

# CLEAN ENERGY MARKETS REPORT

Executive Office of Energy and Environmental Affairs  
in consultation with the Department of Energy Resources and Department of Public Utilities  
May 24, 2023

## INTRODUCTION

This Clean Energy Markets Report (Report) summarizes the Executive Office of Energy and Environmental Affairs' (EEA) investigation into the advantages and disadvantages of using or participating in regional or multi-state, market-based mechanisms, structures, systems or competitive solicitations to facilitate the development of clean energy resources and meet the Commonwealth's decarbonization requirements.<sup>1</sup> In completing its investigation, EEA worked with the Department of Energy Resources (DOER) and the Department of Public Utilities (DPU) to assess the current state of clean energy market reform.<sup>2</sup> This work was also informed by engagement with regional partners, including other New England states and ISO New England (ISO-NE).

After investigation, as discussed further below, the Secretary finds that: (1) use of a regional or multi-state, market-based approach to facilitate the development of clean energy generation resources—and, more broadly, to achieve and maintain a clean, reliable, and affordable energy resource mix—could result in lower costs to consumers and would be beneficial for the Commonwealth; and (2) further consultation and coordination with regional partners is necessary prior to exercising the authority provided to the Secretary and DOER in Section 85(c) to adopt regulations establishing or governing such an approach.

Other key findings from the investigation include:

- There are limitations to the current single-state, technology-specific procurement model in achieving the necessary scale and speed for new clean energy development at the lowest possible cost.
- One potential market-based approach, the January 2023 Forward Clean Energy Market Design Proposal (FCEM Design Proposal) that DOER commissioned, helped to provide a better understanding of the key design features of such a forward clean energy market, how elements of the design might interact, and the spectrum of products that may be offered. In so doing, the FCEM Design Proposal also illustrated the complexity of and lengthy implementation process for such a forward market.

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<sup>1</sup> Section 85 of *An Act Driving Clean Energy And Offshore Wind* (the Act) requires the Secretary, in consultation with DOER and DPU, to investigate the advantages and disadvantages of using or participating in regional or multi-state competitive market-based mechanisms, structures, systems or competitive solicitations in order to facilitate the development of clean energy generation resources, including but not limited to offshore wind energy generation, to meet the Commonwealth's clean energy needs and comply with the statewide greenhouse gas emission limits and sublimits established pursuant to the Global Warming Solutions Act (GWSA), Chapter 21N of the Massachusetts General Laws, while providing benefits for the Commonwealth. Such mechanisms, structures, systems or competitive solicitations may include long-term contracts, ISO-NE administered markets or any other exchanges, banking, credits, charges, exactions or electricity transactions consistent with rules and protocols established by state regulation designed to achieve the statewide greenhouse gas emissions limits and sublimits required by the GWSA.

<sup>2</sup> Following this investigation, EEA is required to submit to the Clerks of the Senate and House of Representatives (Legislature) a report on the advantages and disadvantages of using or participating in regional or multi-state market-based mechanisms, structures, systems or competitive solicitations to facilitate the development of clean energy generation resources.

- Massachusetts must collaborate with its regional partners and explore more expedient market-based approaches to support the development of clean energy, the achievement of state decarbonization requirements, and reduced consumer costs.
- While we explore other market-based approaches with our regional partners, Massachusetts should continue to optimize its existing clean energy procurement authority through multi-state and regional coordination, building on recent efforts to partner with other states to further shared clean energy goals and decarbonization requirements.

## CURRENT CLEAN ENERGY MARKETS AND LONG-TERM IMPLICATIONS OF THE STATUS QUO

The scale of clean energy necessary to meet the Commonwealth’s GWSA emissions limits has increased and is projected to grow substantially; yet, the current regulatory and procurement strategy has largely remained static since the Legislature first authorized large-scale clean energy procurements in 2008.<sup>3</sup> Specifically, clean energy generation is incentivized in Massachusetts through several state regulations governing environmental attributes, including the Renewable Energy Portfolio Standard (RPS) and the Clean Energy Standard (CES). The Massachusetts RPS and CES require that retail energy suppliers annually increase the use of renewable and clean energy generation when supplying Massachusetts electricity customers. Under these programs, clean energy generation is incentivized through the creation of transferrable energy certificates that are sold by generators at a market price to retail energy suppliers for their RPS and CES compliance obligations. These transactions are not made through a centralized marketplace but instead through bi-lateral transactions where the price for the certificates is determined by the contracting parties, as constrained by market forces. Each of the six New England states (MA, VT, RI, CT, ME, and NH) has a renewable portfolio standard with several overlapping eligibility requirements, in effect creating a regional RPS market where energy generated in one state may be used for compliance in another.

The value of renewable or clean energy certificates will vary, sometimes with significant volatility, based on the demand for certificates created by the RPS and CES obligations, the number of available certificates based on the amount of renewable and clean energy facilities that are operating, and the Alternative Compliance Payment (ACP) which acts as a price ceiling. Currently, the RPS’s minimum standard is set by the Legislature, which established that the 2023 obligation under the program shall be 22%. The minimum standard will increase by 2% in 2024, 3% annually from 2025 through 2029, and then 1% each year thereafter.<sup>4</sup> The CES obligation is set through regulation by the Massachusetts Department of Environmental Protection (MassDEP) and increases annually until it reaches 80% in 2050 and remains at that obligation for each year thereafter.<sup>5</sup>

Revenues from state regulatory compliance mechanisms and the regional wholesale markets have been insufficient on their own to support the development of large-scale clean energy generation projects for the Commonwealth. To finance the development of new clean energy resources, the Commonwealth has utilized clean and renewable energy procurements. Beginning in 2008, Section 83 of the Green Communities Act (GCA) required the Massachusetts electric distribution companies (EDCs) to “solicit proposals from renewable energy developers and, provided reasonable proposals have been received, enter into cost-effective long-term contracts to facilitate the financing of renewable energy generation ....” Since the first Section 83 procurements, the GCA has been amended several times, including the additions of Section 83A, Section 83C, and Section 83D. These authorities and subsequent procurements have resulted in the execution of contracts between the Massachusetts EDCs and

