination of renewable and non-emitting resources to meet the climate and clean energy goals of policymakers and consumers across the New England region. The FCEM framework proposed in this document adheres to the following market design objectives, as derived from the states' Vision Statement Report to the Governors and from the states' engagement in the development of this proposal.¹ The FCEM design objectives are to:

- Enable state policymakers and consumers to reflect and achieve their decarbonization goals through a competitive regional marketplace;
- Ensure that participation is voluntary, costs are assigned to voluntary buyer participants, and that no costs are imposed on non-participants in the FCEM;
- Align with and augment other contracting and policy instruments that states and consumers have used, and will continue to use, to meet policy goals, while allowing states to replace existing policy and contract mechanisms with a competitive market mechanism if desired;
- Achieve economically efficient and affordable clean energy transition through the use of competitive markets, and by aligning with complementary competitive wholesale and retail market structures across the region;

¹ See Managers of the New England States Committee on Electricity, [New England Energy Vision Statement Report to the Governors: New England States' Vision for a Clean, Affordable, and Reliable 21st Century Regional Electric Grid](#). June 2021.

- Offer robust financial terms sufficient to attract the large-scale investments in new clean energy infrastructure;
- Align with system reliability needs and the market and regulatory structures, both present and future, that will be needed to maintain reliability throughout clean energy transition; and
- Provide a sound governance framework that reflects a proper level of state oversight, empowers consumers to reflect their goals, enables innovation in policy and product design, and offers a stable and sustainable foundation for attracting large-scale financial investments.

To fulfill these objectives, the FCEM will need to demonstrate its value proposition to voluntary buyers and states. The FCEM must be designed to serve modest volumes of demand in the initial years upon implementation; attract more voluntary buyers as the market demonstrates success; and, over the long term, offer a stable and sustainable platform capable of attracting and retaining the majority of all clean electricity resources across the New England region.

RELATIONSHIP TO OTHER POLICIES AND ELECTRICITY MARKET STRUCTURES

The FCEM will be a new marketplace for transacting unbundled clean electricity attribute products, which can provide complementary incentives to other policy mechanisms and wholesale electricity markets. The FCEM will be a market platform available to states and consumers to use, on a voluntary basis, to meet their decarbonization goals. This design proposal presumes that states and consumers will continue to use a variety of policy instruments, renewable energy certificate (REC) markets, bilateral and state contracting, and other available mechanisms to serve their decarbonization goals. The FCEM-NE will not require states to alter legislation or revisit established policy as a precondition for market participation; instead, the FCEM will offer a flexible platform that can be used in the fashion and at the scale that makes sense for each state. This design proposal anticipates that differently-situated states and buyers will choose varying levels of participation and reliance on the FCEM ranging from no participation, to small purchases in fulfillment of existing state policy requirements, to large-scale procurements, to comprehensive reliance on the FCEM.

Similarly, the FCEM is envisioned to work alongside and in a complementary fashion to the wholesale electricity markets administered by the Independent System Operator of New England (ISO-NE) that are focused on ensuring reliability needs are met. In the investment timeframe, the FCEM-based investment incentives will complement the incentives created by the Forward Capacity Market (FCM) to attract and retain a resource mix that serves policy requirements and can maintain system reliability. Further, the FCEM and new regional clean attribute products transacted through the FCEM will be designed to offer incentives that are in alignment with operational dispatch incentives that meet reliability and policy requirements at the lowest combined cost. This FCEM design proposal does not include enhanced greenhouse gas (GHG) or carbon dioxide (CO₂) emissions pricing, but is designed to be forward-compatible with higher GHG pricing that may arise through other state, regional, or federal policies.

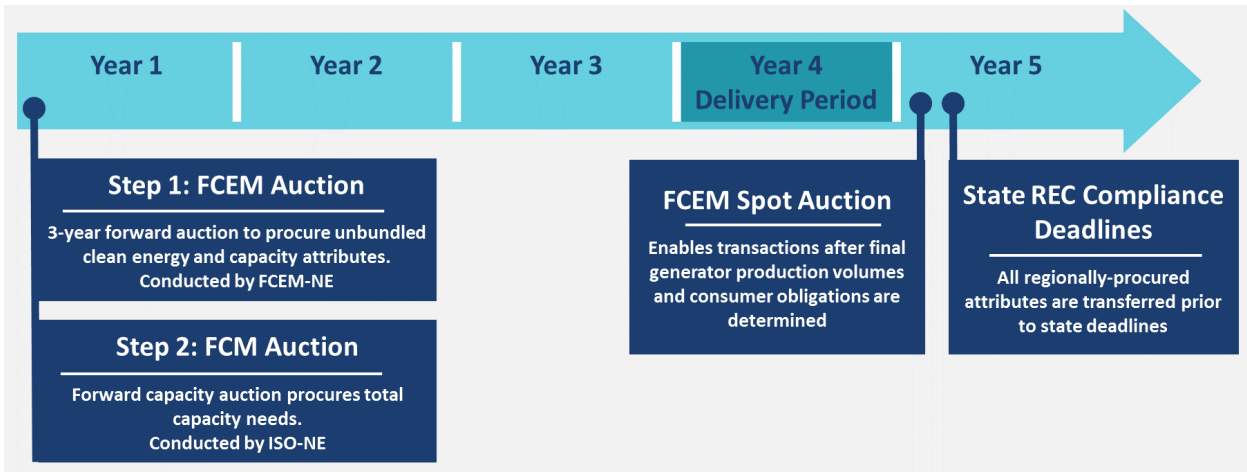
As it demonstrates success, the FCEM will become a critical component of New England’s power sector, helping to attract and retain a balanced mix of resources that will be needed to support large-scale clean electricity transition. The FCEM will offer a more competitive and transparent platform for consumers and policymakers to procure their clean energy requirements at lower prices and in a fashion that shifts risks from consumers to producers. Because clean electricity incentives will be incorporated into a regional market structure, the FCEM will substantially harmonize the investment signals provided by the ISO-NE electricity markets with the investment signals needed to achieve state policy requirements.

PRIMARY DESIGN ELEMENTS

This initial design proposal assumes that a new independent non-profit entity, the Forward Clean Energy Market of New England (FCEM-NE) will be created to administer the market and manage its governing documents. Representatives of the six New England states will comprise the board of directors of FCEM-NE and hold the rights to propose rule changes to the Federal Energy Regulatory Commission (FERC). Implementation of the FCEM will be carried out in full coordination with and with support from ISO-NE, to align with and leverage existing expertise and institutional capabilities. This design proposal further acknowledges that the New England states are undertaking legal analyses to identify the most desirable institutional and governance arrangements for the FCEM, including two alternative governance options with either: (1) an entirely non-FERC-jurisdictional FCEM overseen exclusively under state authorities that may be more or entirely separated from ISO-NE activities; and (2) a FERC-jurisdictional FCEM that is administered by ISO-NE or a new affiliate entity. This initial FCEM design proposal maintains the option to be implemented under any of these alternative governance structures, though certain design elements would need to be adjusted as described in the relevant portions of this design document.

The timeline of the FCEM is summarized in Figure 1. FCEM-NE will conduct a three-year forward FCEM auction in which voluntary buyers can procure the desired clean electricity certificates. All categories of potential buyers will be enabled to participate, such as state agencies, competitive retailers, distribution utilities, municipalities, and private companies. The three-year forward FCEM will use a single-round, uniform-price auction format to competitively procure clean energy and clean capacity certificates (unbundled from energy and capacity) up to the maximum price and volume specified by participating buyers. After the conclusion of the FCEM auction, ISO-NE will conduct the subsequent FCM to procure total capacity needs. Three years later in the delivery period, the committed certificate volumes will be transferred and paid for. At the conclusion of the delivery year and prior to state compliance deadlines, FCEM-NE will conduct a final auction within which buyers and sellers can make final adjustments to clean certificate positions. Certificates procured via FCEM-NE can then be retired in fulfillment of state mandates or private goals.

FIGURE 1: FCEM AUCTION AND DELIVERY TIMELINE



Buyers in the FCEM will be able to submit demand bids reflecting the desired volume, maximum price, and products they wish to procure. A suite of clean energy attribute products will be available through the FCEM, with no maximum limit on the number of products that can be transacted. Two categories of products will be listed including: (1) state-defined clean energy attribute products such as Class I Renewable Energy Certificates (RECs), Solar RECs, and Class II RECs, that can be listed subject to state opt-in; and (2) new regionally-defined FCEM products including a New England REC (NE-REC), a New England Clean Energy Attribute Certificate (NE-CEAC), a New England Greenhouse Gas Marginal Abatement Certificate (NE-GHG), and a New England clean capacity certificate (NE-CCC). New England Power Pool Generation Information System (NEPOOL GIS) will issue and track the new regionally-defined FCEM certificates in coordination with FCEM-NE and ISO-NE.

The procurement costs of each FCEM product will be allocated to voluntary buyers consistent with the cleared procurement volume and clearing price for each product, with no costs allocated to non-participants. The costs of administering the FCEM will be assessed as a charge on cleared FCEM volumes. ISO-NE will oversee administration of settlements and penalty provisions for non-fulfillment of FCEM obligations. All FCEM-related charges and payments will be issued in monthly basis by ISO-NE; load serving entities' (LSEs') monthly bills will track FCEM-related charges as a separate line item in their FCEM settlement statements. Procurement costs to fulfill demand bids submitted at the direction of authorized state agencies will be recoverable from the relevant customers through the energy supply portion of the customer bill.

The FCEM-NE will include several mechanisms to facilitate the financing of large volumes of new clean electricity resources including: (a) a new resource price lock-in that guarantees new resources a clearing price for a term of 15 years at the rollout of the FCEM, with the lock-in term declining to seven years as the FCEM gains maturity; (b) the option for buyers to specify that their demand must be fulfilled by new resources; (c) the option for buyers to submit a "phased entry" demand bid that offers greater flexibility in the online date for projects that can offer a more competitive price if initiating operation in a future year; (d) 10-year demand volume commitments for state agencies that submit demand bids with cost recovery under retail rate

authorization; and (e) trailing settlement obligations allocated to voluntary buyers to support payments in fulfillment of any multi-year commitments procured on their behalf.

This FCEM design proposal includes other provisions of a complete design package including provisions for rules updating processes; attribute product definition and resource eligibility; support for bilateral transactions; management of obligations and penalties; attribute banking; and market monitoring and mitigation. These provisions are summarized in Table 1 and described in detail throughout this report.

TABLE 1: FCEM PRIMARY DESIGN ELEMENTS

Primary Design Elements	
Governance and Administration	<ul style="list-style-type: none"> • FCEM is administered by independent non-profit entity FCEM-NE, with implementation support from ISO-NE and NEPOOL-GIS • New England state representatives comprise the board of directors of FCEM-NE and hold Section 205 filing rights of FERC-jurisdictional FCEM market rules • Market surveillance panel to offer independent review and advice to the FCEM-NE board and public
Product Definition	<ul style="list-style-type: none"> • Initially, FCEM will offer four new regionally-defined clean energy and capacity attribute products: NE-RECs, NE-CEACs, NE-GHG, and NE-CCC. New and enhanced products can be phased in over time • State opt-in to list state-defined attribute products (no maximum limit on the number)
Demand	<ul style="list-style-type: none"> • Accommodate multiple types of buyers with different participation models including: state agencies, utilities, competitive retailers, municipalities, and non-load-serving-entity buyers • Bidders specify maximum price, maximum volume, eligible products • Options for buyers to submit “new resource” or “phased entry” demand bids
Supply	<ul style="list-style-type: none"> • Supplied by eligible clean electricity resources; eligibility varies by product • Only physical resources are eligible to sell FCEM products (no financial-only sell offers)
3-Year Forward FCEM Auction	<ul style="list-style-type: none"> • Three-year forward FCEM auction conducted by FCEM-NE to procure clean electricity certificates including forward procurement of MWh-based energy certificates (unbundled from energy), and MW-based clean capacity certificates (unbundled from capacity) • After the FCEM auction, ISO-NE procures remaining capacity needs within the FCM
Bilateral Transactions	<ul style="list-style-type: none"> • Bilateral commitments, trading, and self-supply allowed at all timeframes until certificate retirement • Facilitation of self-supply relative to “rate-authorized” demand bids submitted by state agencies
Delivery and Performance Obligations	<ul style="list-style-type: none"> • Forward auctions create financial and volume commitments for buyers and sellers, with ISO-NE administering credit requirements and implementing settlements • MWh-based certificates created when resources inject energy, MW-based certificates created when resources physically deliver capacity to ISO-NE; all certificates issued and tracked and verified by NEPOOL GIS in coordination with FCEM-NE and ISO-NE • Under-delivery of certificates relative to obligations must be fulfilled via spot auction buy-out, up to the maximum spot auction price
Spot Auction	<ul style="list-style-type: none"> • Spot auction conducted following delivery year and prior to state renewable portfolio standard (RPS) reporting deadlines • Administrative penalty curve for any market-wide under-delivery relative to obligated certificate volumes is reflected in spot auction clearing (imposes a maximum penalty of 150% of clean resource net cost of new entry (“Clean Net CONE”) if market-wide shortfalls rise to 5% of obligation volume)
Settlements	<ul style="list-style-type: none"> • Transfer of certificates and settlements completed on a monthly basis during the delivery year • FCEM procurement costs allocated to voluntary buyers (no settlements to non-participants)
Certificate Retirement and Banking	<ul style="list-style-type: none"> • Certificates procured via the FCEM can be retired at any time in fulfillment of state mandates or private goals. Certificate transfers will be coordinated to align with state obligation deadlines • Regionally-defined certificate products can be banked for use in future years at a conversion rate at the lower of either: (a) 80%; or (b) a lower value that prevents more than 20% of market-wide certificates from being rolled over from one year to any subsequent year
Monitoring and Mitigation	<ul style="list-style-type: none"> • Pre-auction screens for firms with incentive and ability to exercise market power in any market or sub-market, with flagged firms subject to provisions preventing the exercise of market power • Independent market monitor (IMM) to issue monitoring and mitigation reports covering competitiveness of auctions and bilateral market • IMM tasked with reporting potential conduct violations for investigation to state agencies and FERC

I. Governance

The Governance structure of the FCEM will align with the market’s primary design objective of enabling states and consumers to achieve policy and private decarbonization goals through a financially sustainable competitive marketplace. To that end, the governance structure will incorporate the required level of state oversight, independent expert review of market performance, and transparent rules-change processes. Stakeholder representation will acknowledge the central role of buyers in a voluntary marketplace. The FCEM governing documents will incorporate sufficient guarantees of long-term market sustainability to attract private investments.

This design proposal includes a proposed governance structure in which the FCEM will be administered by a new entity, the FCEM-NE. Though the market would be FERC-jurisdictional, state representatives would take the primary role in developing and approving new FCEM market rules through appointing the six members of the

“Section 205 Filing Rights” are defined under Section 205 of the Federal Power Act as the right of a FERC-regulated public utility to propose new just and reasonable rates for which FERC-jurisdictional services and products can be provided. In the context of the FCEM, the FCEM-NE would be defined as the public utility that supports trade in the FCEM at rates established via the FERC-approved FCEM Market Rules.²

FCEM-NE Board of Directors. The Board of directors would oversee and guide the activities of the FCEM-NE and hold the Section 205 Filing Rights required to propose FCEM-NE market rule changes for FERC approval.

The New England states and the New England States Committee on Electricity (NESCOE) will continue to conduct a legal analysis and implementation feasibility review of at least three alternative governance models including: (1) a FERC-jurisdictional FCEM administered by FCEM-NE and implemented with coordination and support from ISO-NE (the governance approach assumed for the purposes of this design proposal); (2) a non-FERC-jurisdictional FCEM implemented under state authority that is separated from ISO-NE activities; and (3) a FERC-jurisdictional FCEM that is administered by ISO-NE or a new affiliate entity. Most elements of this FCEM design proposal are consistent with all three of these alternative governance models, though certain elements would need to be revised if the second or third approach is ultimately chosen (as identified at relevant places in this document).

The following features of FCEM governance are proposed to balance the requirements for adequate state oversight, investor confidence, and attracting voluntary buyers:

² The role of the FCEM-NE and Market Rules in determining the rules of trade within the FCEM would be analogous to the role of ISO-NE and Market Rule 1 for determining the rules of trade within other New England wholesale electricity markets. For additional discussion of Section 205 filing rights in other FERC-jurisdictional markets, see Parent, *et al.* [Governance Structure and Practices in the FERC-Jurisdictional ISOs/RTOs](#). Prepared for the New England States Committee on Electricity. February 2021.

- **Market Rules:** The FCEM market rules will be codified in a new “FCEM Market Rules” similar to ISO-NE’s “Market Rule 1” that sets the terms of current wholesale electricity markets in New England. However, unlike Market Rule 1, the FCEM Market Rules will be separate from ISO-NE’s current Open Access Transmission Tariff (OATT). Conforming changes may be required to existing governing documents including the OATT, NESCOE Memorandum of Understanding, and Participants Agreement. Similar to the ISO-NE OATT and Market Rule 1, the FCEM Market Rules would establish the rules through which prices would be set and costs allocated to buyers.
- **Administration:** A new independent non-profit entity, FCEM-NE, will be created to administer the FCEM and manage market rules-change processes. The new FCEM-NE entity will rely on formalized relationships with ISO-NE (to implement the majority of the operational and settlement functions of the FCEM), and with NEPOOL-GIS (to support coordinated FCEM certificate issuance and tracking functions). The new FCEM-NE entity will perform additional functions required to support and attract state and voluntary buyer participation in the FCEM including supporting desirable product definition, supporting the development of demand bid parameters, and adjusting processes to align with state regulatory requirements.
- **Jurisdiction:** The FCEM will be a FERC-jurisdictional market.
- **Board of Directors of FCEM-NE:** The Board of Directors of the new FCEM-NE entity would be comprised of the NESCOE Board of Managers, with each state reflecting a 1/6 voting share. The FCEM-NE board will have the authority to hire and fire the Chief Executive Officer of the FCEM-NE, provide guidance on FCEM reform priorities, and authorize/veto Section 205 reforms to the FCEM Market Rules. Rules-change filings would require a majority voting share among non-abstaining states.
- **Section 205 Filing Rights:** Section 205 filing rights to reform the FCEM-NE Market Rules would be held by the FCEM-NE Board. Stakeholders will participate in developing Section 205 reforms proposals as follows:
 - FCEM-NE can submit Section 205 filings to FERC with >50% sector-weighted stakeholder approval (subject to Board veto).
 - If stakeholders (via the New England Power Pool (NEPOOL)) achieve 2/3 majority on an alternative proposal, FCEM-NE will be obligated to submit the alternative proposal to FERC (either as a single proposal or as a “jump ball” filing alongside the FCEM-NE’s preferred proposal).
- **Section 206 Filing Rights:** Section 206 complaints can be filed by any entity.³

³ Under Section 206 of the Federal Power Act, any party may file a complaint alleging that a rate (i.e. rates set through FCEM Market Rules in this case) is unjust and unreasonable and seek a FERC-approved replacement rate. See Parent, *et al.* [Governance Structure and Practices in the FERC-Jurisdictional ISOs/RTOs](#). Prepared for the New England States Committee on Electricity. February 2021.