<sup>3</sup> <https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter169>

<sup>4</sup> See 225 CMR 14.07; available at <https://www.mass.gov/doc/rps-class-i-11-28-22/download>

<sup>5</sup> See 310 CMR 7.75; available at <https://www.mass.gov/doc/310-cmr-774-final-amendments-october-2022/download>

several clean energy projects (Table 1). Once online, these projects generate and sell clean energy and associated environmental attributes to the EDCs through contracts at pre-defined prices that have been approved by the DPU. The EDCs sell the energy and any attributes they do not use to meet their retail supply obligations.<sup>6</sup> This allows retail electric suppliers, such as those that supply energy through municipal aggregations, to purchase attributes for RPS and CES compliance. If there is a net cost associated with any energy from the contracts, this cost is recovered by the EDCs through electric rates to Massachusetts ratepayers. One advantage of using long-term contracting for clean energy procurement is that project developers receive a guaranteed, stable revenue source for up to 20 years that can be used to finance development of projects with high upfront costs. This revenue certainty enables larger projects that are unlikely to be developed without such procurements and at a lower cost due to lowered financing risk as development risks have been shifted to ratepayers.

**Table 1: Clean Energy Procurements**

Clean Energy Procurement	Year	Size	Project(s)
Section 83	2010	Approx. 150 MW (reached commercial operation)	Onshore Wind, Hydroelectric, Cape Wind
Section 83A – Multi-State	2014	Approx. 500 MW (reached commercial operation)	Onshore Wind and Solar
Section 83D	2017	9.55 TWh	New England Clean Energy Connect (NECEC)
Section 83C Round 1	2017	800 MW	Vineyard Wind 1
Section 83C Round 2	2019	804 MW	SouthCoast Wind (formerly Mayflower Wind)
Section 83C Round 3	2021	1600 MW	Commonwealth Wind and SouthCoast Wind (formerly Mayflower Wind)
Section 83C Round 4	2023	<i>Draft RFP solicits up to 3,600 MW</i>	<i>TBD</i>

With regard to other advantages, the current model of long-term contracting includes pursuit of multiple state objectives like economic development, environmental justice, and diversity, equity, and inclusion in the procurement process. For instance, the Section 83C offshore wind RFP will require projects to demonstrate these additional benefits. There are, however, disadvantages to incorporating these objectives into the procurement process. For example, including economic development and other costs—and their associated risks—in electric rates may cause ratepayers in areas that do not directly benefit from the economic development or other investments to incur associated charges. Moreover, electric ratepayers become obligated to pay contract costs for a 20-year period. Finally, energy contracts do not have enforcement mechanisms in the way that other publicly supported economic development grants may include. Neighboring states are increasingly pursuing clean energy economic development initiatives outside of procurement processes. For example, the New York State Energy

<sup>6</sup> While DOER has the authority to direct the EDCs to retain any attributes, to date, such a determination has not occurred.

Research and Development Authority (NYSERDA) released its 2022 offshore wind RFP on the same timeline as the Supply Chain Investment Plan (SCIP) opportunity to access \$500 million in economic development grant funding.<sup>7</sup> Bidders were required to submit bids with and without SCIPs.

The current model of large-scale clean energy procurements resulting in fixed prices has operated outside the regional wholesale electricity markets. Like other regional energy resources, clean energy can participate in the ISO-NE wholesale markets to receive revenue for their energy, capacity, and ancillary services. However, with fixed pricing, contracted resources have less incentive to respond to real-time price fluctuations and, until recent market rule changes were implemented, clean energy resources with long-term contracts for offtake had significant barriers to participating in the capacity market.

In addition, Massachusetts participates in both in-state and regional cap-and-invest programs. The Regional Greenhouse Gas Initiative (RGGI) is a cooperative, market-based effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia to cap and reduce CO<sub>2</sub> emissions from the power sector.<sup>8</sup> The costs of compliance with RGGI become imbedded in the cost of electricity in the wholesale market, contributing to the dispatch of energy resources and ultimately emissions reductions.<sup>9</sup> Participating states use proceeds from the RGGI market to invest in clean energy programs. In Massachusetts, proceeds from RGGI auctions are used to support the Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) electric vehicle incentive program, among others. Massachusetts also has established a declining limit on carbon dioxide emissions from large power plants located in Massachusetts through the Electricity Generator Emissions Limits regulation.<sup>10</sup> This regulation creates a cap-and-trade program setting a cap on emissions based on GWSA requirements and allowing generators to purchase allowances in auctions sufficient to cover their emissions and use for compliance. Similar to RGGI, the Massachusetts electric generator cap-and-trade program creates a cost and market signal that influences electricity generation and investment decisions.

## CLEAN ENERGY GROWTH

The GWSA, as amended by Chapter 8 of the Acts of 2021, requires Massachusetts to achieve Net Zero greenhouse gas (GHG) emissions in 2050. The requirement has two components: (1) achieve gross emissions reductions of at least 85% below 1990 levels, and (2) ensure that the total statewide GHG emissions released into the atmosphere are less than or equal to the amount removed from the atmosphere. Pursuant to the GWSA, EEA has set sector-specific sublimits, including an emissions limit for the electric power sector. The 2050 electric sector sublimit was adopted December 21, 2022, as a 93% emissions reduction from 1990 levels.<sup>11</sup> To achieve Net Zero, there must be a significant increase in clean electricity generation to displace existing fossil generation and meet increased

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<sup>7</sup> See NYSERDA, 2022 Offshore Wind Solicitation (Closed); available at <https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations/2022-Solicitation>.