- **Stakeholder Engagement:** NEPOOL will act as the body for supporting stakeholder engagement on FCEM, but will create a separate registry of stakeholders and voting shares for the purposes of supporting engagement related to the FCEM. The stakeholder voting shares for the FCEM will be as follows:⁴
 - 12% state-authorized buyers (*e.g.*, agencies or utilities submitting buy bids under state mandate)
 - 12% competitive retailer buyers (*e.g.*, LSEs submitting voluntary buy bids)
 - 12% public power, municipalities and local governments
 - 12% direct consumer buyers (typically companies or large end users)
 - 12% consumer advocates
 - 35% sellers qualified to offer certificates into the FCEM
 - 5% environmental organizations
- **Annual FCEM Parameters and Market Rules Updating:** The FCEM-NE will conduct a regularized annual market parameters and rules-change process that includes: (a) the independent review of market outcomes and recommended reforms provided by a panel of independent experts to the FCEM-NE Board, stakeholders, and public (similar to the role of the Ontario Market Surveillance Panel and California Market Surveillance Committee); (b) for any state requesting analytical support for developing their demand bids, FCEM-NE staff will develop draft recommended parameters for consideration or adoption in alignment with each state’s relevant approvals processes; and (c) FCEM-NE staff will offer market-wide rule change recommendations to the FCEM-NE Board that would be refined through stakeholder and 205 filing processes. Though other rule update processes may be initiated separately or on different timelines, the annualized update process would be envisioned as the primary opportunity to revise FCEM Market Rules. Many rules changes would be implemented in a staged fashion to ensure continuity and avoid disrupting active transactions.
- **Independent Market Monitor (IMM):** An IMM will be selected to monitor the competitiveness of the FCEM as a whole and all relevant sub-markets, subject to the relevant market monitoring and mitigation provisions.
- **Administrative Costs:** The costs of administering the FCEM will be funded through a surcharge on transactions within the FCEM.

⁴ As in current NEPOOL processes, registered stakeholders may delegate participation on their behalf to their representatives and delegate proxy voting rights.

II. Product Definition

The FCEM is a multi-product market platform through which buyers can procure their chosen clean electricity attribute products, unbundled from energy and capacity. The forward auction will enable buyers and sellers to make forward financial commitments via the centralized exchange to buy or sell one of several state-defined and regionally-defined clean electricity certificates. This forward obligation will then be fulfilled in the delivery year: sellers will produce or otherwise deliver the committed volume of certificates to FCEM-NE, and FCEM-NE will deliver the committed volume of certificates to the pertinent buyers. Buyers may then retire the procured certificates in fulfillment of state mandates and private goals.

A. Overview of Products and Resource Eligibility

The FCEM will support both regionally-defined clean electricity attribute products, as well as any state-defined attribute products introduced by participating states. Each state or regional product will be classified as either a clean energy certificate (measured in MWh) or a clean capacity certificate (measured in MW-month). Within each of those categories, there can be no double-counting of certificates. A resource may be certified as eligible to produce more than one certificate, but each energy certificate may only be settled/retired once, in satisfaction of one obligation or claim. A resource may, however, sell both its energy and capacity certificates.

Upon initial implementation, the FCEM will support the procurement of four new regionally-defined clean electricity attribute products plus any state-defined attribute products submitted for FCEM listing by state authorities.⁵ There is no maximum number of distinct attribute products that can be listed and cleared through the FCEM; it will be flexible to support the number and nature of products that will attract the greatest levels of buyer participation in the FCEM. Products can be listed, refined, or delisted from the FCEM within the annual rules-change processes described under Section I: Governance above, subject to the condition that any such changes would be applied prospectively and will not affect pre-existing delivery and settlement obligations.

Table 2 summarizes the general description and the technologies eligible to sell each of the regionally-defined FCEM attribute products. The preliminary determination of eligible technologies under each product will be refined by representatives of New England states based on stakeholder input, consistent with the FCEM guiding principals to maximize the benefits that the FCEM can offer to the New England region. New renewable and non-emitting technologies seeking eligibility to participate in one or more FCEM regionally-defined products can submit a request for consideration and demonstration of non-emitting status to FCEM-NE for consideration within the Board's annual rules-change processes.

⁵ Further, even these initially-defined attributes may be implemented in a staged fashion if such staging would expedite the timeframe for FCEM implementation.

Buyers will have the ability to select which product or products can be procured to fulfill each submitted demand bid; sellers will have the ability to make offers to supply multiple products for which the resource is eligible though resources will not be able to commit to sell higher volumes of certificates that the resource is certified as eligible to produce in one year (see also Sections III-0 below). Both existing resources and planned new resources from the relevant technology classes will be eligible to produce regionally-defined products regardless of online year, though buyers can elect to procure a portion of their demand from planned new resources under the “new resource” demand bid option. For state-defined attribute products, all aspects of product definition and eligibility will continue to be determined within the relevant state laws and regulations. State authorities will have the option to determine whether one or more of the regionally-defined products can be submitted in fulfillment of that state’s renewable portfolio standard (RPS) or other state mandates.

TABLE 2: OVERVIEW OF FCEM PRODUCT DEFINITION AND RESOURCE ELIGIBILITY

Product	Description	Eligible Resources
New England Renewable Energy Certificate <i>NE-REC</i> <i>Units: MWh</i>	MWh-denominated certificate representing energy generated by a renewable energy resource. Energy injected at a node during an interval with a negative real-time locational marginal price (LMP) will not be eligible	Onshore wind, offshore wind, solar, run-of-river hydro <30 MW, tidal, wave. Distributed resources eligible if qualified and delivering into ISO-NE energy markets
Clean Energy Attribute Certificate <i>NE-CEAC</i> <i>Units: MWh</i>	MWh-denominated certificate representing energy generated by any non-emitting energy resource. Energy injected at a node during an interval with a negative real-time LMP will not be eligible	Onshore wind, offshore wind, solar, hydroelectric, nuclear, tidal, wave. Distributed resources eligible if qualified and delivering into ISO-NE energy markets
GHG Marginal Abatement Certificate <i>NE-GHG</i> <i>Units: MWh_{GHG}</i>	MWh-denominated certificate representing a pre-defined “standardized abatement rate” in tonnes/MWh of marginal GHG abatement, consistent with locational marginal emissions (LME) at the node of injection during each real-time market interval. The standard abatement will be rate updated prior to each FCEM auction	Onshore wind, offshore wind, solar, nuclear, hydroelectric, storage, and demand response. Storage resources eligible only for net GHG abatement from injecting at a time of higher marginal emissions than when the resource charged
Clean Capacity Certificate <i>NE-CCC</i> <i>Units: MW-month</i>	MW-month denominated certificate representing FCEM-eligible capacity provided by any non-emitting resource. Clean capacity certificates denominated consistent with ISO-NE delivered capacity and within each ISO-NE designated capacity zone in each month. FCEM obligations transacted in each auction will be combined into a 12-month series of monthly obligations	Onshore wind, offshore wind, solar, nuclear, hydroelectric, storage, and demand response. Clean capacity imports are eligible, as long as qualified under ISO-NE capacity qualification rules
State-Defined Certificates <i>Units: MWh</i>	Defined by state laws or regulations	Determined by state laws or regulations

B. Regionally-Defined FCEM Products

This design document describes four regionally-defined FCEM products, but additional products may be added to accommodate stakeholder demand. These four proposed products may be introduced in a staged fashion if they are not immediately available upon FCEM initiation. The NE-REC, NE-CEAC, NE-GHG, and state-defined REC products are all MWh-based clean electricity attribute products and are therefore mutually exclusive (*i.e.*, 1 MWh of generation can be retired in satisfaction of consumer demand or state mandates under only one of these mutually exclusive products). The NE-CCC product is the unbundled attribute of 1 MW-month of clean capacity, which can be issued and sold separately from MWh-based certificates.

1. Renewable and Clean Energy Attribute Certificates

Regionally-defined renewable and clean energy attribute certificates, NE-RECs and NE-CEACs respectively, are defined as the unbundled attribute certifying the injection of 1 MWh of non-emitting energy meeting the applicable eligibility standards into the grid. NE-RECs and NE-CEACs will not be issued for energy injections during real-time pricing intervals when the resource node has a negative locational marginal price (LMP). Both NE-RECs and NE-CEACs are produced in the same way, but NE-RECs can only be produced by renewable generation resources, while NE-CEACs can be produced by any non-emitting generation technology.

2. GHG Abatement Certificates

GHG marginal abatement certificates, or NE-GHG, will be an energy-based product certifying the marginal CO_{2e} abatement achieved by a non-emitting resource. The volume of NE-GHGs issued to any resource will be scaled in proportion to the marginal tonnes of CO_{2e} that would have been emitted had the non-emitting resource in question not operated in that real-time pricing interval. The NE-GHG product will provide an opportunity for states and consumers to procure energy supply from clean electricity resources, including storage and demand response, that can eliminate greater volumes of GHGs from the grid by virtue of operating at times and locations where the highest-emitting fossil resources would otherwise be needed.

Though the NE-GHGs will be issued in proportion to displaced tonnes of GHG emissions, the certificates will still be denominated in MWh. As such, FCEM-NE must determine the standard abatement rate (in tonnes/MWh) that will apply to NE-GHG certificates issued in each vintage year. The standard abatement rate will be published alongside other FCEM auction parameters, prior to submission of FCEM offers and bids. In the first year of FCEM implementation, the standard abatement rate will be 0.4 tonnes of CO_{2e}/MWh. In subsequent years, the rate will be updated based on a rolling three-year average of issued certificates, subject to a minimum and maximum range of 0.1 to 1.0 tonnes of CO_{2e}/MWh.

When an eligible non-emitting resource supplies energy into the ISO-NE power grid, NEPOOL-GIS will issue the volume of NE-GHGs calculated as shown in Equation 1. The volume of NE-GHGs issued will be calculated based on the locational marginal emission (LME) rate at the resource's

energy pricing node during each five-minute real-time market interval. To support the determination of NE-GHG awards, ISO-NE will begin calculating and publishing settlement-quality LME data in every five-minute dispatch interval for all pricing nodes within the real-time energy market.⁶

EQUATION 1: CALCULATION OF GHG ABATEMENT CERTIFICATES ISSUED, PER 5-MINUTE INTERVAL

$$\text{NE-GHGs Issued} = \text{Energy Injected} \times \text{Locational Marginal Emissions} \div \text{Standard Abatement Rate}$$

WHERE:

NE-GHGs Issued (MWh_{GHG}) is the quantity of NE-GHGs issued to a resource for delivering energy to the ISO-NE grid in a specific 5-minute real-time energy market dispatch interval

Energy Injected (MWh) is the volume of energy delivered into the ISO-NE energy during the 5-minute real-time dispatch interval (physically-delivered quantities in real time will determine NE-GHGs issued, even if a portion or all of the resource’s energy deliveries are financially settled relative to the day-ahead energy market price)

Locational Marginal Emissions (tonnes of CO₂e/MWh) is the marginal rate of GHGs displaced by injecting energy (or avoiding consumption) of energy at the resource’s energy market pricing node in the relevant 5-minute real-time energy market dispatch interval

Standard Abatement Rate (tonnes CO₂e/MWh) is the pre-defined rate of GHG emissions that must be abated for NEPOOL-GIS to issue 1 NE-GHG certificate. The standard abatement rate is determined by FCEM-NE prior to each forward FCEM auction, and is maintained at that same value for the entire delivery year (and may be updated for future delivery years)

For standalone storage resources or hybrid resources that sometimes or always use grid power to charge, the volume of NE-GHGs issued will be reduced to account for the marginal emissions associated with the grid power used to charge the storage resource. The same Equation 1 will be used to calculate the volume of NE-GHGs issued in discharge intervals, and the volume of NE-GHGs deducted in charging intervals (negative “energy injected” resulting in negative “NE-GHGs Issued”).⁷ Resources sometimes charging from grid power within a defined delivery month are eligible to produce NE-GHGs in that month net of all NE-GHG deductions for charging hours; those resources may not produce NE-RECs or NE-CEACs in that same delivery month.

Figure 2 illustrates differences in the volumes of NE-GHGs that may be awarded to an energy resource or a storage resource as the relevant LME changes over the course of a day. For 1 MWh of energy delivered into the ISO-NE energy market, the quantity of NE-GHGs awarded (aqua bars)

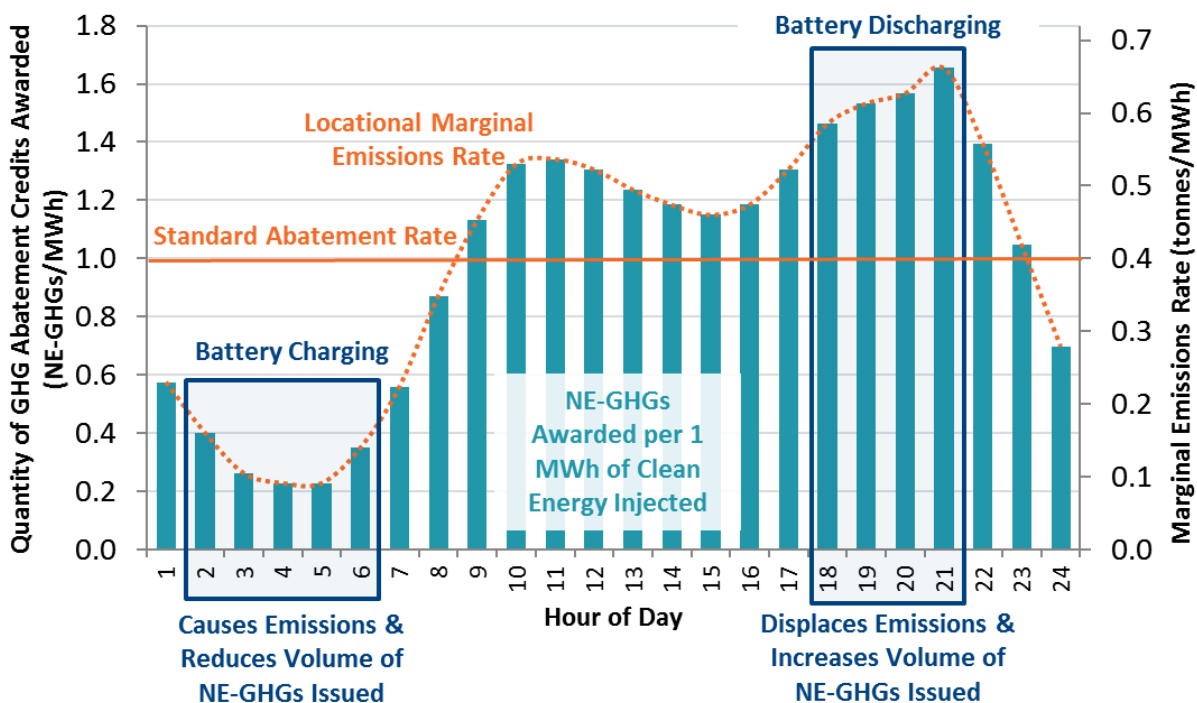
⁶ The calculation of LMEs will be calculated and published alongside LMPs, similar to the approach utilized in PJM. See PJM Interconnection, “[Marginal Emissions Rate—A Primer](#).”

⁷ A storage resource taking on an obligation to produce NE-GHGs will be incentivized to operate in ways that displace GHG emissions sufficient to meet or exceed their obligation. Still, it is theoretically possible for a committed resource to accumulate a net negative GHG abatement over the year, in which case the negative performance would be added to the resource’s shortfall relative to its FCEM-NE delivery obligations (see Section VI).

will vary by interval in proportion to the LME (orange dotted line). If the LME exceeds the standard abatement rate (orange solid line) at the time of energy delivery, then the awarded NE-GHG will be greater than 1; if the LME is below the standard abatement rate, then the awarded NE-GHG will be less than 1.

The figure further illustrates the NE-GHG awarded to storage resources (dark blue boxes). The example battery charges during hours with low LME rates and then discharges during intervals with high LME rates. The NE-GHG issued accounts for the net GHGs displaced across the charging and discharging intervals, including accounting for round-trip efficiency losses.⁸ Battery, demand response, and hybrid resources earning NE-GHG awards will also be eligible to earn revenues from ISO-NE energy and ancillary service market participation as well as for selling NE-GHG, and so may optimize their operations to maximize their private revenues received for selling NE-GHG alongside other grid services.

FIGURE 2: ILLUSTRATION OF NE-GHG CERTIFICATES PRODUCED FOR 1-MWH OF PHYSICAL ENERGY DELIVERED OVER AN ILLUSTRATIVE DAY



Notes: Mock data created for illustrative purposes only. Standard abatement rate of 0.4 tonnes of CO₂e/MWh is used. Delivering energy during intervals and at nodes with LME above 0.4 tonnes/MWh results in more than 1 NE-GHG awarded per 1 MWh of delivered.

⁸ Putting specific numbers to the example, and considering a 0.4 tonnes/MWh standard abatement rate: The battery charges over five hours, hours ending 2–6, against low LME rates of approximately 0.12 tonnes/MWh (equates to 0.59 tonnes caused by charging and 1.46 NE-GHG deducted); then the battery discharges over four hours, hours ending 18–21 against high LME rates of 0.62 tonnes/MWh (equates to 2.49 tonnes displaced by discharging and 6.22 NE-GHG awarded). On net over the example day, the battery has displaced 1.90 tonnes of GHG emissions, which translates to 4.76 NE-GHG issued, including accounting for round trip efficiency losses from the charge-discharge cycle.

3. Clean Capacity Certificates

Clean Capacity Certificates, or NE-CCCs, will correspond to the unbundled attribute reflecting capacity delivered into the ISO-NE FCM and supplied by non-emitting resources. The new NE-CCC product will create an opportunity for states and consumers to dictate and certify that a particular share of their total resource adequacy requirements must be served by non-emitting clean electricity resources, rather than fossil resources. The product will offer an opportunity to support graduated transition from present reliance on fossil resources for providing most grid reliability services, toward graduated reliance on clean electricity resources with high reliability value potentially including storage, demand response, nuclear, and thermal resources retrofitted to operate on decarbonized fuel sources.

One NE-CCC signifies that 1 MW-month has been committed and delivered under ISO-NE market rules, subject to FCM market rules governing resource qualification, accredited capacity value, delivery obligations, and penalties. Consistent with practice in the FCM operated by ISO-NE, the NE-CCC product transacted in the forward FCEM auction will constitute an obligation to deliver the committed volume of NE-CCCs across twelve consecutive months in the delivery year. If changes to the prevailing FCM rules alter resources' qualified capacity volumes and market clearing, this will affect those resources' ability to produce NE-CCCs. NE-CCCs will be separately defined for each capacity zone within the ISO-NE capacity market. If the FCM market is segmented into seasonal or other sub-products, the associated FCEM procurement practices and product definitions will be updated accordingly to ensure continued alignment.

Eligible resources will be able to unbundle and sell NE-CCCs, while separately selling unbundled energy-based clean energy attribute products (NE-CEACs, NE-RECs, NE-GHGs or state-defined energy attribute products).

C. State-Defined Attribute Products

The New England states each have unique climate and environmental policy objectives that inform the technologies they support through state policy and voluntary FCEM participation. States can opt in to listing one or more state-defined attribute products within the FCEM, with no restrictions on whether these state-defined products prioritize features such as scale (*e.g.*, resources below a certain MW capacity or resources connected to the distribution system), or technology (*e.g.*, only solar or offshore wind resources). States will continue to utilize their individual legislative and regulatory processes to establish rules for qualification, excess compliance options, alternative compliance payments, and other aspects of product definition.

These state-defined rules need not match the rules applicable to similar regional FCEM-defined products. However, over time, the experience with innovative product offerings within the FCEM and across participating New England states may be mutually informative, improving the economic efficiency and efficacy of both state policies and the FCEM products.

D. Certificate Tracking

The FCEM will utilize and build on the NEPOOL GIS certificate issuance and tracking system already in use today across the New England states. Operational data from ISO-NE will be used as the basis for issuing certificates under the four new regionally-defined products FCEM rules will determine the qualification, retirement, and certificate banking processes for all FCEM-defined regional products, which will follow similar (but not identical) processes to those already supported by NEPOOL GIS.

Processes relevant to certificates issued, traded, and retired will not change for any state programs that are not participating within FCEM.

1. Overview of Certificate Tracking Processes

The processes for tracking FCEM-based obligations and fulfillment of those obligations is summarized in Figure 3, with all of these initially proposed tracking mechanics subject to further refinement based on the joint expertise and recommendations of FCEM-NE, ISO-NE, and NEPOOL-GIS. Resources will be certified as eligible to produce FCEM-defined regional products by FCEM-NE and ISO-NE based on the defined qualification criteria, while eligibility to produce state-defined products will continue to be certified by state agencies as is done today. Once certified as eligible, NEPOOL-GIS will begin issuing certificates consistent with FCEM eligibility criteria to the resource owner for any volumes delivered. ISO-NE will provide resource and system operational data required for the determination of eligible resource volumes.⁹

Qualified buyers and sellers can participate within the three-year-ahead centralized FCEM auction, and, if cleared, will take on an obligation to buy or sell specific classes of FCEM-defined or state-defined certificates. FCEM-based delivery and payment obligations will be made with FCEM-NE acting as the counterparty to all buyer and seller transactions, supported by credit requirements, provisions for supply under-delivery, and settlements implemented by ISO-NE. On a market-wide basis within each FCEM auction, the aggregate resulting commitments to purchase each product will be the same size (in both volume and dollar terms) as the aggregate commitments to deliver.

The forward obligation to purchase or deliver each defined product will be tracked by FCEM-NE. Both NEPOOL-GIS and ISO-NE will have access to the FCEM-NE database of certificate obligations and will implement streamlined data handling processes across the three organizations. Buyers and sellers will interact with a single front-end web interface for the purposes of all FCEM-related

⁹ Today, this information includes only resource-specific MWh delivered volumes. To support the new regionally-defined FCEM products, ISO-NE will have to provide data to account for the differences between existing and future state product definitions as discussed in Section II.B. Specifically, NE-RECs and NE-CEACs will not be awarded during 5-minute dispatch intervals with a negative price at the injection point, NE-GHG will be awarded in proportion to nodal locational marginal emissions at the injection point in each 5-minute interval, and NE-CCCs will be awarded for delivery of capacity across each month throughout the defined capacity market obligation period.

activities including bid submissions; viewing and managing outstanding obligations and certificate positions; and allocating certificates toward state compliance or private goals. Obligations to purchase or deliver certificates may be reassigned to a new resource or entity through bilateral market transactions, as long as both parties agree to the transfer and as long as all relevant resource eligibility and credit requirements are fulfilled.

Within the delivery year, the issuance of certificates and fulfillment of obligations, will be implemented on a monthly basis, with timing adjusted as needed to align with ISO-NE settlement timelines and credit management practices.¹⁰ NEPOOL-GIS will issue certificates to resource owners on a monthly basis consistent with delivered volumes.¹¹ Consistent with current practice in the NEPOOL GIS, for resources eligible to produce more than one product, the certificates issued may be tagged as eligible to satisfy more than one state or FCEM obligation, but only if the issued volume of certificates is identical under both regimes.¹² If a resource is eligible to produce more than one separately-tracked and mutually exclusive product, monthly certificate volumes will be issued in proportion to outstanding FCEM obligations unless the asset owner over-rides the proportion of certificates produced within each product.¹³ Certificates issued to resource owners will be transferred to FCEM-NE and applied toward fulfillment of outstanding FCEM delivery obligations as a precondition to receiving payment for the delivered volumes.¹⁴ Buyers will be issued the procured certificates and issued settlements in monthly installments as fulfillment of FCEM-based obligations.

At the conclusion of the delivery year, buyers and sellers will have approximately six months to finalize positions before final FCEM obligation and state compliance deadlines. Sellers with a deficit in certificates relative to FCEM obligations may fulfill the shortfall by procuring replacement supply from within the same product or by procuring replacement supply from a spot auction conducted by FCEM-NE.¹⁵ Buyers will have received all FCEM-eligible certificates transferred into their NEPOOL-GIS account and can retire certificates as contributions toward state mandates or private goals within designated sub-accounts. State agencies opting into FCEM

¹⁰ As further described under Section VII: Financial Arrangements, FCEM-related settlements will be implemented so as to ensure alignment in the timing of collected settlements, distributed payments, and associated credit requirements for each market participant, as consistent with ISO-NE settlement and credit practices.

¹¹ Current practice in NEPOOL-GIS is based on quarterly issuance, while ISO settlement activities are monthly. This proposal describes alignment with a monthly schedule, with timing, software, and implementation plans to be refined based on the joint recommendations of FCEM-NE, ISO-NE, and NEPOOL GIS.

¹² State-defined and FCEM-defined MWh-based products will not result in identical awarded volumes because NE-CEAC and NE-REC products are not awarded during negative price intervals; NE-GHG products are awarded in proportion to delivered abatement volumes; and NE-CCC credits are awarded in different units of measure and are not mutually exclusive. Due to these differences, FCEM-defined certificates will be tracked separately from state-defined certificates. Within FCEM-defined products, NE-CEAC and NE-REC eligibility can be signified within a single certificate as long as the resource qualifies under both products.

¹³ The proportion of attributes produced within separately tracked and mutually exclusive products can be adjusted on a monthly basis for each resource, but cannot be adjusted on a granular interval-by-interval basis.

¹⁴ Monthly variability in issued volumes will be managed as described in Section VI.

¹⁵ Resources obligated to produce certificates under new resource obligations must be replaced by new resources qualified under the same product and under the same or a later new resource online year.

participation can opt in to utilizing new functionality that will be included in FCEM-NE for tracking LSE compliance relative to state mandates, including accounting for excess compliance, state-authorized procurements, and certificate banking.

Excess certificate volumes may be sold bilaterally, sold into the FCEM spot auction, applied toward voluntary goals, used for excess RPS compliance (subject to state rules), or banked for future years (only for the relevant FCEM-defined products). At the final FCEM and state compliance deadline, any residual certificate positions will be frozen and swept into the residual system mix for the purposes of system-wide GHG emissions accounting and source disclosure.

FIGURE 3: FCEM CERTIFICATE TRACKING AND SETTLEMENTS

3-Year Forward FCEM Auction	Bilateral Transactions	Delivery Period	Retirement & Compliance
<ul style="list-style-type: none"> • Resource Eligibility: Certified by FCEM-NE & ISO-NE (regional products), or state agencies (state products) • Sellers: Offer resources into FCEM auction and accept resulting delivery obligations • Buyers: Place demand bids into FCEM auction and accept resulting payment obligations • FCEM-NE: Conducts FCEM auction • Forward Obligations: Buyer and seller obligations tracked in FCEM-NE accounts (database updating is coordinated with NEPOOL-GIS and ISO-NE) 	<ul style="list-style-type: none"> • FCEM-NE: Supports bilateral transactions enabling sellers to reassign resources' delivery obligations and buyers' payment obligations within each product 	<ul style="list-style-type: none"> • ISO-NE: Provides resource and system operational data • NEPOOL-GIS: Issues certificates to resource owners on a monthly basis. For FCEM participants, certificate volumes are transferred to FCEM-NE toward fulfillment of outstanding FCEM obligations (excess volumes can be held in either the NEPOOL-GIS or FCEM-NE account, deficit volumes tracked for final compliance processes) • Buyers: Receive procured certificates in equal monthly installments in delivery year. Buyer may allocate certificates to state-specific FCEM sub-accounts for state compliance • ISO-NE: Charges buyers monthly for delivered certificates; pays sellers monthly for fulfilled FCEM obligations 	<ul style="list-style-type: none"> • FCEM-NE: Conducts spot auction • Seller Residual FCEM Positions: Excess certificate volumes held in account may be sold bilaterally, sold via FCEM spot auction, or banked. Deficits must be resolved prior to or within spot auction • Buyers: May buy/sell certificates in spot auction to manage positions relative to state/private targets • Attribute Retirement: Certificates are applied toward state compliance or voluntary goals via dedicated FCEM-NE sub-accounts. Retirements allowed any time prior to compliance deadline (retirement is non-reversible) • Unretired Certificates: Certificates that remain unsold, unretired, or unbanked will be frozen and tracked in the residual system mix • ISO-NE: Implements spot auction settlements and penalties

2. Bilateral and Replacement Transactions

The intent and effect of the FCEM must be to augment, enable, and support bilateral market transactions, by providing infrastructure and transparency that can inform contracting decisions and reduce barriers to trade. As such, buyers and sellers in the FCEM will have the ability to engage in bilateral transactions at all times prior to and after making commitments in the forward FCEM auction, up to the final state and FCEM compliance deadline. The nature of bilateral transactions that will be supported include, but are not limited to:

- **Bilateral Transactions for State-Defined Certificates and Made Outside of the FCEM Market Context:** This category of bilateral transactions will be supported by NEPOOL-GIS in the same fashion as today, and will not be affected by the introduction of the FCEM.

- Bilateral Transactions for Regionally-Defined Certificates and Made Outside of the FCEM Auctions:** This category of bilateral transactions will be supported via NEPOOL-GIS and FCEM-NE tracking systems to issue and track the volume of certificates sold, with the eligibility and volume certification parameters dictated by FCEM Market Rules. However, the financial parameters for payment, settlement, and penalty rates for non-delivery will be entirely established by private buyers and sellers outside the scope of FCEM-NE, NEPOOL-GIS, or ISO-NE business activities. For purposes of market-wide transparency, aggregate transacted volumes will be reported and accounted for in annual reports. For the purposes of supporting adequate market monitoring and mitigation activities relative to the bilateral market, FCEM-NE and the IMM will continuously review bilateral market activities and will investigate price and other terms of private transactions on an as-needed basis.
- Bilateral Commitments Made Prior to the FCEM Auctions and Settled Relative to the FCEM Forward or Spot Market Price:** Buyers and sellers may wish to engage in long-term contracts based on privately-agreed prices or other terms, but settled relative to their separate FCEM market positions. These bilateral transactions will be supported within the FCEM market context. Two typical arrangements, common in other wholesale electricity markets, include:

 - Contract-for-difference arrangements between private parties that agree to a contracted strike price for a specified certificate price and volume, the payment for which is settled relative to the realized price in the FCEM forward market or spot market. Both parties will typically engage as buyers and sellers within the relevant FCEM auction(s) at volume levels similar to those in the contract and hence use the bilateral contract as a long-term hedge. The volume, price, and other terms of the bilateral contract would not need to be reported to FCEM-NE or other administering entities, unless disclosure were required for IMM review processes.
 - Self-schedule arrangements between private parties, but reported through FCEM auctions. The contract terms for self-schedule arrangements would be made outside of the FCEM auction systems, but would be reported and mutually confirmed by offsetting buyer and seller positions prior to the pertinent FCEM auction. Any self-scheduled committed volume would be treated as cleared and committed for the purposes of FCEM auctions and commitments, but would not result in any settlements (which would take place privately and outside the FCEM auctions). However, the tracking of the obligation via the FCEM system would obligate the seller to deliver upon the committed volume to FCEM-NE, conform with relevant credit requirements, and face penalty provisions for any non-delivered volumes. The buyer would also be eligible to receive the committed volumes from FCEM-NE. A similar self-schedule process will be available for LSEs engaging in self-supply relative to rate-authorized demand bids (see Section III.B.1).
- Bilateral Replacement Transactions in Fulfillment of FCEM Obligations:** If a seller has taken on a forward obligation to deliver certificates via FCEM and is not able to physically produce the required volume, then the required certificates can be procured bilaterally and submitted in fulfillment of the obligation. The procurement of the required certificates can be conducted bilaterally and outside of the FCEM auctions, with the transfer of the procured certificates

supported by FCEM-NE upon confirmation of both parties. Once the obligated seller holds the needed certificates in account, they can be submitted to FCEM-NE in fulfillment of any outstanding obligations.

Additional supports may be introduced into the FCEM Market Rules or NEPOOL-GIS systems on an as-needed basis to enhance value to buyers and sellers across the region.

3. Certificate Retirement and State Compliance

For states not opting-in to FCEM participation or product listing, processes for retiring certificates and tracking compliance will remain unchanged.

For states opting in to FCEM participation, additional functionality will be offered to state agencies that wish to utilize the FCEM-NE system for tracking and compliance purposes. Certificates procured via the FCEM may be used in fulfillment of voluntary goals or state mandates as tracked under separate FCEM-NE sub-accounts. If a single LSE has obligations to retire certificates toward multiple states' mandates or private goals, separate NEPOOL-GIS sub-accounts must be created for managing each separate state compliance requirement and for managing voluntary retirements. For states wishing to utilize the FCEM-NE system for the purposes of tracking compliance with obligations, each state sub-account will track the LSEs' compliance obligation, retired volumes, and satisfaction of applicable state mandates.¹⁶ A certificate must be retired in order to satisfy state compliance obligations or to receive certification of fulfillment toward voluntary goals. A certificate can be retired any time after it is transferred into a buyer's account and before the final FCEM and state compliance deadline. Once retired, certificates cannot be further transferred, traded, or banked.

The entity responsible for managing certificate retirement will differ somewhat for different classes of FCEM buyers described in Section III.B, and will generally allow state-mandated participation in FCEM to be automatically reflected as compliance with state RPS or other state mandates.

4. Excess Compliance and Certificate Banking

For some classes of certificates and state programs, the value of clean resources' production can be stored and used in future years. There are two separate mechanisms that may enable storing clean certificate value: (1) state provisions for excess compliance to be utilized in future years, and (2) FCEM certificate banking.

¹⁶ Note that these processes are similar to the current retirement reporting processes offered by NEPOOL-GIS, but with new functionality that will allow state agencies to track obligations and compliance within the system (rather than through outside state processes).

BANKABLE EXCESS COMPLIANCE RELATIVE TO MINIMUM STATE MANDATES

Currently, most New England states allow obligated LSEs to retire state-qualified certificates beyond the minimum required and to use some or all of the excess compliance toward future year obligations, subject to various duration and volume limits. State-defined certificates procured via FCEM would be subject to the same excess compliance provisions as certificates procured via other means. States' processes for tracking and enforcing excess compliance provisions can remain unchanged. For states that wish to utilize new functionality offered by FCEM-NE for tracking compliance, the system will be able to support excess compliance tracking over time.

FCEM CERTIFICATE BANKING

Provisions for certificate banking will differ across FCEM-defined products. NE-CCCs will not be eligible for certificate banking, and must reflect continuously-delivered capacity over the relevant capacity obligation period, given that capacity needs must be achieved in all years to ensure resource adequacy is maintained. For energy-based FCEM, it will be possible to bank a portion of the certificate value for future use as a means to enable market participants to manage year-to-year variability in supply and obligations and in recognition of the multi-year nature of the underlying environmental needs. Banking provisions (together with penalty and shortfall provisions) included in this FCEM proposal are applied under a graduated approach intended to mitigate pricing extremes.¹⁷

Energy-based FCEM products (NE-RECs, NE-CEACs, and NE-GHGs) will be eligible for product banking under a product-specific rollover rate. For example, if the rollover rate is 75% for the year 2030, then 100 2030-vintage certificates can be converted via the FCEM-NE system into 75 2031-vintage certificates. Certificate rollover is a non-reversible conversion.¹⁸

The rollover rate will be the lesser of 80% or a market-wide value that ensures that no more than 20% of all energy-based certificates can be banked for use in subsequent years. Equation 2 is the formula that will be used to establish the market-wide rollover rate, and may result in different rollover rates for each FCEM-defined product. Preliminary calculations of the rollover rate will be calculated by FCEM-NE and made available to market participants each month prior to the FCEM compliance deadline. The market-wide rollover rate will be finalized after the compliance deadline when the total volume of certificates requesting banking treatment is determined.

¹⁷ Absent such mitigating market features, many product markets, including for RECs, can be susceptible to extreme pricing volatility and "end price effects" as the compliance deadline approaches. If the market is modestly over-supplied, the price would drop to zero (or if the market is modestly under-supplied, the price would rise to the price cap or alternative compliance payment). The banking provisions described here, combined with the spot auction penalty rate (described in Section VI.B-C) will mitigate the pricing extremes that might otherwise be caused by typical year-to-year variability in resource output and consumer demand.

¹⁸ Conversions are roll-forward only. Certificates cannot be converted from future vintage years into prior vintage year certificates.

**EQUATION 2: ROLL-OVER RATE FOR FCEM CERTIFICATE BANKING,
VALUE CALCULATED SEPARATELY FOR NE-RECS, NE-CEACS AND NE-GHGS**

$$\text{Rollover Rate} = \text{Minimum}[80\%, \text{ or } 20\% \times \text{Total Certificates Issued} \div \text{Banked Certificates}]$$

WHERE:

Rollover Rate (%) is the rate at which a certificate created in year Y can be rolled forward into certificates in year Y + 1 for the same FCEM-defined product

Total Certificates Issued (MWh) is the total volume of certificates issued in year Y by NEPOOL-GIS under that product definition

Banked Certificates (MWh) is the total volume of certificates requested for rollover treatment from year Y to year Y + 1, as of the year Y compliance deadline

Table 3 summarizes the excess compliance and certificate banking provisions applicable for different state-defined and FCEM-defined products.