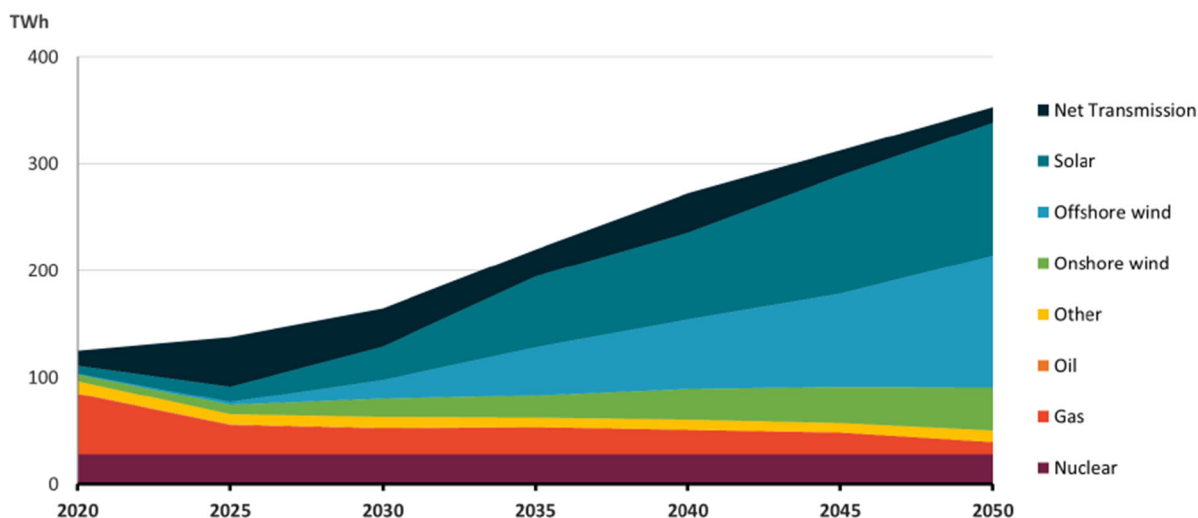
<sup>8</sup> See The Regional Greenhouse Gas Initiative: an initiative of Eastern States of the US, available at <https://www.rggi.org/>

<sup>9</sup> RGGI, CO<sub>2</sub> Emissions from Electricity Generation and Imports in the Regional Greenhouse Gas Initiative: 2019 Monitoring Report, June 15, 2022, at 4; available at [https://www.rggi.org/sites/default/files/Uploads/Electricity-Monitoring-Reports/2019\\_Elec\\_Monitoring\\_Report.pdf](https://www.rggi.org/sites/default/files/Uploads/Electricity-Monitoring-Reports/2019_Elec_Monitoring_Report.pdf)

<sup>10</sup> See Massachusetts Department of Environmental Protection, Electricity Generator Emissions Limits (310 CMR 7.74); available at <https://www.mass.gov/guides/electricity-generator-emissions-limits-310-cmr-774>.

<sup>11</sup> See Executive Office of Energy and Environmental Affairs, Determination of Statewide Greenhouse Gas Emissions Limit and Sector-Specific Sublimits for 2050, December 2022; available at <https://www.mass.gov/doc/determination-letter-for-the-2050-cecp/download>

demand from electrification. As demonstrated in Figure 1, “more than 80% of the electricity consumed in New England [in 2050] is anticipated to come from renewable sources located in the region, particularly offshore wind and rooftop- and ground-mounted solar.”<sup>12</sup> The Clean Energy and Climate Plan for 2050 (2050 CECP) notes that such an expansion will require Massachusetts “to go beyond contract procurements as the main deployment strategy [for clean energy] and consider approaches that better capture market pricing, quickly achieve scale, and are technology neutral.”<sup>13</sup>



Note: “Other” includes both biomass and municipal solid waste electric generation units.

Figure 1: 2050 CECP Energy Generation

## INVESTIGATIONS INTO CLEAN ENERGY MARKETS

There have been several public forums that have focused on the challenges clean energy generators have faced in participating in the wholesale markets in New England. In 2016, the New England Power Pool (NEPOOL) hosted a stakeholder process, Integrating Markets and Public Policy (IMAPP), to “identify and explore potential changes to the wholesale power markets that could be implemented to advance state public policy objectives in New England.”<sup>14</sup> This forum included presentations and proposals from stakeholders on several draft framework documents including an FCEM, carbon pricing, and integrated forward capacity markets. As a result of this forum, ISO-NE proposed the Competitive Auctions with Sponsored Resources (CASPR) framework to accommodate public policy resources into the Forward Capacity Market (FCM).<sup>15</sup> The Federal Energy Regulatory Commission (FERC) approved CASPR in 2018. CASPR did not prove to be successful in practice. The New England states, through the

<sup>12</sup> See Executive Office of Energy and Environmental Affairs, Clean Energy and Climate Plan for 2050 (2050 CECP), page 67, December 2022; available at <https://www.mass.gov/doc/2050-clean-energy-and-climate-plan/download>.

<sup>13</sup> See Executive Office of Energy and Environmental Affairs, Clean Energy and Climate Plan for 2050 (2050 CECP), page 67, December 2022; available at <https://www.mass.gov/doc/2050-clean-energy-and-climate-plan/download>.

<sup>14</sup> See NEPOOL, IMAPP; available at <https://nepool.com/zimapp/>

<sup>15</sup> See ISO-NE, Competitive Auctions with Sponsored Policy Resources (CASPR) Key Project; available at <https://www.iso-ne.com/committees/key-projects/implemented/caspr>

New England States Committee on Electricity (NESCOE),<sup>16</sup> and others strongly supported further reform of the FCM given the continued misalignment of the market with state clean energy goals and requirements.

In October 2019, the Massachusetts Attorney General's Office held an Energy Market Symposium on wholesale market design in a low/no-carbon electricity system that included energy market design experts and New England stakeholders.<sup>17</sup> A white paper following the symposium summarized the areas which received broad consensus, including an increased need for demand flexibility with the growth of clean energy, a recognition that meaningful regional carbon pricing will be necessary but not sufficient to achieve decarbonization, and an understanding that new techniques, tools, and markets will be required to meet state requirements.<sup>18</sup>

In July 2019, NESCOE requested that ISO-NE and NEPOOL initiate a process to analyze and discuss potential future market frameworks that contemplate and are compatible with the implementation of state energy and environmental laws.<sup>19</sup> In October 2020, the New England states released a Vision Statement for a clean, affordable, and reliable 21<sup>st</sup> century regional electric grid that identified three core segments of our shared energy system that will require significant changes, including addressing wholesale markets that can support clean energy goals.<sup>20</sup> The Vision Statement expressed the states' view that New England's existing wholesale electricity markets must modernize if they are to support achievement of clean energy laws, while maintaining system reliability and fostering more affordable electricity for regional consumers.<sup>21</sup>

In early 2021, ISO-NE's Board of Directors directed the ISO-NE management team to pursue an assessment of policy and market frameworks that could further advance the evolution of the regional power grid. Released in April 2022, the Pathways Study provides the region with significant data and analysis to evaluate four approaches that could meet the New England states' ambitious environmental requirements and goals.<sup>22</sup> The Pathways Study focuses on four potential approaches, one of which is a "status quo" use of state-directed clean energy procurements, and three of which represent a significant change in how clean energy is financed, an FCEM-structure, a net carbon pricing framework, and a hybrid of an FCEM and net carbon pricing.<sup>23</sup>

The Pathways Study compared key policy factors and challenges with each approach but did not address legal or regulatory issues, including jurisdiction and compliance with existing law.<sup>24</sup> The analysis showed that continuing with the status quo of state bilateral power purchase agreements is not the most cost-effective mechanism for achieving emissions reductions, does not create transparent price signals for customers, creates a potential risk of

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<sup>16</sup> NESCOE is the Regional State Committee for New England, representing the collective positions of the six New England states in regional electricity matters.

<sup>17</sup> See Office of the Attorney General, Energy Market Symposium 2019: Wholesale Market Design in a Low/No-Carbon Electricity System; available at <https://www.mass.gov/lists/energy-market-symposium-2019-wholesale-market-design-in-a-lowno-carbon-electricity-system>

<sup>18</sup> Massachusetts Attorney General's Office and the Regulatory Assistance Project, Wholesale Electric Market Design for A Low/No-Carbon Future Report on The October 2019 Symposium & Proposed Next Steps, at 8; available at <https://www.mass.gov/doc/wholesale-electric-market-design-for-a-lowno-carbon-future/download>

<sup>19</sup> See NESCOE July 16, 2019, memo to ISO-NE, ISO-NE 2020 Work Planning: Markets and State Laws; available at [http://nescoe.com/wp-content/uploads/2019/07/WorkPlan2020Request\\_16July2019.pdf](http://nescoe.com/wp-content/uploads/2019/07/WorkPlan2020Request_16July2019.pdf).

<sup>20</sup> See NESCOE, New England States Vision Statement, October 16, 2020; available at <https://nescoe.com/resource-center/vision-stmt-oct2020/>

<sup>21</sup> Id.

<sup>22</sup> See Analysis Group, Pathways Study Evaluation of Pathways to a Future Grid (Pathways Study), April 2022; available at <https://www.iso-ne.com/static-assets/documents/2022/04/schatzki-et-al-pathways-final.pdf>

<sup>23</sup> Id. at ES-1.

<sup>24</sup> Id. at ES-3.

price discrimination, and has the potential to create market disruptions.<sup>25</sup> In particular, the status-quo approach is forecasted to increase periods of negative pricing. This occurs in the study because contracted clean energy resources are incentivized to generate irrespective of the wholesale market price signal and offer into the wholesale market at a negative value, impacting the wholesale market clearing price. The impact of this pricing can act as a disincentive for needed flexible resources, such as battery storage, to operate when needed for reliability.<sup>26</sup> The Pathways Study notes that the status quo approach of clean energy procurements supports the financing of new resources but does not compensate existing resources and would likely result in state support for existing clean energy resources, including the nuclear units, which has occurred in other markets.<sup>27</sup>

Under the net carbon pricing framework, the Pathways Study analyzed an incremental carbon price from generators in the wholesale energy market (in dollars per ton of carbon dioxide emissions) and returned the carbon price revenues to electricity consumers. The Pathways Study found that the net carbon pricing approach is the only mechanism of those examined that directly displaces carbon-intensive generation. However, the Pathways Study noted potential challenges in achieving regional consensus on an emissions reduction target.

The Pathways Study found that an FCEM-style centralized market would provide incentives for least-cost clean energy but would not incentivize carbon-emitting generators to reduce emissions or provide incentives for dynamic emissions reductions.<sup>28</sup> Additionally, the Pathways Study identified a risk of incentivizing negative pricing with the FCEM and hybrid approaches as the FCEM framework would allow clean energy resources to receive an incentive when a negative pricing event occurred.

The Pathways Study found that the hybrid approach (a combination of carbon pricing for existing clean energy resources and an FCEM for new clean energy resources) may raise questions about price discrimination based on the different compensation models for resources providing otherwise similar services.

The Pathways Study also included quantitative analysis for the annual incremental social cost per MWh for each approach, reported relative to a reference case which assumes the region does not achieve any additional electric sector carbon emissions reductions beyond those resulting from the clean energy procurements already planned by the states.<sup>29</sup> This type of analysis does not represent the total cost of any approach but can be used to compare approaches to each other. The Pathways Study found that all three market-based approaches were lower cost than the status quo state procurement model, with net carbon pricing having the lowest incremental social cost.

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<sup>25</sup> Id. at ES-4.