TABLE 3: EXCESS COMPLIANCE AND CERTIFICATE BANKING PROVISIONS

Product	Bankable Excess Compliance Under State RPS and Other Mandates	Certificate Banking
Regional Renewable Energy Certificate (NE-REC)	n/a	Banking allowed at lesser of 80% or product-specific rollover rate
Clean Energy Attribute Certificate (NE-CEAC)	n/a	Banking allowed at lesser of 80% or product-specific rollover rate
GHG Marginal Abatement Certificate (NE-GHG)	n/a	Banking allowed at lesser of 80% or product-specific rollover rate. Rollover accounts for the difference in the GHG standardized abatement rate between the two vintage years (<i>e.g.</i> , NE-GHGs abating 100 tonnes of GHG emissions in 2030 can be rolled over to NE-GHGs abating 75 tonnes for 2031 vintage if the rollover rate is 75%)
Clean Capacity Certificate (NE-CCC)	n/a	Not eligible for banking
State-Defined Certificates	State rules apply regarding whether excess compliance volumes can be applied for compliance in future years	n/a

III. Demand Participation in the FCEM

A. Overview of Demand in the FCEM

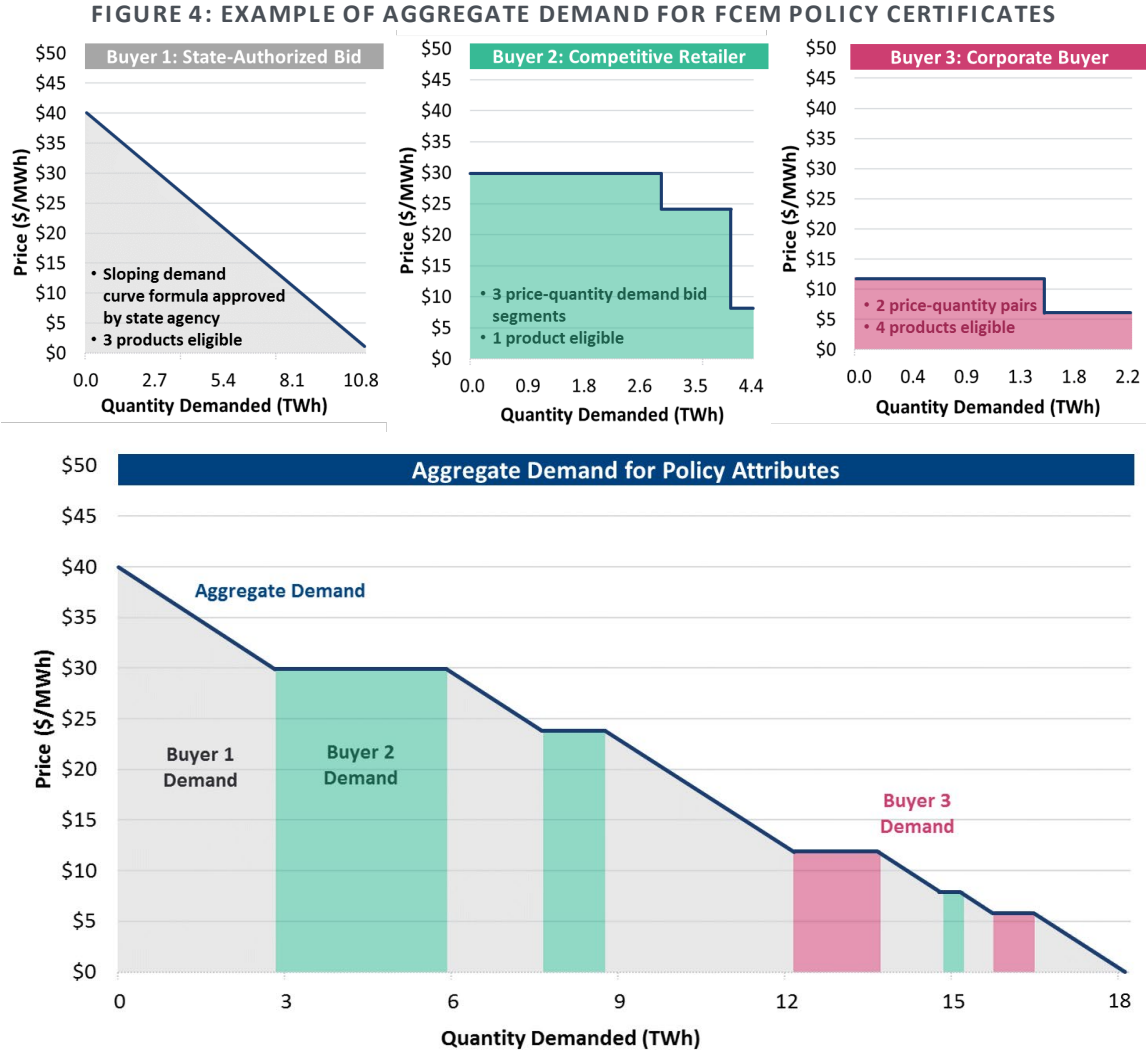
This FCEM design proposal aims to attract many differently-situated buyers to participate and procure the regionally-defined and state-defined certificates needed to satisfy their current and evolving policy and private clean energy procurement goals. These buyers may be state agencies; utilities or third-party entities acting on behalf of a state government; local governments; LSEs seeking to fulfill a state procurement mandate or serve voluntary consumer demand; companies fulfilling private sustainability goals, or environmental groups. Detailed participation rules will vary somewhat across differently-situated buyers.

All buyers participating in FCEM will be able to specify: the desired volume of certificates to procure; the FCEM-defined or state-defined products eligible to serve their demand; and the maximum price the buyer is willing to pay for each demand bid segment. The FCEM will also enable buyers the option to participate using a downward-sloping demand curve; to require that only planned new resources be eligible to fulfill their demand bids under a multi-year commitment; and/or submit a phased entry demand bid designed to accommodate projects across multiple online years. The sum of all demand volumes from all state and individual buyers can be summed into an aggregate market-wide market demand for clean energy certificates that can be procured via FCEM. Figure 4 is a simplified illustration of aggregate demand in the FCEM, depicting the aggregation of demand from three different buyers:

- **Buyer 1** (gray) is a state agency submitting a downward-sloping demand bid on behalf of consumers under its rate-making authority. For example, the agency may be a state energy office or commission that, under historical practice, would have conducted or approved a solicitation for long-term contracts, the cost of which would have been recovered through retail rates from customers under the agency's ratemaking authority. If the agency instead procures certificates via the FCEM, the costs will be recovered through the energy portion of the relevant customers' bills. In this example, the agency stipulates that three different categories of certificates can satisfy state demand;
- **Buyer 2** (green) is a competitive retailer in a different state where the state regulatory authorities have opted in to enabling the listing of state-defined RECs via the FCEM (but where the state agency does not require LSEs to procure RECs via the FCEM). Buyer 2 chooses to submit a demand bid in three price-quantity segments, and intends to use the procured certificates in partial fulfillment of its anticipated state RPS obligation (the standard being enforced through state processes outside the FCEM). The LSE plans to supplement its FCEM-based REC purchases with other bilateral purchases closer to the delivery year and compliance deadline, after it better understands its total RPS obligation. Only one product can satisfy this buyer's demand, the REC associated with the relevant state-defined RPS standard; and

- **Buyer 3** (pink) is a voluntary corporate buyer submitting a demand bid in two price-quantity segments. Buyer 3 intends to use the procured certificates in fulfillment of corporate sustainability commitments. The buyer stipulates that four different products can be used to fulfill the demand bid.

The aggregate demand of these three buyers can be illustrated by horizontally aggregating the three demand bids (though this simplified representation does not readily depict the eligibility of different products to serve each buyer’s individual demand).



Notes: This figure is simplified representation of aggregate FCEM with a small number of buyers (each with large demand volumes). In reality, the FCEM may support many more buyers with small and large demand bids. Further, there will be several FCEM products each with their own sub-market; some bidders may be indifferent to which particular product they procure (*i.e.*, products being substitutable from the customer’s perspective). Similarly, some sellers may be eligible and willing to serve demand across multiple products. To match supply with demand in the way that maximizes social value and tracks both substitutability and non-substitutability on the supply and demand side, the FCEM auctions will be cleared using a co-optimized multi-product auction format as described in Section V.

B. Demand Participation Mechanics

To enable differently-situated buyers to participate, the FCEM will need to be sufficiently flexible to accommodate the states’ different regulatory models and different classes of potential certificate buyers. This initial FCEM design proposal contemplates three different types of FCEM demand bids that will need to be reflected via distinct participation rules: (1) rate-authorized demand bids; (2) LSE demand bids; (3) and non-LSE demand bids. Differences in how FCEM rules will apply to these three categories of demand bids are summarized in Table 4.

TABLE 4: FCEM DEMAND PARTICIPATION MODELS

	1. Rate-Authorized Demand Bids	2. LSE Demand Bids	3. Non-LSE Demand Bids
Examples of Entities	<ul style="list-style-type: none"> State agency FCEM-NE-calculated bid, using state-dictated formula Distribution utility (under state-authorized participation) 	<ul style="list-style-type: none"> Retailer subject to state RPS or serving voluntary end use demand Public power or integrated utility engaged in resource planning 	<ul style="list-style-type: none"> Local governments End use consumers Non-governmental organizations
Payment Obligation	<ul style="list-style-type: none"> Payment obligation follows the state-specified customer group (not the LSE) 	<ul style="list-style-type: none"> Payment obligation assigned to the LSE (not the end use customer) 	<ul style="list-style-type: none"> Payment obligation to voluntary buyer
Credit Requirements	<ul style="list-style-type: none"> n/a (guarantee to pay is derived through rate authority) 	<ul style="list-style-type: none"> Credit requirements sufficient to cover buyer-specified max price & term 	<ul style="list-style-type: none"> Credit requirements sufficient to cover buyer-specified max price & term
Certificate Delivery	<ul style="list-style-type: none"> Certificates transfer to state-designated entity (to be retired in fulfillment of obligations for designated customer classes) prior to compliance deadline 	<ul style="list-style-type: none"> Transferred to LSE 	<ul style="list-style-type: none"> Transferred to voluntary buyer

1. Rate-Authorized Demand Bids

This FCEM design proposal envisions that the market will become a critical tool used by several states in the New England region for implementation of their respective clean energy policies. They will do so through overseeing FCEM market rule and product enhancements as described above, and, for some states, by acting as the largest buyers of clean energy certificates and hence attracting investment in a balanced portfolio of clean electricity resources.

“Rate authorized” buyers are defined as those buyers, typically state agencies or their designees, that have retail ratemaking authority sufficient to authorize the allocation of FCEM procurement costs to a defined class of consumers, typically arising in the energy supply portion of the bill. As the anchor buyers in the FCEM, state agencies will have access to additional analytical and implementation support from FCEM-NE on an as-needed basis to develop and implement their chosen demand bid structure (e.g., analytical support in the development of sloping demand curve parameters).

State participation as buyers in the FCEM is voluntary. States wishing to use the FCEM to fulfill an RPS mandate or other policy commitments can do so by authorizing a designated entity to submit the relevant demand bids in the FCEM forward or spot auctions. Under rate-authorized demand bid rules, demand participation must be authorized by a state agency with rate-making authority, including identifying the classes of customers that will be obligated to pay for any FCEM volumes procured on their behalf. The entity submitting demand bids on behalf of the state may be state agency staff; a utility acting at the directive of the state agency; FCEM-NE developing demand bid parameters consistent with a formula stipulated by the state agency (and subject to state agency approval); or another third-party entity designated by the authorized state agency. Any entity submitting a rate-authorized demand bid may request analytical support from the FCEM-NE administrator to develop and update parameters and demand bids, subject to state approval and over-ride. Rate-authorized demand bids are the only category of demand bids that are not subject to credit requirements (as obligation to pay is guaranteed as a function of the agency's ratemaking authority), and are the only category of demand bids eligible for submission through sloping demand curve formula.

Certificates procured via the FCEM will be transferred into an escrow or holding account that is visible to both the agent of the state that has submitted the FCEM-demand bid, as well as to the individual LSEs that are presently serving the customers who will ultimately pay the associated procurement costs. Though the LSEs will be able to view the outstanding procurement obligations and allocated certificates as pertinent to customers under their management, the LSE will not be able to transfer, bank, or otherwise manage the certificates procured under rate authority. On an ongoing basis throughout the delivery year, the procured certificates will be retired toward fulfillment of the relevant customers' state obligations through the FCEM-NE system, and associated settlements will be issued to the LSE by ISO-NE.

LSEs wishing to self-supply certificates relative to rate-authorized demand bids can do so via either a financial hedge or via explicit self-supply mechanics. Under the first option to implement a supply-side hedge, the LSE in question would submit and clear a sell offer into the forward FCEM auction within the relevant product category. The LSE would then be settled relative to offsetting position supply and demand positions, both struck at the same price in the forward FCEM auction. Under the second option for explicit self-supply, the LSE can submit a sell offer tagged as "self-supply" relative to the particular state's demand bid. If the LSE's sell offer is submitted at a zero price it can be guaranteed to clear, while a priced sell offer may or may not clear. If the sell offer does clear, then the LSE can designate the cleared volumes as self-supply on behalf of the customers they serve and so would not be subject to allocated procurement volumes and associated costs. The LSE would then forfeit any revenues that otherwise would be received from FCEM and the LSE would not be allocated costs associated with the state-authorized demand bid (any mismatches in volumes would be settled under the default rules).¹⁹

¹⁹ Under this mechanism, the LSE is effectively acting as the buyer and seller of the specified volume and stipulating that the volume will be applied toward a particular state mandate. Volumes committed via this self-supply mechanism will be tracked by FCEM-NE, but no financial settlements will be issued. The underlying resource designated in the sell offer may be directly owned by the LSE or may be contracted to the LSE. The pricing and

Continued on next page

2. LSE Demand Bids

Even if not required by state law or regulation, other LSEs may want to procure clean energy certificates through the FCEM in fulfillment of state mandates or in addition to any applicable state-mandated procurements. LSEs wishing to procure certificates through the FCEM can do so by submitting demand bids. Volumes cleared under LSE demand bids will be tracked in FCEM-NE accounts associated with the LSE entity submitting the bid for both settlement and certificate allocation purposes. The LSE will have the ability to transfer, manage, retire, or bank the procured certificates within their FCEM-NE account and across multiple sub-accounts used for compliance in multiple states. LSEs can then pass both the value and the costs of the procured certificates on to the relevant customers they serve, subject to applicable state law and competitive forces.

3. Non-LSE Demand Bids

The FCEM will enable voluntary demand bids submitted by entities that are not presently acting as LSEs within the ISO-NE wholesale markets. Consistent with prevailing practice within current REC markets, non-LSE buyers will be enabled to procure, hold, transfer, retire, or bank certificates through the FCEM. These entities might include local governments, corporate buyers, environmental groups, or their representatives, procuring clean electricity certificates directly through FCEM and without the involvement of their LSE. These entities will likely seek to retire the procured certificates and receive the associated FCEM-NE certifications relative to voluntary goals (rather than as retirement toward any state mandate). Non-LSE demand bids will be subject to the same credit requirements and other FCEM participation rules applicable to LSE buyers. ISO-NE will manage credit and settlement requirements for these entities, but to reduce barriers to participation, non-LSE buyers will be able to enroll in the FCEM market under streamlined participation rules, and will not be subject to other rules relevant for qualifying LSEs to act on behalf of customers via the ISO-NE energy and capacity markets.

C. Demand Participation Commitments for Rate-Authorized Demand Bids

States wishing to participate in the FCEM through rate-authorized demand bids will support market sustainability and security by making long-term demand participation commitments. These demand participation commitments are separate from and additional to any settlement obligations associated with multi-year procurement commitments for new resources (see Section VII: Financial Arrangements).

Rate-authorized demand bid commitments will apply for a period of 10-years. Rate-authorized buyers participate in the FCEM on a voluntary basis, but by doing so will take on a voluntary commitment to proceed with an orderly withdrawal process if and when the state wishes to

contracting arrangements underpinning the arrangement can be agreed outside the FCEM context and do not need to be reported to FCEM-NE, similar to the “self schedule” bilateral arrangement described in section I.D.2.

cease its participation in FCEM. A state wishing to reduce participation in FCEM may do so by reducing the volume parameters of its FCEM demand bids at the rate of 10% per year when considering total demand across all energy-based procured products.²⁰ During a period of declining FCEM participation volumes, rate-authorized demand bids can continue to procure the same products or can shift to procuring certificates with higher marginal realized GHG abatement values, as measured based on LME during delivery intervals in the most recent three-years. The state cannot shift its demand procurement volumes toward products with lower GHG abatement value.

D. Submitting Demand Bids

1. Required and Optional Demand Bid Parameters

Buyers within the FCEM forward or spot auctions will submit demand bids to FCEM-NE. Each buyer may submit more than one demand bid, and each demand bid may have up to 10 distinct bid segments. The buyer must demonstrate credit adequate to fund payments assuming that all demand bids clear (these credit requirements will be reduced to apply to the cleared volumes after the FCEM auction is concluded).

Table 5 summarizes the parameters required from all demand bids, as well as the optional demand bid structures that can be used if desired. Each demand bid must specify the product or products that the buyer wishes to procure, the maximum volume that the buyer wishes to procure at each price, and the maximum price they are willing to pay. As the default approach available to all buyers, the FCEM presumes that bids will be submitted in the format of price-quantity pairs for each bid segment. The FCEM will include provisions enabling sloping demand curve formulas, but this option will be available only for rate-authorized buyers. Buyers may also submit “new resource” demand bids that express either a preference or requirement that the supply is from planned new resources under a multi-year commitment; and/or “phased entry” demand bids that aim to enable the competitive entry of potentially large new clean energy resources that can offer more favorable pricing if the entry year is flexible.

For each bid, the buyer will specify the products that can be accepted to fill the demand. Within a single submitted bid and across all bid segments, all eligible products will be viewed as interchangeable from the buyer’s perspective with equal willingness to pay.²¹ If the buyer wishes

²⁰ The 10% of volume measurement is made relative to the highest MWh level of demand submitted across the most recent ten-year period, and is calculated separately at the highest offer price across all demand bid segments or sloped bids, at the lowest price, and at four equally-spaced price points in between. For the purposes of this volume measurement, any demand commitments associated with multi-year commitments to new resources will be added to the demand bid volumes. Capacity-based products are not subject to long-term demand commitments.

²¹ This interchangeability from the individual buyer’s perspective does not necessarily mean that the products will all clear at the same price when considering the market-wide supply and demand. For any cleared demand bid,

Continued on next page

to procure more than one product with different willingness to pay between products, then separate bids must be submitted reflective of demand for each product. If the buyer wishes to submit a new resource or phased entry demand bid, it would be a separate bid from other demand bids that do not express preference between new and existing resources.