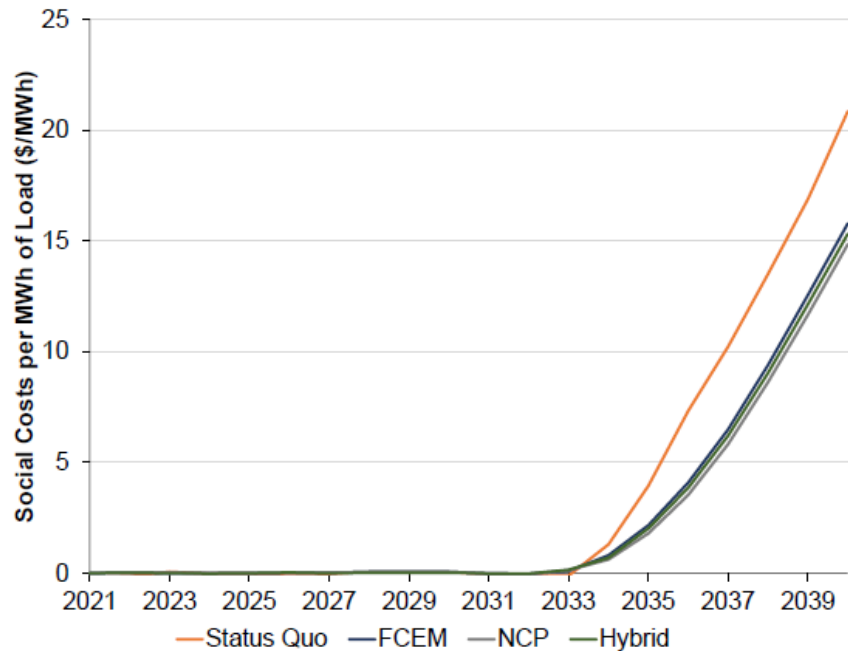
<sup>26</sup> Id. at ES-8.

<sup>27</sup> Pathways Study at 14. In Massachusetts, there is some compensation for existing resources through the CES, but existing resources have been ineligible for GCA Procurements.

<sup>28</sup> Id. at ES-6.

<sup>29</sup> Id. at ES-11.





Note: Incremental social costs is the difference between social costs for each policy case and social costs in a baseline, Reference Case.

Figure 2: Incremental Social Costs by Policy Approach, 2021-2040 (\$2020/MWh)<sup>30</sup>

Given CASPR’s failure to facilitate the market entry of clean energy resources, the New England states, through NESCOE, and many regional stakeholders sought changes to the rules governing the FCM, specifically the removal of the minimum offer price rule (MOPR) that limited the participation of state-sponsored resources. After a multi-year stakeholder process, in March 2022, ISO-NE filed a proposal with FERC to remove the MOPR from the FCM.<sup>31</sup> ISO-NE’s proposal called for a graduated phasing out of the MOPR over a three-year period, applying a renewable technology resource (RTR) exemption for up to 700 MW of qualified capacity from state-sponsored resources during the transition (the equivalent of 2,000 MW in nameplate capacity). The RTR exemption allows up to 300 MW of qualified capacity in FCA #17, held in March 2023, and up to 400 MW of qualified capacity in FCA #18, scheduled for February 2024. Full elimination of the MOPR will occur in FCA #19. Any unused portion of the exemption from FCA #17 carries over into the total available for FCA #18.

In May 2022, FERC issued an order approving ISO-NE’s proposed tariff revisions to remove the MOPR by FCA #19.<sup>32</sup> Elimination of the MOPR clears a path for renewable resources to enter the capacity market, earn capacity revenues, and count towards meeting the capacity requirements of the region.

In March 2023, ISO-NE administered FCA #17 where only 108 MW (out of the 300 MW cap available) of renewable resources utilized the RTR exemption from the MOPR. This leaves 592 MW of the RTR exemption available for FCA #18, which will be administered in 2024, before full elimination of the MOPR in FCA #19, which will be administered in 2025.<sup>33</sup>

<sup>30</sup> Pathways Study at ES-12.

<sup>31</sup> [https://www.iso-ne.com/static-assets/documents/2022/03/mopr\\_removal\\_filing.pdf](https://www.iso-ne.com/static-assets/documents/2022/03/mopr_removal_filing.pdf)

<sup>32</sup> [https://www.iso-ne.com/static-assets/documents/2022/05/er22-1528-000\\_5-27-2022\\_order\\_accept\\_mopr\\_removal.pdf](https://www.iso-ne.com/static-assets/documents/2022/05/er22-1528-000_5-27-2022_order_accept_mopr_removal.pdf)

<sup>33</sup> <https://www.iso-ne.com/static-assets/documents/2018/05/fca-results-report.pdf>



## MASSACHUSETTS JANUARY 2023 FCEM DESIGN PROPOSAL

Based on these previous investigations and the need to increase the scale of clean electricity to achieve Net Zero in the Commonwealth in 2050, DOER explored clean energy market designs that addressed three key goals:

1. support the financing of new clean energy projects with a financeable product;
2. support the scale and supply mix of clean energy that will be required to meet the region's and Massachusetts' ambitious clean energy and emissions reduction requirements while maintaining system reliability; and
3. be implementable by state and/or federal authorities, integrating effectively with existing regulations and markets.

This included building on the existing work done to identify limitations with the status quo (Table 2) and addressing the concerns identified in the Pathways Study. To advance regional discussions toward implementation of a market structure, DOER commissioned consultants at The Brattle Group and Sustainable Energy Advantage (Consultant Team) to support the development of a detailed design proposal that could be used to kick-start more detailed stakeholder engagement on specific design elements. To support their work, the Consultant Team and DOER engaged in detailed interviews and discussions with all New England states to inform the design proposal.

The goal in releasing the FCEM Design Proposal was not to commit Massachusetts to a specific clean energy market design but to contribute to regional discussions, prompt conversation, and help identify areas for further refinement. A link to the FCEM Design Proposal is included in the Appendix.