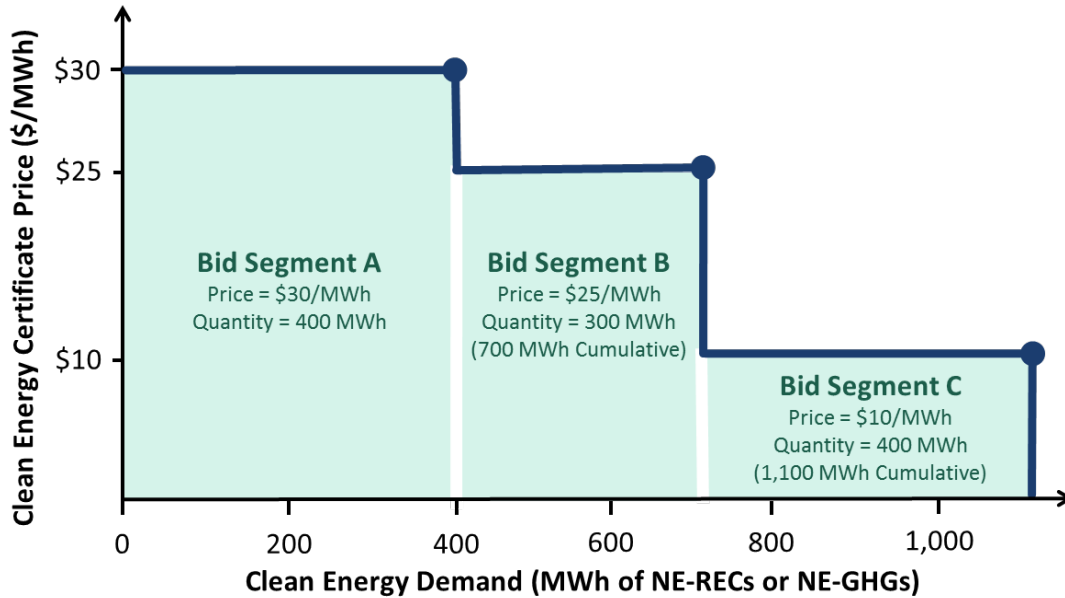
TABLE 5: FCEM AUCTION DEMAND BID PARAMETERS

Demand Bid Parameters	
Required Parameters	<ul style="list-style-type: none"> • One or more products eligible fulfill demand bid • Maximum procurement volume at each buyer-determined price, submitted either as price-quantity pairs (available to all buyers) or as a sloping demand curve (available only to rate-authorized buyers)
Optional Parameters	<ul style="list-style-type: none"> • “New resource” demand bids, expressing desire to procure new resources and commit to the prescribed multi-year commitment term. The demand bid can be submitted either as: (1) a preference for new (reflected by a maximum willingness to pay to procure certificates from new resources rather than existing resources that can produce the same class of certificates); or (2) as a strict requirement that the supply must be from planned new resources • “Phased entry” demand bids, that reflect volumes of demand for new resources that can be served across the FCEM prescribed year as well as the subsequent two years and can offer greater flexibility with respect to the online date of the procured supply

The following Figure 5 illustrates the example of a demand bid submitted in three bid segments. Each price-quantity pair represents the maximum number of certificates that the bidder is willing to purchase at the specified price. Together, the set of price-quantity pairs form a stair-step function reflecting total demand for the products specified within the bid (in this case, NE-RECs or NE-GHGs that are both considered as interchangeable to the buyer). If the buyer wishes to procure other products subject to different price and quantity parameters, then the buyer would need to submit additional demand bids reflective of their desired volume and willingness to pay for those other products.

the product allocated to serve the demand will clear at a price at/below the buyer’s maximum willingness to pay, and the optimized auction clearing will seek to maximize the cleared volumes of the lowest-cost resources/products prior to clearing higher-cost resources/products.

FIGURE 5: ILLUSTRATIVE DEMAND BID SUBMITTED AS PRICE-QUANTITY SEGMENTS



2. Sloping Demand Curve

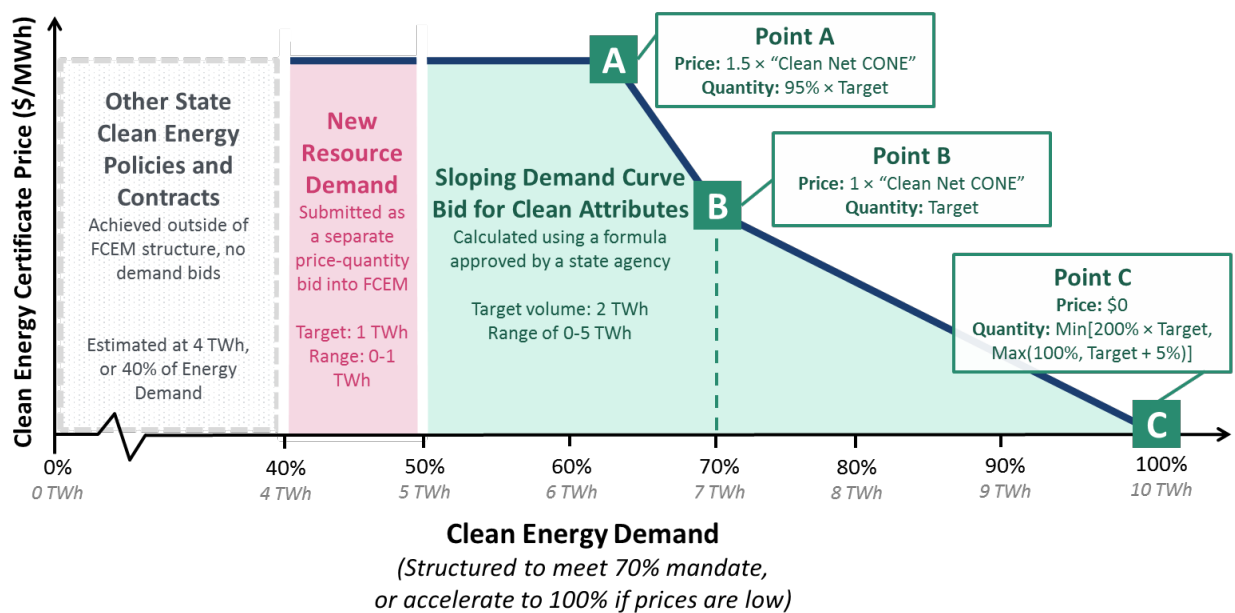
For rate-authorized demand bids submitted by or on behalf of a state agency, the option will be available to reflect demand for clean attribute products through a sloping demand curve rather than as price-quantity pairs. The sloping demand curve option will allow state agencies to dictate participation in the FCEM through either price-quantity points on a demand curve, or based on a formula for calculating the price and quantity points. State agencies will have access to analytical support from FCEM-NE on an as-needed basis to develop their chosen demand bid structure (*e.g.*, in a one-time regulatory hearing to develop the selected demand curve formulas), as well as on an ongoing basis for calculating updated demand curve and other bid parameters each year (always subject to state approval or revision within the defined market timelines). Rate-authorized demand curves must reference the customer classes that will be allocated procurement costs and must determine the product or products eligible to fulfill the demand. Rate-authorized entities will be able to submit new resource and phased entry demand bids (see Sections III.D.3-4), but those must be implemented under a price-quantity bid format (not a sloping demand curve).

To support state agencies' implementation of sloping demand curves and to inform market participants, FCEM-NE and ISO-NE will publish various market parameters that the states may wish to use as input to their chosen demand curve formulas. One such parameter developed by FCEM-NE and ISO-NE will be the Clean Net Cost of New Entry ("Clean Net CONE"), expressed in both \$/MWh and \$/kW-month terms, reflecting the estimated net revenues that a new resource of the most likely reference technology would need to earn via FCEM for an investor to be willing to build a project. Analogous to the "Net CONE" parameter in the FCM operated by ISO-NE, the Clean Net CONE can be used to inform or set pricing parameters within states' chosen demand curve formulas. Separate Clean Net CONE parameters may be developed to reflect the net cost of developing alternative clean electricity technologies, in different locations of the New England

grid, and to serve different classes of FCEM-defined products. If requested by one or more states, FCEM-NE will develop other parameters or analyses needed to inform their demand bids.

Though there will be no specific restrictions on how states may opt to develop their chosen demand curve for clean attribute products, Figure 6 includes an illustrative example of the types of features a state might wish to consider when developing a sloping demand curve. For the purposes of developing this example, we assume that the state agency has determined to use the FCEM as one of its primary policy instruments for meeting a clean energy mandate on behalf of a set of consumers reflecting a projected 10 TWh of electricity demand and subject to a 70% clean energy mandate. Relative to the total clean energy mandate of 7 TWh, the agency projects that 40% (4 TWh, gray area) will be served by other policies and contracts outside the FCEM. The agency plans to meet another 10% (1 TWh, pink area) through a separate new resource demand bid. The portion of this class of customers' demand that is to be met through the sloping demand bid structure is set at a target volume of 20% (2 TWh, green area) but subject to a sloping demand curve formula that will procure more clean energy credits to accelerate decarbonization if prices are low (and reduce procured volumes if prices are high).²²

FIGURE 6: ILLUSTRATIVE RATE-AUTHORIZED DEMAND CURVE TO MEET A 70% CLEAN ENERGY TARGET



The illustrative demand curve in Figure 6 is drawn through three price and quantity points that FCEM-NE would update each year using a formula stipulated by the state agency. The demand curve is drawn as follows:

²² Note that for the pink shaded areas reflecting existing policies and new resource demand bids, the multi-year nature of the resulting commitments needs to be accounted for in establishing the demand bid for any one year and will tend to reduce the incremental procured volumes required in subsequent year demand bids.

- **Point B:** The curve is anchored at “Point B,” which is the volume that would be needed to achieve the annual procurement target of 7 TWh (70% clean energy) for the class of customers. The state further subtracts the 5 TWh (50% clean energy) that will be achieved through other FCEM and non-FCEM procurement/contract structures from all demand curve points. Consequently, the sloping demand curve quantity is 2 TWh (or 20% of projected annual energy demand) at Point B. The price at Point B is equal to the Clean Net CONE parameter estimated by FCEM-NE, reflecting the approximate price that would be needed to attract new clean electricity resource investments.
- **Point A:** To the left of the anchor point, the curve slopes up to the price cap at “Point A”. The price is capped at 1.5 times Clean Net CONE, at a quantity 5% less than the target. This higher-priced portion of the demand curve allows the pace of clean energy achievement to moderate if clean energy certificates are only available at high prices (*e.g.*, in case there is a period with high commodity prices or tight financial market conditions). During such a time, the state expresses a preference through the sloping demand curve to take a somewhat moderated pace as a cost mitigation decision.
- **Point C:** To the right of the anchor point, the demand curve slopes downward and reaches “Point C” at a price of zero and a quantity either: (i) at double the policy target if clean energy targets are below 50% of electricity demand for the specified customer group; (ii) at 100% of forecasted electricity demand if the clean energy target is between 50% and 95%; or (iii) at the target plus 5% for clean energy targets exceeding 95%. This low-priced portion of the demand curve enables the state to pursue an accelerated pace of decarbonization if it is possible to do so at low cost.

As illustrated in the chart, all three of the formula-based quantity points are adjusted downward to account for the portion of the relevant consumers’ demand that will be met through other policies, contracts, and FCEM demand bids. State agencies can use any criteria that are most relevant to that state to establish FCEM demand bids, but likely will consider factors such as GHG achievement potential, consistency with other programs, minimum mandates vs. soft goals, alternative compliance payments, and any cost containment provisions included in legislation.

3. New Resource Demand Bids

Buyers wishing to procure the desired certificates from new resources with a commercial online date consistent with the FCEM delivery year (three years after the forward auction date), can submit a “new resource” demand bid. The buyer can stipulate the bid as either:

- **A new resource “requirement”** indicating that only planned new resources can fulfill the demand bid. Under this bid structure, if no new resources are able to fulfill the demand below the maximum specified \$/certificate price, then the demand bid will not clear any volume; or
- **A new resource “preference”** that indicates both a maximum *total price* in \$/certificate that the buyer is willing to pay, as well as a maximum price *premium* in \$/certificate that the buyer is willing to pay to source the certificates from new rather than existing resources. Under this

bid structure, if no new resources are able to fulfill the demand below the specified maximum price and price premium, then existing resources can be procured to satisfy the demand.

New resource demand bids, if cleared, will obligate the buyer to commit to a multi-year term at the resulting clearing price and volume. The multi-year term of these commitments will be specified within the FCEM Market Rules, *e.g.*, beginning at 15 years at market initiation and declining to 7 years over time (see Section IV.B.2).

4. Phased Entry Demand Bids

Some buyers, such as state agencies, may wish to structure a portion of their FCEM demand to enable the competitive entry of potentially large new clean energy projects that can offer more competitive prices if the date of entry is flexible. The “phased entry” demand bid structure is similar to the “new resource” demand bid structure, but has some differences intended to accommodate large projects such as offshore wind projects that may be able to offer more cost-effective clean energy supply if they have more flexibility in the proposed online date and can gain a new entry price lock-in for a large volume of certificates that might exceed the market-wide demand for new resources in any individual year.

Phased entry demand bids will be structured as follows, including an example of a phased entry demand bid structure in the following Table 6. To submit a phased entry demand bid, the buyer will:

- Express demand for clean energy certificates from new resources for the FCEM delivery year relevant to the three-year forward action, and the following two years (up to three consecutive years). The entire cumulative three-year demand bid may be satisfied by either a single large project, or by many separate projects. In the below example, the buyer’s 2030 demand for certificates supplied by incremental new resources is 1 TWh/year across each year 2030–2032, or a total of 3 TWh/year of delivery fulfilled by no later than year 2032 (approximately the total annual production of an 800 MW offshore wind project).
- Specify the products eligible to serve the demand.
- Determine whether the first year demand should be treated as a “preference” or “requirement” for new resources, and the price premium level associated with a new resource preference. The subsequent years’ demand will be treated as requirements for new resources. In this example, the 2030 demand is treated as a preference while subsequent years are treated as a requirement (meaning that for year 2030, up to 1 TWh of new or existing supply may clear; while for 2031 and 2032 only new resources can be cleared in fulfillment of the demand).
- Stipulate the maximum prices the buyer is willing to pay across each demand year, with willingness to pay in farther-forward years being lower than nearer-term years within a single bid structure. In this example in 2030, the buyer is willing to pay a premium of up to 50% of Clean Net CONE to procure new resources in 2030 (up to a maximum price of 150% of Clean

Net CONE), as expressed across several demand bid segments. For years 2031 and 2032, the maximum willingness to pay is 85% and 70% of Clean Net CONE respectively. This demand bid pricing structure implies that the buyer applies some risk aversion with respect to taking on larger and farther-forward commitments, and will only do so if the price point is sufficiently below the expected cost of new clean electricity supply.

- Demonstrate credit or rate recovery authority sufficient to commit to the prevailing multi-year term. The term offered to resources under the phased entry demand bid structure will be the same regardless of the demand year (7–15 years, the same as other demand commitments). The multi-year commitment term will begin on the initial commitment date for each segment supply and demand cleared (*e.g.*, if a portion of the demand clears in 2031 and another portion in 2032, each portion will commit to the same multi-year commitment term but with a commitment beginning and end dates that are staggered by one year).
- For large phased entry bids submitted under rate authority, develop and enable FCEM-NE to publish the volume and timing parameters of the phased entry demand bid sufficiently in advance of the FCEM auction to enable the development of customized supply offers in response to the size and online date requirements of the phased entry demand bid. Pricing parameters of the phased entry demand bids will not be published in advance.

The phased entry bid structure will be reflected within the FCEM auction clearing in a fashion that can enable a large and lumpy project to clear and serve a maximum total demand consistent with the cumulative demand across all three demand years (a total of 3 TWh/year by 2032 in this example). Mechanically, demand across the three demand curve years is connected as follows:²³

- Any volume of cleared new supply in 2030 will be assumed to continue serving the demand in years 2031 and 2032. Similarly, any volume of cleared new supply in 2031 will be assumed to continue serving demand in 2032. Thus, for a large new project to clear to serve all 3 TWh of demand in 2032, no new supply can be cleared for demand years 2030 and 2031.
- If the initial-year bid is specified as “preference,” and demand for that year remains uncleared due to large volumes clearing in later years, then the demand can be served by existing resources that qualify to produce the specified product. In this example, a possible outcome would be for 1 TWh of existing clean resources to clear to serve 2030 demand while 3 TWh from a large project clears to serve demand beginning in 2032.
- If a new resource clears to serve the demand beginning in 2031 or 2032, it can be offered the multi-year commitment term for the entire cleared volume of up to 2 TWh or 3 TWh respectively.

This demand bid structure, if used widely by buyers, can enable cost-effective large projects to compete and clear in the FCEM. However, nothing in the demand bid structure requires that the cleared supply be from a large project as preferred to an equal volume of smaller resources at

²³ See also the associated auction clearing mechanics in Section V.

the same price. Under this structure, a large project will only clear if it offers into the FCEM at a sufficiently attractive price that it can out-compete other new resources that are offered the same commitment terms and online dates.

TABLE 6: ILLUSTRATIVE EXAMPLE OF A “PHASED ENTRY” DEMAND BID STRUCTURE

	2030	2031	2032
Demand for Certificates from New Resources	1 TWh/year	1 TWh/year Incremental (2 TWh/year Cumulative)	1 TWh/year Incremental (3 TWh/year Cumulative)
Maximum Term	FCEM standard 7–15 year term, depending on delivery year	FCEM standard 7–15 year term, starting on the commitment date (<i>e.g.</i> , 2031)	FCEM standard 7–15 year term, starting on the commitment date (<i>e.g.</i> , 2032)
New Resource Preference or Requirement	Preference	Requirement	Requirement
Maximum Bid Price	Multiple bid segments with: <ul style="list-style-type: none"> • Maximum Price: 100-150% × Clean Net CONE • Maximum Price Premium: 50% × Clean Net CONE 	85% × Clean Net CONE	70% × Clean Net CONE
Examples of Possible Clearing Outcomes	<ul style="list-style-type: none"> • 1 TWh of resources clear (and continue to serve demand for years 2031 and 2032) • 1 TWh of existing resources clear (<i>e.g.</i>, if 2-3 TWh of large projects can come online in 2031 or 2032) 	<ul style="list-style-type: none"> • 1 TWh of demand served by resources coming online in 2030, plus another 1 TWh of demand served by resources coming online in 2031 (2 TWh total cleared for 2031) • No volumes cleared (<i>e.g.</i>, if a large 3 TWh project comes online in 2032) 	<ul style="list-style-type: none"> • 2 TWh of demand served by resources coming online in 2030 and 2031, plus another 1 TWh served by a new resource beginning 2032 (3 TW total cleared for 2032) • 3 TWh large project cleared and online starting 2032 • No volumes cleared (<i>e.g.</i>, a large 3 TWh project offered on a lumpy project basis, but out-competed by smaller projects that can enter earlier at a lower price)

IV. Supply Participation in the FCEM

A. Overview of Supply in the FCEM

The FCEM is designed to attract the maximum volume of eligible supply resources to offer, commit, and produce the regionally-defined and state-defined certificates needed to satisfy state and private clean energy procurement goals. Eligible supply resources may include both new and existing resources and a variety of different technologies. Detailed eligibility rules will vary for each product available for procurement via the FCEM.

Sellers who own or are developing FCEM-eligible resources can offer to sell FCEM-defined and state-defined certificates in the delivery year at a minimum price of their choosing, subject to FCEM-NE and IMM review of eligible offer volumes (see Section IV.B.2), and any applicable monitoring and mitigation provisions (see Section VIII). Sellers can offer to sell any or all of the products for which they are eligible, while the FCEM offer submission and auction clearing will ensure that total cleared commitments cannot exceed the resource's maximum qualified volume of energy-based certificates across products. Sellers can specify whether the offer is eligible for partial clearing, or if the entire resource must be cleared or non-cleared (*e.g.*, relevant for resources making market entry and exit decisions). For new resources, sellers may optionally submit two separate offers: one that is contingent on receiving a multi-year price and volume lock-in and one that they would be willing to accept without a lock-in (*i.e.*, clearing a one-year commitment, only for the delivery year). New resources are further able to specify phased entry dates if they propose, or are able, to begin commercial operations in a subsequent year.