Table 2: Limitations with Status Quo

	Limitations with Current Procurement Model	Goals for FCEM Market Design
1	<b>Lack of Regional Coordination.</b> Multiple electric distribution companies make coordination with other states unmanageable.	Regionally integrated – MA and other states all can submit their desired clean energy targets. Regional entity combines all and procures together. Allow for additional voluntary buyers outside the EDCs.
2	<b>Unpredictability.</b> The procurement processes in MA and other states make it difficult for developers to plan their businesses.	Predictable schedule – 3-year forward market, run annually.
3	<b>Lack of Scalability.</b> While scale has increased, the current process would be challenged to deliver the 1 GW or more of new clean energy generation per year that our decarbonization laws may require.	Scalable – Procure as much offshore wind or other clean energy as the market demands/supplies.
4	<b>Ratepayer Risk.</b> 20-year contracts are inherently risky.	Lower risk from 20-year contracts – if costs go down, consumers can realize those benefits closer to real time.

5	<b>Long Procurement Process.</b> With electric distribution company contracts, the total process can take nearly two years from procurement development to executed contracts approved by DPU.	Eliminates need for individual electric distribution company contracts with projects; procurement can be achieved faster.
6	<b>Bulky Purchases.</b> The current structure has big projects coming online every few years that causes disruption in the RPS markets.	Purchases are smoothed out annually and in-line with increasing state targets.
7	<b>Less consistent with Federal Markets.</b> Policy requirements not reflected in wholesale market incentives, introducing risk of excess cost to customers.	Regional coordination and incentives alignment can support policy and reliability needs most cost-effectively.

Additional goals were developed from the New England Energy Vision, as described below:

- 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.
- Offer robust and commercially reasonable financial terms sufficient to attract the large-scale investments in developing and financing 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 the clean energy transition.
- 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.

The FCEM Design Proposal represents a potentially new component of the New England wholesale electricity marketplace through which Massachusetts and other states could choose to coordinate procurements of large amounts of clean energy at a competitive price. Under this proposal, a new independent non-profit entity, FCEM-NE, would be created and overseen under joint authority of the six New England states. FERC would regulate the market rules. This organization would conduct a coordinated regional procurement that would include clean energy certificates, similar to ISO-NE's bulk electricity markets. These procurements would come in the form of a 3-year forward auction, conducted every year. The auction clearing format would select winning buyers and sellers, set a clearing price, and seek to maximize the volume of trade. New resources would gain 15-year (reducing to 7-year over time) fixed-price commitments to support financing new project development.

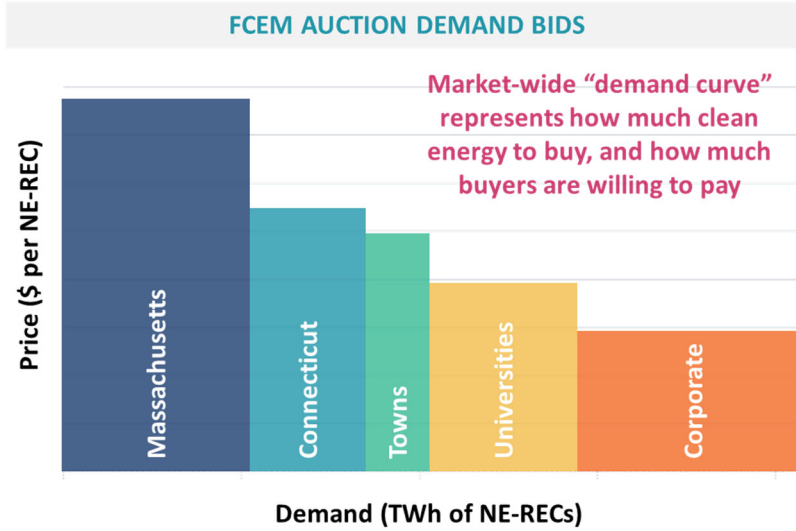


Figure 3: FCEM Demand Bids

FCEM would accept all types of buyers from state agencies, suppliers, utilities, and smaller buyers such as localities, universities, and corporate buyers. Buyers would place "demand bids" that represent a desired amount of clean energy and maximum price they are willing to pay. Buyers would also specify one or more categories of renewable energy certificates (RECs) or other certificates they wish to buy. This includes specifying "new-only" demand bids. The FCEM auction structure would seek to fill as many buy orders as possible where the clearing price is always equal to or below the buyer's specified price.

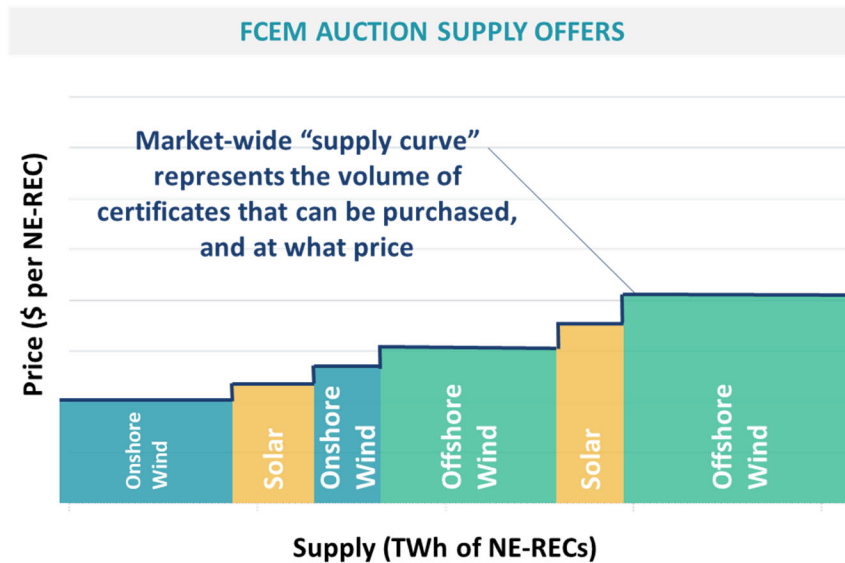


Figure 4: FCEM Supply Offers

Sellers would place "sell offers" into the auction, representing the volume of certificates they predict their resources could generate. Resources would be able offer to sell one or more categories of renewable and clean energy certificates for which they are eligible while tracking would ensure that there was no double counting of clean energy.