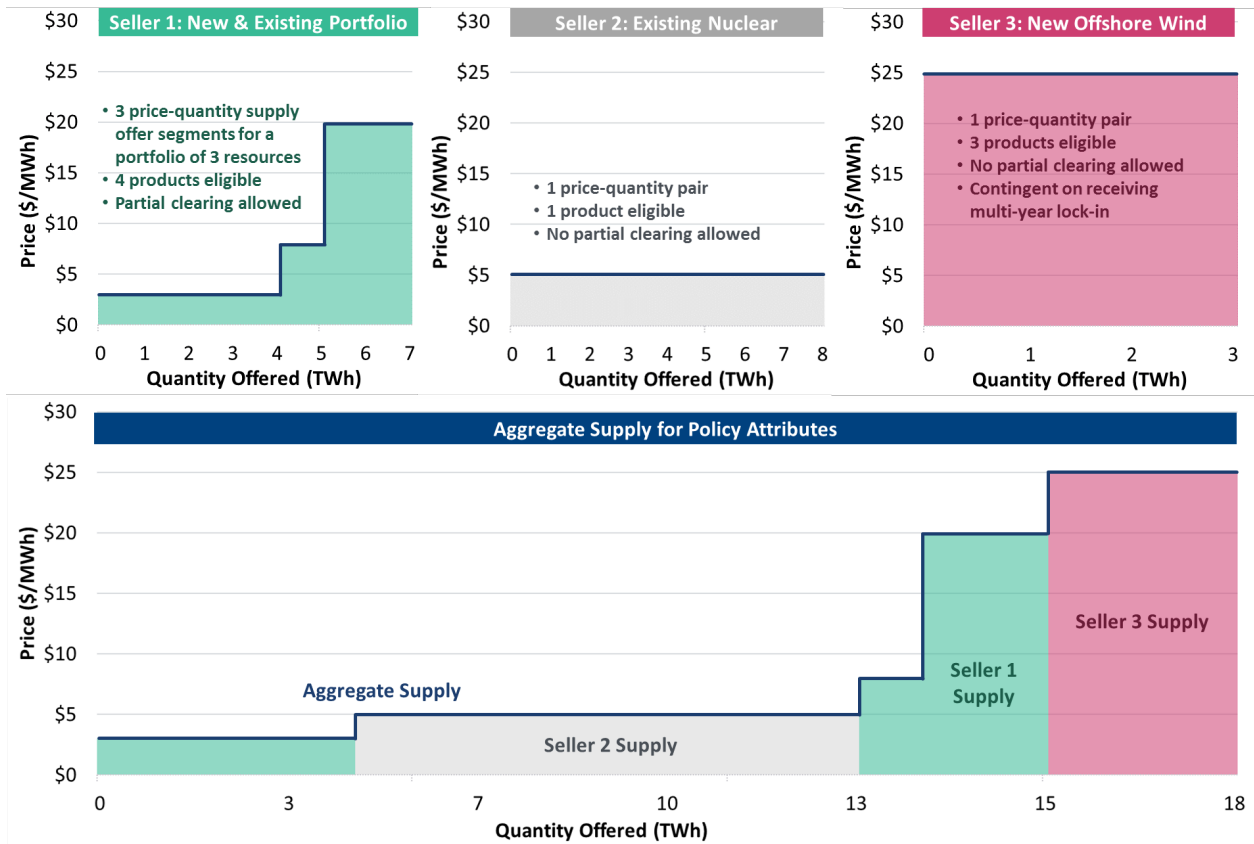
As with demand bids, the supply offers from each seller can be aggregated into a market-wide supply offer curve for clean energy certificates that can be sold via the FCEM. A simplified aggregate supply in the FCEM is shown in Figure 7, comprised of supply from three different sellers:

- **Seller 1** (green) is a renewable owner/operator submitting a supply offer for its portfolio of three differently-priced groupings of new and existing solar, wind, and solar/battery hybrid resources. The resources in the portfolio are eligible to produce certificates for four different FCEM products (only the energy-based products are depicted in the figure). The seller's offer consists of three price-quantity pairs, one for each resource in the portfolio. The seller has stipulated that partial clearing is allowed;
- **Seller 2** (gray) is submitting a supply offer for an existing nuclear generator that is only eligible to produce certificates for one FCEM product. The seller has stipulated that partial clearing is not allowed, signaling intent to retire the resource if it does not clear for the full offered quantity; and
- **Seller 3** (pink) is submitting a supply offer for a new offshore wind resource that will be eligible to produce certificates for three different FCEM products. The seller has stipulated

that partial clearing is not allowed, and that the offer is contingent on receiving a multi-year price/volume lock-in.

The total supply of these three sellers can be illustrated by horizontally aggregating the three supply offers (though this simplified representation does not readily depict the eligibility of each underlying resource to sell different products).

FIGURE 7: EXAMPLE OF AGGREGATE SUPPLY FOR FCEM POLICY CERTIFICATES



Notes: This figure represents a conceptual simplification of how aggregate supply offers can be represented in FCEM auctions. Though not readily depicted on this chart, there will be several different FCEM products, each with their own sub-market. The co-optimized multi-product auction-clearing format will ensure that each resource will clear in whichever product is most valuable.

B. Submitting Supply Offers

1. Required and Optional Supply Offer Parameters

Sellers within the FCEM forward or spot auctions will submit supply offers to FCEM-NE. Each seller may submit more than one supply offer, and each offer may have up to 10 distinct offer segments.²⁴ The seller must demonstrate credit adequate to fund any potential penalty

²⁴ Higher-order offer segments can only be selected if the lower-order segments are cleared in full.

obligations that may be applied for non-delivery, including funding replacement purchases for all products offered for sale to FCEM-NE at the level of the spot auction price cap for those products (these credit requirements will be reduced to apply to the cleared volumes after the FCEM auction is concluded and during the delivery year as obligations are fulfilled, see Section VII.A).

Table 7 summarizes the parameters required from all supply offers, as well as the various optional structures that can be selected if desired by sellers. Each supply offer must specify the product or products for which the offered resource is eligible, confirmed by FCEM-NE in a pre-auction qualification process with coordination, implementation, and analytical support from ISO-NE as required. These offers must include price/quantity pairs for each offer segment, capped at the eligible offer volume. Depending on the types of products offered, the seller may submit their offer price in one of four formats for: (i) energy-based certificate offers (in \$/MWh or \$/certificate); (ii) GHG-based certificate offers (in \$/MWh_{GHG} or \$/tonne); (iii) capacity certificates (in \$/CCC or \$/kW-month); or (iv) energy and capacity offers (in \$/year for the specified volume of MWh and MW certificate commitments). Within a single supply offer segment, all energy-based certificates will be treated as interchangeable from the seller’s perspective with one price/quantity pair covering all eligible products.²⁵ For each offer segment, the seller must stipulate whether the offer can be treated as eligible for clearing partial volumes, or whether the offer segment must be selected or rejected for the entire volume.

As an option to fully enable new resources, sellers may submit “new resource” supply offers that would reflect the need for a multi-year price commitment (beginning at 15 years at FCEM launch, and declining to 7 years over time) from buyers to enable the entry of the resource reflected in the supply offer (see Section IV.B.3). Sellers may also specify a “phased entry” supply offer, if the resource requires or is able to enter up to two years after the prescribed FCEM auction delivery year (see Section IV.B.4).

TABLE 7: FCEM AUCTION SUPPLY OFFER PARAMETERS

Supply Offer Parameters	
Required Parameters	<ul style="list-style-type: none"> • For each offer (uniform across all offer segments, up to 10): categories of certificates offered (including state- or FCEM-defined products) • Selection of offer type: (i) energy-based certificates only (\$/certificate, \$/MWh); (ii) GHG-based certificates only (\$/MWh_{GHG} or \$/tonne); (iii) capacity certificates only (\$/CCC, \$/kW-month); or (iv) multi-product offer for energy and capacity certificates (\$/year for specified MWh and MW volumes). Offer type is uniform across all offer segments • For each offer segment: minimum price and maximum volume, with the total volume capped at the quantity of physically qualified offers • Specification of willingness to sell partial or only the full offered quantity (specification can differ by offer segment, but higher offer segments will only clear if lower segments are fully cleared)

²⁵ This interchangeability from the individual seller’s perspective does not necessarily mean that the products will all clear at the same price when considering the market-wide supply and demand. For any cleared supply offer, the product purchased from the offer will clear at a price at/above the seller’s offer price, and the optimized auction clearing based on maximizing social surplus will seek to maximize the cleared volumes of the lowest-cost offers prior to clearing higher-cost offers.

Supply Offer Parameters

Optional Parameters

- “New resource” supply offers, including the option to request a multi-year price commitment to enable revenue certainty (all multi-year FCEM commitments will have the same term as applicable to that FCEM delivery year). These offers will only clear if there is a corresponding volume of new resource demand bid with sufficient commitment to finance the multi-year term. New resource supply offers can stipulate a second higher price at which they can be cleared without the multi-year price lock
- “Phased entry” supply offers for new resources that can offer an online year that offer up to three different online years (FCEM auction year, one year later, or two years later). If more than one year is offered, then different prices can be specified for each available online year

2. Determination of Eligible Offer Volumes

The eligible volume for sale as part of any supply offer is determined through a pre-auction qualification process led by FCEM-NE with analytical and implementation support as necessary from ISO-NE, NEPOOL-GIS, and the IMM. This process will ensure that each supply resource meets the technology requirements to qualify for each offered product and the new resource development milestones necessary to demonstrate the ability to enter by the relevant online year. As described in Section II.0 above, qualification for state-defined products will continue to be certified by each state, while qualification for regionally-defined products will be certified by FCEM-NE. Maximum allowed volumes for any product offered into the FCEM (whether a state-defined or regionally-defined product) will be certified by FCEM-NE consistent with analytical support provided by ISO-NE, NEPOOL-GIS, and the IMM as required.

Existing sellers participating in the FCEM will be able to specify their desired volume of certificates to supply, up to an FCEM-NE approved maximum quantity, based on historical output. For new resources, or those with short operational history, the offered quantity will be less than or equal to an FCEM-NE estimated class average output, unless the seller demonstrates additional unit-specific capability. For firms identified as having the incentive and ability to exercise market power, a minimum offer volume can be imposed on existing resources (see Section VIII).

Slightly different processes will be used to determine eligible offer volumes for each product type that can be offered in the FCEM:

- **Energy-Based Certificates (Other Than NE-GHGs):** To determine the qualified volume of NE-CEACs, NE-RECs, or MWh-denominated state-listed certificates for a new resource, FCEM-NE will develop annually a default maximum production estimate for each technology type. For existing resources, the qualified volume will be an average of the most recent five years’ production. New resources that wish to demonstrate higher capability than the default estimate will have the ability to make a resource-specific demonstration to FCEM-NE for review and approval, for example based on facility production projections, location, and technical characteristics. As a new resource achieves commercial operation and gains operational history, the default technology qualified volume will be replaced with resource-specific data on a weighted-average basis until five years of operational history is achieved. The qualified volume may be offered into more than one MWh-based products, but the sum

of the volume cleared across multiple products will not exceed 100% of the qualified volume for each resource.

- **GHG Abatement Certificates:** To determine the qualified volume of NE-GHGs, FCEM-NE will similarly certify maximum allowed offer volumes on a resource-specific basis for existing resources based on five years of operating data, and using a default estimated production volume for each resource type for new resources with the value updated to reflect resource-specific data over a five-year period. New resources will be capped at this estimated volume of GHG abatement, unless they make a unit-specific demonstration that the offered resource is capable of additional abatement, subject to review and approval by FCEM-NE. For both new and existing resources, the measured and projected production volumes will be estimated relative to the realized GHG abatement value, and adjusted to be consistent with the GHG standard abatement rate applicable for each future FCEM delivery year.
- **Clean Capacity Certificates:** To determine the qualified volume of NE-CCCs, FCEM-NE will rely on the resource-specific qualification and capacity rating rules of the ISO-NE, to ensure that resources selling NE-CCCs are physically qualified capacity resources from a regional reliability perspective. Each resource will be qualified to produce NE-CCCs from the FCM capacity zone where the resource is located (the locational nature of all capacity demand will be reflected throughout all auction and replacement transaction processes). The capacity value of CCC resources will be determined by ISO-NE and communicated to FCEM-NE during the pre-qualification process.

3. Multi-Year Commitments for New Resource Supply Offers

As an optional element of offers in the FCEM, sellers can specify whether their offer for a new resource is contingent on receiving a multi-year commitment from a willing buyer (or “price lock”). To qualify for multi-year commitments, the resource must not have cleared in any prior FCEM and must have a viable plan to achieve commercial operation within one year before or during the relevant FCEM delivery year. The seller must provide verification that the resource will be technologically eligible, as well as documentation supporting the project’s development milestones and credit requirements, to be reviewed by FCEM-NE and ISO-NE.

Features of the multi-year commitment offers include:

- **Products:** All regionally-defined FCEM products are eligible for treatment as multi-year commitments (NE-RECs, NE-CEACs, NE-GHGs, NE-CCCs). In addition, state-defined products can be eligible for treatment as multi-year commitments subject to opt-in from the relevant state authority.
- **Price:** The FCEM clearing price awarded in the first year will be paid to the seller in the first year and for all subsequent years throughout the commitment term, without inflation. For the NE-GHG product, the committed price will be translated to a constant \$/tonne GHG basis that will be carried constant throughout the commitment term (even as the market-wide standard abatement rate is updated over time).

- Committed Volumes:** The cleared volume awarded in the first year will be applied as an obligation for all subsequent years over the commitment term. For the NE-GHG product, the committed volume will be translated to the equivalent tonnes of GHG abatement and held constant over time (even as the market-wide standard abatement rate is updated). For the NE-CCC product, the committed volume will be for the same monthly MW volume for a continuous one-year delivery within the resource’s defined FCM capacity zone. If the FCM capacity delivery period changes (*e.g.*, to a seasonal construct), the FCEM offering and clearing mechanics would be updated for alignment. If FCM capacity zones are altered, delivery obligations will be consistent with the resource’s newly-defined capacity zone. If there are changes to the nature and size of obligations, penalties, resources’ qualified capacity ratings, or other provisions applicable under ISO-NE’s separate FCM market and capacity product, the financial or physical consequences of those changes will be managed entirely by the seller outside the FCEM rules or implementation. Any other updates to product definition will be implemented with transitional arrangements applicable for multi-year commitments to maintain consistency with originally-understood supply and demand commitments.
- Term:** Initially, the term of the multi-year commitment will guarantee new resources a clearing price for a term of 15 years, and will decline to seven years as the FCEM gains maturity. The term of this price lock mechanism will be updated every second FCEM auction, reducing the term of the multi-year commitment by one year in each update.²⁶
- Matching Demand and Supply Cleared Volumes:** A supply offer that seeks a multi-year commitment cannot clear unless there is an equal or greater volume of demand to support the cleared multi-year commitments for any product. For this reason, resources requiring a multi-year commitment may not clear the FCEM auction even if clearing prices exceed the seller’s offer price (see Sections VII.A regarding financial arrangements surrounding multi-year commitments).
- Separate Price for a One-Year Commitment:** To increase the chances of clearing the auction, a seller may offer new resources at a separate (higher) price for a one-year commitment. The seller will not clear more than 100% of its eligible volumes across the single and multi-year commitments.
- Offer Segments:** The seller may use a multi-product and multi-segment supply offer structure to manage clearing risks. For example, the first offer segment can be submitted under a lumpy (non-partial) offer that requires a multi-year commitment, while higher-order offer segments can be offered for partial clearing or with no multi-year commitment requirement.

Supply that is in subsequent years of a price lock will have all multi-year cleared products pre-scheduled as cleared into the FCEM for the duration of the commitment term. The obligations

²⁶ For the first two FCEM auctions, the term will be 15-years; in the third and fourth FCEM auctions the term will be 14 years; beginning with the 17th FCEM forward auction, the term will be at the long-term value of seven years.

associated with these pre-scheduled quantities will be reported to each buyer and seller individually through their FCEM accounts, and published on an aggregate market-wide basis in advance of each FCEM auction. Pre-scheduled supply and demand commitment volumes will be accounted for in FCEM auction clearing to ensure that location-specific demand for NE-CCCs can be accurately reflected. However, the outcomes of FCEM auctions after the initial year when the commitment was made will not affect the physical obligations or financial commitments relevant to multi-year commitments.

4. Phased Entry Supply Offers

Certain supply resources may be able to offer at a lower offer price if afforded more flexibility in their online date. Phased entry supply offers are structured similarly in most ways to the new resource supply offers, but offer additional flexibility to propose online dates one or two years after the prescribed FCEM delivery year.

Compared to other new resource supply offers (described in the prior Section I.D.3), the distinguishing features of the “phased entry” supply offers include:

- **Flexible Online Date:** The seller may offer its supply volumes for sale in the prescribed FCEM delivery year, and/or up to two years later. A seller can offer the proposed volumes for multiple years if the entry date is flexible (but cannot offer for dates prior to the achievable online date as determined by FCEM-NE and ISO-NE through the prequalification process).
- **Separate Offer Prices Based on Online Year:** For a project that can come online in any of several subsequent years, separate prices may be proposed. Up to four distinct prices may be offered for: (1) a single-year commitment; (2) a multi-year commitment consistent with the FCEM delivery year; or (3 and 4) a multi-year commitment beginning one or two years after the FCEM delivery year.
- **No Duplicate Clearing:** Phased entry supply offers may not clear more than 100% of the qualified volume, regardless of the initial online year that the resource clears into.
- **Offer Segments:** The seller may use a multi-product and multi-segment supply offer structure to manage clearing risks. For example, the first offer segment can be submitted on a lumpy offer basis and require a multi-year commitment to clear, while higher-order offer segments can be offered on a partial clearing basis or with no multi-year commitment requirement. Higher-order offer segments can clear only for online dates equal or later than lower-order segments.

5. Cross-Product Supply Offers

Sellers can offer their eligible volumes to clear in one or more FCEM-listed products. If offering into more than one type of product, the FCEM clearing rules will ensure that duplicate volumes are not committed across products that cannot be simultaneously delivered. Sellers may select one of the following types of offers:

- **Energy-Based Certificate Offer:** An offer to produce NE-RECs, NE-CEACs, or other state-defined energy certificates can be submitted in units of \$/MWh. The volumes may clear as an obligation to deliver one or more of the offered product types.
- **Greenhouse Gas Abatement Certificate Offer:** An offer to produce NE-GHGs can be submitted in units of \$/MWh_{GHG} (or GHG-adjusted MWh as consistent with the FCEM-published standard abatement rate, which can be converted into an equivalent \$/tonne value). The MWh_{GHG} volumes that a resource can produce and is qualified to sell may be greater or less than the resources' expected physical MWh output volumes.
- **Clean Capacity Certificate Offer:** An offer to produce NE-CCCs can be submitted in units of \$/kW-month, as consistent with the resource's qualified capacity rating as determined by ISO-NE. The offer will be made consistent with the resource's FCM capacity zone. If cleared, the offer will constitute a commitment to deliver the cleared volume across twelve consecutive delivery months.
- **Multi-Product Offer:** An offer to produce more than one product on a bundled basis can be submitted in units of \$/year total for the seller's specified quantity of each product (which may include NE-RECs, NE-CEACs, NE-GHGs, NE-CCCs, and/or state-defined attribute products). The seller may clear up to 100% of the qualified energy volume plus 100% of the qualified capacity volume. For all energy-based products (NE-RECs, NE-CEACs, and NE-GHGs), the mutually exclusive nature of the products will be accounted for to ensure that even if the resource clears to serve within more than one product, the total cleared volume does not exceed the volume offered (and that the ratio of GHG-based products does not deviate from the offered ratio).