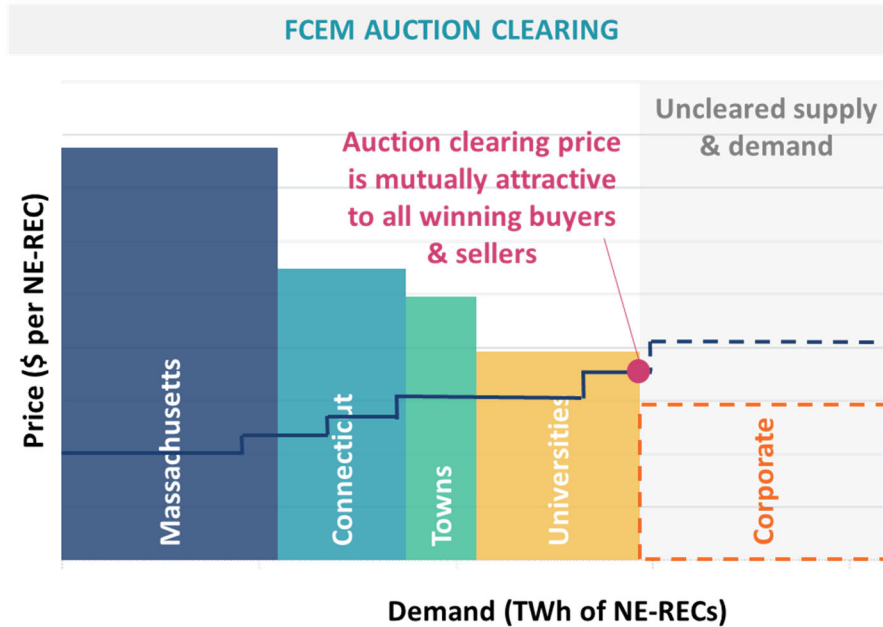


Figure 5: FCEM Auction Clearing

The FCEM auction clearing would seek to maximize the benefits from supply offers and demand bids, matching commitments at a mutually attractive price. The demand bids from various buyers and sell offers from generators would be stacked up from lowest price to highest price with matching volumes. The auction would set a single clearing price for each certificate product. Sellers that offer at a price higher than the clearing price would not be selected and buyers that place demand bids at a lower price than the clearing price would not procure their future renewable or clean energy requirement.

The FCEM Design Proposal includes several proposed products that were designed to meet the needs of a wide range of potential buyers and address the challenges identified in the Pathways Study. To achieve clean energy goals, a clean energy market must attract large-scale and stable investment in new clean energy. A stable market reduces financing risk for developers and reduces the price risk ratepayers currently assume with long-term contracts.

Product	Description & Purpose	Eligible Resources
<b>State-Defined Certificates</b> <i>Units: MWh</i>	<ul style="list-style-type: none"> <li>Different in all states</li> <li>Enable states and retail providers to meet current laws and requirements</li> </ul>	Determined by state laws or regulations
<b>New England Renewable Energy Certificate</b> <i>NE-REC</i> <i>Units: MWh</i>	<ul style="list-style-type: none"> <li>Renewable product, eligibility consistent with most or all states' current criteria. States may decide to allow such RECs for use in compliance with their Class I RPS.</li> </ul>	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

	<ul style="list-style-type: none"> <li>NE-RECs cannot be minted in negative price intervals (i.e., during curtailment events)</li> </ul>	
<b>Clean Energy Attribute Certificate</b> <i>NE-CEAC</i> <i>Units: MWh</i>	<ul style="list-style-type: none"> <li>Clean energy product, includes nuclear and large hydro to maximize scope of eligible supply (increases competition, reduces system cost)</li> <li>NE-CEACs cannot be minted in negative price intervals (i.e., during curtailment events)</li> </ul>	Onshore wind, offshore wind, solar, hydroelectric, nuclear, tidal, wave. Distributed resources eligible if qualified and delivering into ISO-NE energy markets
<b>GHG Marginal Abatement Certificate</b> <i>NE-GHG</i> <i>Units: MWh<sub>GHG</sub></i>	<ul style="list-style-type: none"> <li>New product focused on tons of GHG displaced by a resource (rather than MWh produced)</li> <li>Aims to favor clean resources producing energy at the times and locations that displace the most GHG emissions</li> <li>Storage and demand response eligible</li> </ul>	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
<b>Clean Capacity Certificate</b> <i>NE-CCC</i> <i>Units: MW-month</i>	<ul style="list-style-type: none"> <li>Allow states and customers to procure reliability/capacity needs from zero-carbon emitting resource types</li> <li>Capacity value denominated identically to ISO-NE definitions</li> </ul>	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

Several design elements are included in the FCEM Design Proposal that seek to ensure an FCEM can attract new resources and necessary financing:

- Price lock-in for new resources, beginning at 15 years at FCEM launch, declining to 7 years as the market gains maturity.
- Accessible, predictable, and annually conducted regional auctions, creating robust opportunities to monetize unhedged clean resource value over the long term.
- Long-term participation commitments for state buyers and stable, price-locked commitments, ensuring no state can suddenly cease participation.
- Phased entry bid option for state entities making large purchases that have flexibility in resource online date.

## PUBLIC COMMENT

DOER sought public comment on the FCEM Design Proposal to revise and refine the proposal and define next steps. On February 3, 2023, DOER hosted a public webinar that included an introduction to the design proposal process, a short technical review of the FCEM, and time for questions and answers. DOER presented the following questions to stakeholders to consider in their comments.

- Are there key aspects of the FCEM Design Proposal that have advantages or disadvantages over the status quo?
- Are there design aspects that are key to financing a portfolio of new clean energy resources and supporting the Commonwealth meeting emission reduction targets?
- Will there be sufficient interest from both buyers and sellers for an FCEM?
- What processes would help achieve effective implementation of a clean energy market design?
- Are there other clean energy market reforms that could be considered as alternatives or operate with an FCEM?
- Are there any other state policy goals that overlap with the FCEM Design Proposal?
- How should DOER proceed to engage with regional stakeholders to progress clean energy market reforms?