The following Table 8 provides an illustrative example of qualified offer volumes and offer prices that three different resources could make, consistent with energy and capacity volumes that could be relevant for a typical wind, solar, or battery resource.

TABLE 8: ILLUSTRATIVE EXAMPLE OF MULTI-PRODUCT SUPPLY OFFERS

	Onshore Wind	Solar	Battery
Nameplate Resource Rating	100 MW	100 MW	100 MW (300 MWh)
Qualified Volumes			
MWh-Based Products (NE-RECs, NE-CEACs)	315,000 MWh (36% Capacity Factor)	122,000 MWh (14% Capacity Factor)	n/a
Greenhouse Gas Abatement (NE-GHG _s) ^[1] <i>Assume 0.4 tonnes/MWh standard abatement rate</i>	270,000 MWh _{GHG} (108,000 tonnes)	140,000 MWh _{GHG} (56,000 tonnes)	135,000 MWh _{GHG} (54,000 tonnes)
Clean Capacity (NE-CCCs)	15 MW (15% Capacity Rating)	30 MW (30% Capacity Rating)	80 MW (80% Capacity Rating)
Offer Prices Under Alternative Offer Structures^[2]			
Energy Certificates Only (NE-RECs, NE-CEACs)	\$20/MWh	\$25/MWh	n/a
Greenhouse Gas Abatement (NE-GHG _s)	\$23/MWh _{GHG} (\$58/tonne)	\$22/MWh _{GHG} (\$54/tonne)	\$18/MWh _{GHG} (\$45/tonne)
Capacity Certificates Only (NE-CCCs)	\$13/kW-month	\$10/kW-month	\$6/kW-month
Multi-Product Offer (NE-RECs, NE-CEACs, NE-GHG _s , and/or NE-CCCs)	\$8,640,000/year To clear 315,000 MWh of NE-REC/NE-CEACs or 270,000 MWh _{GHG} _s ; <i>Plus, 15 MW of NE-CCCs.</i>	\$6,650,000/year To clear 140,000 MWh of NE-RECs/NE-CEACs or 140,000 MWh _{GHG} _s ; <i>Plus, 30 MW of NE-CCCs.</i>	\$8,190,000/year To clear 135,000 MWh _{GHG} _s <i>Plus, 80 MW of NE-CCCs.</i>

Notes: Values are indicative only and are not intended to accurately reflect prices that should be expected in New England. [1] For the purposes of FCEM offering and clearing, the conversion rate between MWh_{GHG} and tonnes is the same 0.4 tonnes/MWh standard abatement rate for all resources. However, each resource will have its own individual abatement rate that be lower or higher than the standardized product. In this example the values calculated reflect a 0.34, 0.46, and 0.49 tonnes/MWh individual resource abatement rate for the wind, solar, and battery resources respectively. [2] Note that in this example, the offer prices across all four bid structures are self-consistent after applying conversions between the energy-based offers and adding energy plus capacity offers together in the multi-product option.

V. Three-Year Forward FCEM Auction

A. Overview of FCEM Forward Auction

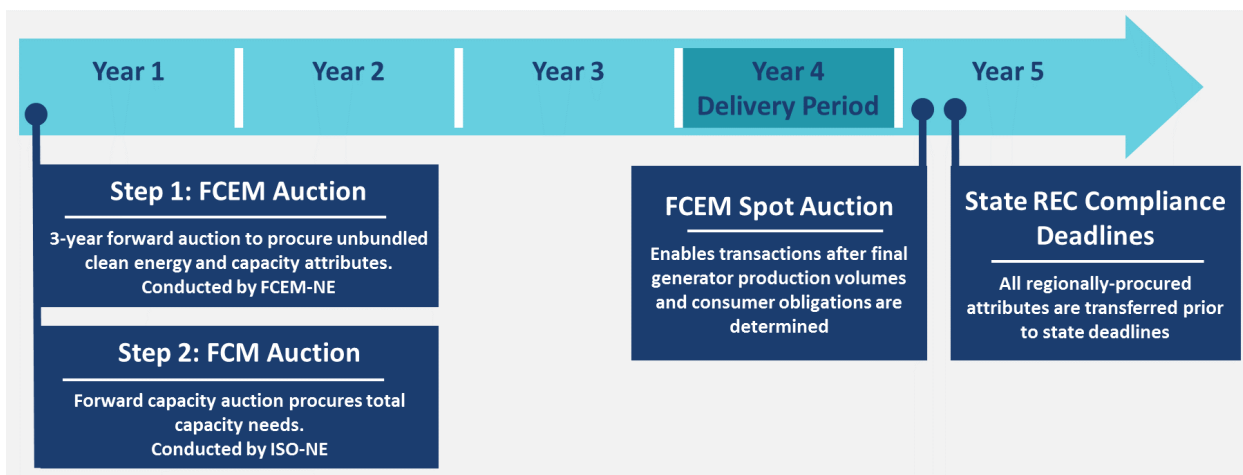
The FCEM centralized forward auction will be a single-round, uniform-price auction conducted annually through which buyers may procure clean electricity certificates to meet their sustainability and policy needs three years later. The newly-created entity FCEM-NE will take primary responsibility for managing FCEM forward auction activities, with substantial analytical and implementation support from ISO-NE and NEPOOL-GIS. Prior to the forward auction, FCEM-NE will publish pre-auction reports and parameters such as the rate-authorized demand bids, the standard abatement rate for NE-GHGs for the relevant delivery year, the Clean Net CONE and related parameters, and any other parameters that may assist buyers and sellers in preparing their bids/offers. FCEM-NE, in coordination with NEPOOL-GIS, ISO-NE, and the IMM, will implement all resource-specific processes including participant registrations; processing resource eligibility and establishing maximum qualified offer volumes; managing credit requirements; and applying market power mitigation parameters to firms failing market power tests. Qualified market participants will then submit their demand bids and supply offers to FCEM-NE within the bidding window, after which clearing results will be issued publicly in aggregate form and individually into buyer and seller accounts.²⁷

As illustrated in Figure 8, the three-year forward FCEM will be conducted by FCEM-NE prior to the subsequent FCM auction conducted by ISO-NE. Information regarding clean resources clearing status and commitment volumes under the NE-CCC product within FCEM-NE will be communicated to ISO-NE. Cleared clean capacity resources will be allowed to self-schedule FCM capacity commitments so as to ensure clearing; these resources will earn separate payment streams for selling the unbundled NE-CCC certificate via FCEM and the ISO-NE-defined capacity

²⁷ As described in Section II above, market participants will be able to interact with a single front-end interface for the purposes of FCEM auctions, commitment management, tracking, and compliance, though the implementation of the underlying business functions must be coordinated and implemented across three responsible organizations (FCEM-NE, NEPOOL-GIS, and ISO-NE).

product via FCM.²⁸ Certificate tracking, compliance, and settlements between the FCEM forward auction and the final compliance window three years later are described in Sections II and VII.

FIGURE 8: FCEM AUCTION AND DELIVERY TIMELINE



B. Auction Format

The three-year forward FCEM will be conducted as single-round, uniform clearing price auction. Similar to the optimization function used to clear the present FCM conducted by ISO-NE, the FCEM auction will use co-optimized auction clearing to maximize the benefits from trade across the multi-product auction.²⁹

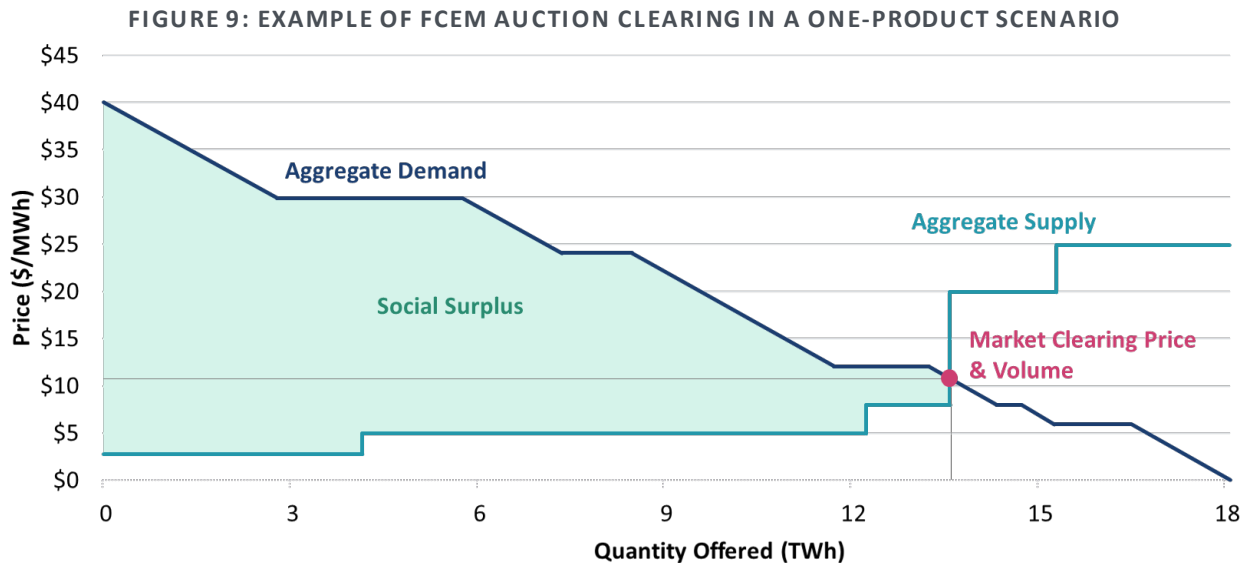
In its simplest scenario, if the auction attracts demand and supply for only one product, the outcomes from the auction can be illustrated simply based on the intersection of supply offers and demand bids as shown in Figure 9. The figure illustrates that aggregated supply offers from all sellers can be compared to aggregated demand bids from all buyers to identify the cleared volume of supply and demand that maximizes the benefits from trade. The highlighted green area above the cleared supply curve and below the cleared demand curve reflects the benefits from trade or “social surplus” achieved within the auction.³⁰ The clearing price (pink dot) consistent with this value-maximizing outcome rests at the intersection of supply and demand (*i.e.*, at marginal cost of supply if it falls on the supply curve or at the marginal value to consumers

²⁸ We note that this two-step FCEM and FCM auction process imposes additional administrative complexity and clearing price risk to clean capacity resources, compared to a fully combined and integrated FCEM+FCM auction. Combining these two auctions would improve market efficiency if an appropriate implementation and governance structure can be identified.

²⁹ The FCEM will not use the multi-round auction format of the FCM, but will use optimization formulation similar to the FCM optimization used within each round of the FCM that uses a social surplus maximization approach to clear location-specific supply and demand, subject to constraints across the multi-product FCM auction.

³⁰ Clearing a higher volume of certificates would reduce the benefits from trade by forcing either some sellers to accept payment below their costs or forcing some buyers to pay more than their private value for certificates; similarly clearing a lower volume would reduce the benefits from trade by failing to match some willing buyers and sellers into a mutually beneficial transaction.

if it falls on the demand curve). Though buyers and sellers will not be individually matched, the total volume of buyer and seller commitments will be identical in size (as measured in both quantity and price × quantity).



C. Objective Function for Auction Clearing and Price Setting

The same conceptual approach illustrated in Figure 9 will be extended to the multiple products available for procurement through the FCEM. As described in Sections III and IV above, buyers can submit demand bids that may be filled by one or more products; and sellers can submit sell offers that can clear via one or more products. To determine which bids/offers to clear, and through which product, the FCEM auction will use the optimization formulation described in Equation 3. This optimization seeks to identify the market clearing outcome that will maximize the market-wide benefits of trade (*i.e.*, “social surplus”). Market-wide benefits from trade are calculated as demand bid prices reflecting buyers’ willingness to pay, minus the sellers’ offer prices reflecting their cost to supply. Under this objective function, the auction will prioritize clearing products that customers value the most while minimizing the total market-wide resource supply cost. The auction will seek to maximize the total volume of cleared transactions, as long as the marginal value to consumers exceeds the marginal cost to supply each product.

The auction clearing function will observe constraints to ensure that the total volume of supply and demand commitments are equally sized for each product; that the parameters of each demand bid and supply offer structure are respected; and that there are no duplicate commitments. Prices will be set separately for each product that has a non-zero cleared volume. Prices will be set based on the shadow price of the supply-demand constraint for each product, which will reflect either the marginal cost of supply or the marginal value to consumers

depending on whether a supply offer or demand bid is marginal.³¹ This is consistent with setting prices at the intersection of supply and demand in the example of a one-product auction.

EQUATION 3: FCEM AUCTION CLEARING OPTIMIZATION FORMULATION

OBJECTIVE FUNCTION:

Maximize: Social Surplus = Consumer Value – Supply Costs

WHERE:

Social Surplus (\$/year) = Market-wide benefits from trade achieved via the FCEM auction

Consumer Value (\$/year) = Customer value of procured clean electricity certificates (*i.e.*, demand bid price × cleared volume, summed across all cleared demand bid segments)

Supply Costs (\$/year) = Cost to producers incurred in order to supply clean electricity certificates (*i.e.*, supply offer price × cleared volume, summed across all cleared supply offer segments)

DECISION VARIABLES THAT CAN BE ADJUSTED TO MAXIMIZE VALUE:

Cleared Volumes within each supply offer segment and demand bid segment

Cleared Products selected from among the eligible options for each sell offer and demand bid

New Resource Preference Share, determining the share of new resource “preference” demand that will be filled by new vs. existing supply offers, relevant for: (i) new resource demand bids (Section III.D.3); and (ii) phased entry demand bids (Section III.D.4)

Supply Offer Type selected amongst offers submitted for one resource under alternative pricing structures, relevant for: (i) different prices offered for single- or multi-year commitments (Section IV.B.3); (ii) different prices offered depending on the entry year for phased entry offers (Section IV.B.4); and (iii) single- or multi-product offers (Section IV.B.5)

SUBJECT TO CONSTRAINTS THAT MUST BE OBSERVED:

Supply-Demand Balance, ensuring that the cleared supply must equal or exceed cleared demand, reflected as one constraint for each listed product including NE-RECs, NE-CEACs, NE-GHGs, NE-CCCs (including locational products), and state-defined products

Bid/Offer Volume Constraints, ensuring that each supply offer segment and demand curve segment clears within the range of 0-100% of potential volume

Lumpy Offer Constraints, ensuring that supply offer segments selecting “all-or-nothing” treatment must be cleared at exactly 0% or 100% (nothing in between)

Offer Segment Clearing Order, ensuring that within any individual supply offer, lower-order offer segments must be entirely cleared before higher-order segments can clear

No Duplicate Clearing, ensuring that demand bids and supply offers submitted under alternative pricing structures cannot clear duplicate volumes, relevant for: (i) demand bids and supply offers submitted with product indifference; (ii) new resource and phased entry demand bids (Sections III.D.3-4); and (iii) supply offers submitted at different prices under different products, years, or commitment terms (Sections IV.B.3-5)

³¹ As a point of precision, in the context of “lumpy” supply offers the auction will first conduct a “clearing run” to determine the optimal selection of offers/bids, followed by a second “pricing run” in which uncleared offers are removed and lumpy offers are treated as if they are rationable, so as to calculate shadow prices for each product.

VI. Delivery and Performance Obligations for Sellers in the FCEM

Sellers are obligated to physically deliver the volume of certificates that they have sold in the forward FCEM auction, usually by producing the required quantity as certified through the NEPOOL-GIS tracking system. If a seller is unable to produce the obligated certificates through the individual resource specified in the originally-cleared supply offer, the obligation can be fulfilled by replacement certificates from an alternative resource within the seller's portfolio, through bilateral procurements, or through a spot auction purchase. If any market-wide shortfalls materialize and replacement certificates cannot be procured via the spot auction, an administrative sliding-scale penalty factor will be applied via spot auction clearing.

A. Physical Delivery and Settlements

Sellers have the obligation to physically deliver certificates to FCEM-NE within the delivery year or before the compliance deadline, and will have flexibility to deliver the certificates according to the time profile of their production or other asset management activities. Payments for delivered volumes will be issued only after the obligated certificates are delivered to FCEM-NE, at which point that portion of the seller's obligation is considered to be fulfilled.

FCEM-NE, and ISO-NE as the settlement agent, may adjust the timing of payments issued to sellers to ensure alignment in monthly settlements collected from buyers. To that end, buyers and sellers' volume and settlement obligations will be split into 12 equal monthly settlement volumes. For buyers, the monthly settlements will be charged to buyers each month and associated monthly installment of procured certificates will be delivered. Sellers will similarly have a target delivery volume that is equally sized each month and may earn payments up to (but not above) the target delivery volume. Sellers whose physical output and certificate creation falls below the monthly target volume can deliver up to the accumulated target volume in future months and will be paid upon delivery of certificates. Sellers whose physical output exceeds the accumulated monthly target volume can deliver and earn payments only up to the target; excess volumes can be delivered in future months for payment. If a seller anticipates that their total annual certificate volume will exceed their total annual obligation, then the excess certificates may be sold bilaterally, sold into the spot auction, or rolled over for use in future delivery years. See Section II.0 for additional description of the options for certificate sales and transfer.

Existing resources may deliver certificates from the specific resource identified in the forward FCEM auction, or may procure and deliver the equivalent volume of certificates from any other resource (new or existing) eligible to produce that certificate. Sellers that commit to deliver certificates from new resources under a multi-year commitment must deliver certificates produced by a qualified resource with an equal or later online year.

B. Penalties for Non-Delivery Relative to FCEM Commitments

If a seller delivers an insufficient volume of certificates relative to their obligation, they will be required to fill any outstanding shortfall within the FCEM spot auction conducted after the delivery year has concluded and prior to the FCEM and state certificate compliance deadline (approximately six months after the delivery year ends). To fill the outstanding obligation, FCEM-NE will include a mandatory buy bid on any short seller's behalf for the volume of certificates needed at a price equal to the maximum FCEM auction price for the relevant product. For regionally-defined products, the maximum spot auction price (which also acts as the maximum penalty rate for non-delivery of certificates in the event of market-wide shortfalls) is set at 150% of Clean Net CONE as calculated for each regionally-defined product. If the spot auction price clears below the originally-determined FCEM auction price, the seller will earn a net revenue on the price difference between forward and spot auctions. If the spot auction price clears above the originally-determined FCEM auction price, the seller will face a net penalty up to a maximum of the spot auction clearing price for the short volume. Beyond this obligation to procure any shortfalls via the (potentially high) spot auction price, existing resources will face no further penalties for under-delivery since the delivery obligation will have been satisfied by a replacement transaction.

Sellers committed to produce certificates from new resources will be obligated to procure any shortfalls through the FCEM spot auction, also through an automatically-placed buy-out bid at the short volume and the product-specific 150% of Clean Net CONE. The only certificates eligible to fill the identified shortfall will be those created by resources with online years equal or later than the new resources facing a shortfall.³² Through this mechanism, sellers under-delivering relative to new resource commitments may face higher (but not lower) buy-out prices as compared to sellers under-delivering relative to existing resource commitments within the same product. Sellers will face no penalties for under-delivery other than this obligation to procure shortfalls via the spot auction (up to a maximum price of 150% of Clean Net CONE).

Sellers under-delivering relative to clean capacity obligations (by under-delivering NE-CCCs) will face the same shortfall buyout obligations described above. In addition, those capacity-committed resources may face additional penalties (or incentive payments) from ISO-NE as consistent with FCM capacity commitment obligations.

For state-defined products procured via the FCEM, the above-described mechanism will be used to enforce delivery obligations on sellers. The maximum buy-out price applied to the seller will be either 150% of Net CONE as determined by FCEM-NE, or a higher level established by the state

³² This provision may potentially produce multiple separate FCEM spot auction clearing prices for certificates based on resources' online year.

agency (a lower penalty rate cannot be used for enforcing delivery of seller obligations within the FCEM, even if the alternative compliance rate that the state may apply to short LSEs is lower).³³

C. FCEM Spot Auction

A final spot auction will be conducted after the end of each delivery year when the final quantity of certificates created is known, and before the FCEM and state compliance deadline (approximately six months after the delivery period). The FCEM spot auction will serve three distinct purposes within the broader FCEM construct:

- Supporting FCEM liquidity and transparency, enabling buyers and sellers to make any final adjustments to their certificate positions prior to compliance and reporting deadlines;
- Serving as the enforcement mechanism ensuring that sellers will fulfill their obligations to deliver on their commitments (facing the costs of buying replacement supply if available or a substantial penalty up to 150% of Clean Net CONE in the event that the entire market is short); and
- Supporting market price stability through the element of an administrative penalty curve that will introduce graduated increases in penalties for market-wide under-delivery, up to a maximum price at 150% of Net CONE in the event that the market-wide shortfall rises to 5% of the obligated volume for any product.³⁴

SPOT AUCTION DEMAND BIDS

Demand in the spot auction will be comprised of multiple categories of demand with functionally different treatment:

- **Administrative demand associated with the administrative penalty curve**, designed to mitigate the price impacts in the event of market-wide under-delivery of certificates relative to obligations within any FCEM-listed product. The administrative penalty curve will be treated as a demand bid or penalty curve defined by two points: (A) Point A at a quantity of negative 5% of market-wide volumes committed and cleared in the forward FCEM auction at a price of 150% of Clean Net CONE (or a higher state-defined maximum price if relevant for state products), this point reflects the maximum penalty rate that will be applied to sellers in

³³ All seller obligations committed through the FCEM marketplace must be understood to be fully enforceable and financially binding at a level sufficient to achieve new resource entry across the market. A lower penalty rate if used for any state-defined product has the potential to undermine the strength of the delivery incentive for other products that are partially substitutable for some buyers and sellers.

³⁴ Together, graduated penalty and banking provisions will support pricing stability in the spot and bilateral markets and mitigating modest year-to-year imbalances in supply and demand that may be created by weather or other short-term factors. These features will mitigate the potential for “end price effects” in which certificate prices might otherwise rise immediately to the price cap in the face of a small shortfall or drop to zero in the face of a small excess.

the event of a market-wide shortfall; and (B) Point B at a quantity of 0% and a price equal to the forward FCEM auction clearing price for that product. Separate administrative penalty curves will be introduced for each FCEM-listed product and for each category of new resource commitments.

- **Mandatory Demand from Sellers Short of Obligations:** Any sellers falling short of delivery obligations prior to the FCEM spot auction will have buy bids submitted on their behalf by FCEM-NE at the price cap and maximum penalty rate for each product.
- **Rate-Authorized Demand Bids:** Consistent with the provisions described under Section III.B.1 relevant to rate-authorized demand bids, demand may be submitted directly by rate-authorized entities or according to a defined formula. These demand bids may reflect, for example, provisions for managing supply and demand imbalances once final demand and supply outcomes are known.
- **LSE and Non-LSE Demand Bids:** Other market participants may similarly submit voluntary demand bids, for example to procure certificates needed to meet any outstanding state obligations or private commitments.

Demand bids may be submitted under the same pricing and certificate bid structures described in Section III above, with the exception that new multi-year commitments will not be cleared in the spot auction (transactions supporting the fulfillment of already-committed new resource obligations will be supported).

SPOT AUCTION SUPPLY OFFERS

Spot auction supply offers must be backed by certificates that have already been created by NEPOOL-GIS and that are held in the seller's FCEM-NE account. The certificates may be offered for sale for more than one product definition (*i.e.*, eligible to fill demand under more than one product type, as described in Section II.0 above), if they were created by a resource qualified under more than one product.

Certificates may be sold by any entity with an FCEM account and that holds the certificates in question, regardless of whether the entity was originally a buyer, seller, or non-participant in the forward FCEM auction.

SPOT AUCTION CLEARING

The spot auction will be conducted using the same auction-clearing and price-setting approach described in Section V above to clear supply and demand in the market. The resulting cleared certificate volumes and settlement payments will be implemented immediately after spot auction clearing and prior to the FCEM and state compliance deadline. Certificate volumes that remain unsold in the spot auction may be rolled over for use in future years (relevant for FCEM-defined products) or applied toward excess compliance subject to state provisions (relevant for state-defined products).

VII. Financial Arrangements

A. Overview of FCEM Financial Arrangements

The financial arrangements of the FCEM will follow best and common practice as used in sustainable wholesale electricity markets and other commodity markets. The financial arrangements include:

- **Allocation of Procurement Costs.** The FCEM is a buyer-pays model, with costs allocated to the states and consumers that opt-in to FCEM participation. Each buyer will pay for the clean electricity certificates procured on their behalf, nothing more. No costs would be allocated to non-participants.³⁵ The following Section VII.B provides an illustrative example of cost allocation in the FCEM and FCM forward auctions. If any make-whole payments must be awarded to partially-cleared “lumpy” supply offers to recover their offer price, the costs and certificate volumes will be allocated on a *pro-rata* basis to buyers that have cleared demand for the relevant product (s).
- **Credit Requirements.** ISO-NE will establish and manage credit requirements for buyers and sellers participating in the FCEM. Rate-authorized buyers will not be subject to credit requirements, given that the obligation to accept settlements for resources procured on their behalf is confirmed by a state agency with rate-setting authority. Other buyers will need to demonstrate credit adequate to cover the full single- or multi-year commitments that may be procured on their behalf in order to submit an FCEM demand bid; buyers’ outstanding credit requirements will decline over time as settlements are issued and consistent with outstanding FCEM procurement obligations. Sellers participating in the FCEM will need to demonstrate credit sufficient to cover the maximum penalties that could be issued for non-fulfillment of any outstanding delivery obligations.
- **Provisions for Multi-Year Commitments.** New resources that enter under multi-year commitments will have a payment guarantee for a specific volume and price over the duration of the commitment (starting at 15 years at the initiation of FCEM, declining to seven years over time). The buyer-side settlement obligation for any cleared multi-year commitments will be assigned at the conclusion of the FCEM auction in which the supply resources cleared. Though individual buyers are not matched with individual sellers, the FCEM auction will have ensured that aggregate demand and aggregate supply are matched for each product, and will further ensure that the total volume of cleared multi-year commitments does not exceed buyers’ aggregate demand for multi-year commitments within each product. Responsibility to fund the multi-year commitments and receive the

³⁵ For consumers that are not participating in FCEM, their electricity bill may decline after the FCEM is implemented—particularly if the outcome from the FCEM is to incorporate higher volumes of clean electricity supply into the energy and capacity markets.

delivered certificates will be allocated to customers in proportion to their cleared demand for the relevant product. No responsibility to fund multi-year commitments can be assigned to non-rate-authority buyers unless they have submitted multi-year demand bids for new resources and demonstrated adequate credit. The obligation to accept payments for all multi-year commitments will extend for the duration of the commitment, even if the buyer or state chooses to reduce or cease participation in FCEM.

- **Costs of Administering the FCEM.** The costs of administering the FCEM will be reviewed and approved by the Board of FCEM-NE. These administrative costs will be assigned on a *pro-rata* basis to the buyers participating in the FCEM, translated into a \$/MWh or \$/kW-month charge on each certificate purchased.
- **Allocation of Collected Penalties.** Any penalties collected from market participants through the administration of delivery and enforcement of FCEM obligations will be applied as a credit against the cost of administering the FCEM. If collected penalties would exceed administration costs, the collected funds would be distributed to FCEM buyers in proportion to their financial settlement obligations.

B. Example of FCEM Procurement Costs and Cost Allocation

The procurement costs of each FCEM product will be allocated to FCEM buyers consistent with the cleared procurement volume and clearing price for each product, with no costs allocated to non-participants. Table 9 illustrates how FCEM clearing prices and volumes are allocated to participating buyers, and how costs are allocated via the subsequent FCM.

The three LSEs reflected in the example are:

- **LSE 1: Voluntary FCEM Participant:** This LSE reflects a customer base with 100% clean energy and 100% clean capacity objectives that are to be achieved through the FCEM. The buyer further wishes to procure the energy-based demand through either the NE-REC or NE-GHG products, with the submitted demand clearing with an 80%/20% ratio between those two products. The buyer is allocated costs consistent with its FCEM-cleared demand bids at the relevant clearing prices. In the subsequent FCM, the buyer accepts payment for its share of system capacity requirements. Though FCEM and FCM are conducted sequentially, the buyer can claim environmental and sustainability credit for the clean capacity resources procured by retiring the relevant volume of NE-CCCs.
- **LSE 2: Rate-Authorized Demand Bids:** This LSE participates in FCEM indirectly by accepting costs authorized by a state agency under a rate-authorized demand bid structure. The state demand bids aim to use FCEM to procure credits sufficient to serve 20% of energy and capacity needs. The LSE serves customers designated as responsible for payment by the state agency and is allocated the appropriate FCEM costs. The LSE is responsible for paying its share of capacity costs through the subsequent FCM.

- **LSE 3: FCEM Non-Participant:** This LSE does not have any clean electricity goals that are to be served via FCEM. As such, the LSE does not submit any demand bids and is allocated no FCEM-related costs. The LSE is subject to its share of FCM-based capacity costs.

Consistent with the design requirements, FCEM buyers pay for the products based on their cleared quantities and the market clearing prices. Non-participants are not allocated any costs. With respect to the NE-CCC product, the unbundled clean capacity certificate is purchased via the FCEM (supporting a portion of the clean capacity resource's total business case) while "brown power" portion of the capacity payment is made through the FCM. In this example, clean capacity resources require a premium of \$2/kW-month (FCEM clearing price for NE-CCCs) above the brown power capacity price \$4/kW-month (FCM clearing price for capacity).³⁶

³⁶ This separation between FCEM and FCM will impose some risk on resources clearing in FCEM due to the uncertainty in clearing prices in the subsequent FCM. This uncertainty will be modest as long as FCM clears at a low price. The risk can be eliminated if FCEM and FCM were combined into a single auction, or if the bundled capacity and clean capacity products were cleared within the first step of the FCEM. Both of these options can be considered as viable alternative implementation options for the FCEM, pending states' review of the appropriate implementation responsibilities and governance structures.

TABLE 9: EXAMPLE OF FCEM PROCUREMENT COST ALLOCATION

		LSE 1 Voluntary FCEM Participant	LSE 2 Rate-Authorized Demand Bids	LSE 3 FCEM Non- Participant
LSE Characteristics				
Peak Load	(MW)	10	10	10
Capacity Requirement	(MW)	11	11	11
Annual Energy Demand	(MWh)	52,560	52,560	52,560
Clean Energy Target	(%)	100%	20%	n/a
Clean Capacity Target	(%)	100%	20%	n/a
Step 1: Forward Clean Energy Market				
Cleared Demand				
NE-REC	(MWh)	42,048	2,628	n/a
NE-CEAC	(MWh)	n/a	7,884	n/a
NE-GHG	(MWh)	10,512	n/a	n/a
NE-CCC	(MW)	11	2	n/a
Clearing Price				
NE-REC	(\$/MWh)	\$10	\$10	n/a
NE-CEAC	(\$/MWh)	n/a	\$4	n/a
NE-GHG	(\$/MWh)	\$15	n/a	n/a
NE-CCC	(\$/kW-m)	\$2	\$2	n/a
Allocated FCEM Procurement Costs				
NE-REC	(\$)	\$420,480	\$26,280	n/a
NE-CEAC	(\$)	n/a	\$31,536	n/a
NE-GHG	(\$)	\$157,680	n/a	n/a
NE-CCC	(\$)	\$264,000	\$52,800	n/a
Total FCEM Costs	(\$)	\$842,160	\$110,616	\$0
Step 2: Forward Capacity Market				
Cleared Demand	(MW)	11	11	11
Clearing Price	(\$/kW-m)	\$4	\$4	\$4
Allocated FCM Costs	(\$)	\$528,000	\$528,000	\$528,000
Total FCM + FCEM Costs	(\$)	\$1,370,160	\$638,616	\$528,000

Notes: All three LSEs illustrated in the example have identical peak load, capacity requirements, and annual energy demand. However, they have different volumes of clean energy and clean capacity demand they wish to procure through the FCEM. LSE 1 and LSE 2 wish to procure 100% and 20% of annual energy and capacity demand through the FCEM. LSE 3 has no clean energy goal and does not participate in the FCEM.

VIII. Market Monitoring and Mitigation

All market participants will be subject to the market monitoring and mitigation provisions under the FCEM, the goal of which is to prevent market participants from profitably engaging in the exercise of market power or other manipulative behaviors. Several features of the FCEM design will support broad competitiveness and limit the ability to exercise market power, including the expectation of relatively flat supply and demand curves, with many buyers and sellers that are buying and selling across multiple venues outside the FCEM. The design further includes provisions for sloping demand curves; and graduated banking and penalty provisions. Each of these features will support a level of pricing stability and supply-demand balance that would make it challenging for even a large market participant to move market prices sufficiently to gain from withholding.

Despite these mitigating factors, both buyers and sellers in any auction may have the ability and incentive to exercise market power in select circumstances.³⁷ To prevent sellers from profitably withholding in these circumstances, the IMM will conduct a pre-auction review of structural competitiveness for all markets and submarkets relevant to the FCEM. The review will use an incentive and ability test to identify sellers with a large enough market share within any submarket to profit from economic or physical withholding. Any firm failing that test will be subject to a must-offer requirement within the identified products and an offer price cap on their existing resources, consistent with net going-forward costs and accounting for relevant uncertainties and risk premiums.

In addition to these pre-auction screens, the IMM will issue post-auction reports and one combined annual report reviewing the competitiveness of each forward auction, spot auction, and bilateral market activities leading up to the compliance deadline. The report will assess whether there could be any need for additional mitigation measures or other changes to market design to address issues identified. The Board of the FCEM-NE will consider the outcomes from the IMM review in combination with other processes within its annual rules-change process described in Section I: Governance.

³⁷ For example, in cases where competition is limited or segmented, for example through products that are defined to strictly limit eligible supply to only a small number of resources or firms.

Glossary of Acronyms

CO₂e	Carbon Dioxide Equivalent. Greenhouse gas emissions, as reflected in their carbon dioxide equivalent global warming potential.
CONE	Cost of New Entry. The gross cost of developing a new resource in \$/kW-month, as levelized across the anticipated asset life.
FCA	Forward Capacity Auction. The annual auction conducted three years prior to delivery by ISO-NE to procure capacity supply.
FCEM	Forward Clean Energy Market. The proposed regional marketplace for large-scale procurement of clean power supply resources.
FCEM-NE	Forward Clean Energy Market-New England. A new non-profit entity that will be created to administer the FCEM in New England, with implementation support from ISO-NE and NEPOOL-GIS.
FCM	Forward Capacity Market. Capacity market operated by ISO-NE.
FERC	Federal Energy Regulatory Commission. The US Federal government agency responsible for the regulation of inter-regional energy markets, including the PJM regional marketplace.
GHG	Greenhouse Gas. Air pollutants that increase the net level of heat absorbed and retained by the atmosphere, thus contributing to the greenhouse effect and climate change.
IMM	Independent Market Monitor. An independent entity responsible for reviewing the competitiveness and efficiency of the wholesale electricity market, and reporting findings to the public and government authorities.
ISO-NE	Independent System Operator of New England. The ISO responsible for scheduling the transmission system and operating the regional wholesale markets serving the six New England states.
LME	Locational Marginal Emissions. The incremental air pollution emissions caused by consuming additional energy (or avoided by producing additional energy) at a given place in the grid at a given point in time, in units of tons per MWh.
LMP	Locational Marginal Price. The price established by ISO-NE at a particular pricing node and pricing interval within the day-ahead or real-time wholesale energy market.
LSE	Load Serving Entity. Entity that is financially responsible for paying ISO-NE for power on behalf of end-use customers, usually a retail electricity provider or regulated utility.
MW	Megawatt. A unit of power consumption or production, equal to 1,000 kW.
MWh	Megawatt Hours. A unit of energy consumption or production, equal to 1 MW continuously produced for one hour.
MWh_{GHG}	GHG-Standardized Megawatt Hours. The units of measure of the NE-GHG product, reflecting the MWh of certificates consistent with a pre-defined tonnes/MWh “standard abatement rate” for the applicable delivery year.
NE-CCC	New England Clean Capacity Certificate. A certificate, representing the clean attribute of a capacity resource (unbundled from capacity sale), specifying that 1 kW-month of capacity has been delivered to ISO-NE within its Forward Capacity Market. A NE-CCC would be a new regionally-defined product for New England.

NE-CEAC	New England Clean Energy Attribute Certificate. The attribute of a resource being a clean energy resource (whether renewable or nuclear) that can be unbundled and separately sold to signify the production of 1 MWh of clean energy produced. A NE-CEAC would be a new regionally-defined product for New England.
NE-GHG	New England Greenhouse Gas Marginal Abatement Certificate. The clean attribute of a resource designating that it has delivered clean energy into the grid, consistent with 1 MWh _{GHG} (which can be converted into an equivalent tonnes of marginal GHG displacement at the standardized abatement rate). A NE-GHG would be a new regionally-defined product for New England.
NEPOOL	New England Power Pool. The entity organizing New England stakeholder engagement for advising on matters related to wholesale electricity market rules and transmission tariff design.
NEPOOL-GIS	New England Power Pool Generation Information System. The entity that issues and tracks certificates for clean electricity attributes in the New England Region.
NE-REC	New England Renewable Energy Certificate. The attribute of a resource being a renewable energy that can be unbundled and separately sold to signify the production of 1 MWh of clean energy produced. A NE-REC would be a new regionally-defined product for New England.
NESCOE	England States Committee on Electricity. A not-for-profit entity representing the interests of the six New England states in matters related to the shared bulk electricity system.
OATT	Open Access Transmission Tariff. The FERC-approved rate document governing the determination of transmission rates and wholesale market operations by ISO-NE.
REC	Renewable Energy Certificate. The attribute of a resource being a clean energy resource (whether renewable or nuclear) that can be unbundled and separately sold to signify the production of 1 MWh of clean energy produced. RECs are defined separately for each state.
RPS	Renewable Portfolio Standard. A law requiring that a certain percentage of all power delivered to consumers must be produced by qualified renewable power supply.
TWh	Terrawatt Hour. A unit of energy consumption or production, equal to 1 million MWh.