DOER requested public comment by February 17, 2023, to identify key next steps. DOER received 45 public comments; a link to those comments is included in the Appendix.

Many public comments shared similar themes and questions, highlighting areas for DOER that need further investigation and analysis. A summary of the key themes raised by stakeholders is included below in Table 3. The stakeholder comments informed the recommendations included herein and will be key for defining future analysis and investigation.

**Table 3: Stakeholder Comment Summary**

Theme	Summary of Comment
<b>Integration with FCM and ISO-NE Markets</b>	Stakeholders raised questions about how the FCEM and the FCM would interact. Comments pointed out that ISO-NE is currently exploring two changes to the FCM in the near-term including resource accreditation standards and developing potential seasonal auctions. Further investigation on how this integration would work would be necessary. Additionally, many stakeholders raised concern about how the design proposal would impact ISO-NE’s use of a minimum offer price rule in the FCM and limit the ability for clean state-sponsored resources from participating.
<b>Market Rules and Product Definitions</b>	The most common concern raised by stakeholders was the number of market products and the complexity of the auction in the design proposal. Concerns about the number of products included an increased risk of double counting of the emissions reductions associated with a single resource, potential undermining of achieving market goals, and increasing administrative burdens and costs. Some stakeholders recommended the use of an internal market monitor. Stakeholders noted that negative pricing restrictions are an improvement over the FCEM design in the Pathways Study but raised concerns that the GHG Abatement product may not achieve effective incentives for energy storage and emissions reductions.
<b>Buyer and Seller Eligibility</b>	There was general support for a market design that supported the participation of voluntary buyers such as community choice aggregation suppliers. Some stakeholders expressed that the market should reduce eligibility differences between both new and existing energy resources and clean and renewable

	energy classifications. Some comments noted the benefit of including demand response as an eligible seller.
<b>Financing</b>	Many stakeholders noted that the proposal did not include a quantitative analysis of how the market design would support financing of both small and large projects. While some stakeholders noted that sellers would be interested in a market with clear buyer interest, many stakeholders raised concerns around the price lock, including the identification of a 15-year lock when current contracts have been for 20 years and how and when the price lock would decrease to 7 years.
<b>Governance</b>	Many stakeholders raised concerns with any market design that would be FERC jurisdictional, both because of concerns that states may not have as much control over the market design and implementation, but also legal concerns. Many stakeholders supported a governance structure where states could impact both market design and implementation.
<b>Alternatives</b>	Following concerns around market governance, many stakeholders recommended the consideration of a state-jurisdictional market. This included some support for the consideration of an alternative to a clean energy attribute market through a stronger carbon price in the existing RGGI structure.
<b>Costs and Other Quantitative Analysis</b>	Stakeholders raised concerns about the costs that would be associated with the administration of the market and that a market that sought least-cost renewable energy may not achieve a diverse resource mix, as described below.
<b>Other State Goals</b>	Stakeholder comments recommended including four state-level goals that are not currently included in the market design proposal: 1) environmental justice and siting impacts 2) diverse resource supply mix including specific support for offshore wind, 3) winter reliability, and 4) interconnection and delivery. Stakeholders expressed support for the development of market tools that take into account siting impacts, especially in environmental justice communities. As noted above, many commenters raised concerns that the market would not result in meeting offshore wind goals and a reliable resource mix. Multiple commenters noted that there are existing policy goals to support resources that contribute to winter reliability, and this market could address that goal more explicitly. Additionally, some commenters noted that the market may support a growth in clean energy development but that interconnection to the electric grid may become a barrier.
<b>Next Steps</b>	Almost all commenters noted the need for further stakeholder engagement as the state refines any clean energy market design. This engagement was requested both by community organizations and individuals, highlighting the need for broad and transparent communication, especially in communities that would be impacted by increased clean energy development. Additionally, next steps should include transparent analysis of the concerns raised by stakeholders, as described above.



## FINDINGS AND RECOMMENDATIONS

The Secretary of EEA finds that use of multi-state, market-based mechanisms, structures, systems or competitive solicitations would be beneficial to the Commonwealth. Massachusetts can improve on its current single-state, technology-specific approach to supporting clean energy development and achieving greenhouse gas emissions reductions. New structures may help the Commonwealth meet its clean energy needs and decarbonization requirements while supporting reliable system operations and affordability for consumers.

The FCEM Design Proposal was helpful in fostering greater dialogue and a shared understanding of the challenges and considerations involved in developing an FCEM. As a technical report, the proposal is appropriately focused on design details and parameters, understandably leaving open a number of threshold questions regarding the viability of the FCEM structure. While the FCEM Design Proposal does not provide a basis to proceed to adopting new regulations pursuant to Section 85(c) at this time, to the extent market participants or other states wish to build on the FCEM Design Proposal and move to the next steps of design development, the Commonwealth would expect to continue its engagement on this potential market mechanism.

However, expedience matters. The Commonwealth is committed to addressing the urgent threat of climate change. An implementable FCEM is many years away, with a timeline that must account for both the design time needed to resolve many open and complicated questions as well as the multi-year lag between adopting such a design and putting it into practice through a forward market that operates three years ahead.

Thus, Massachusetts must collaborate with its regional partners and explore more expedient market-based approaches to support the development of clean energy, the achievement of state decarbonization requirements, and reduced consumer costs. This could include consideration of (1) expanding existing federal and/or state market models or structures that appropriately recognize carbon externalities; and (2) exploring other mechanisms that leverage the collective buying power of public and private entities.

While this regional work is underway, Massachusetts will build on recent efforts to optimize its procurement authority in partnership with other states to facilitate larger-scale and faster-paced clean energy investment and deployment.

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## APPENDIX

- ISO-NE Pathways Study
  - Available at <https://www.iso-ne.com/static-assets/documents/2022/04/schatzki-et-al-pathways-final.pdf>
- January 2023 FCEM Design Proposal
  - Available at <https://www.mass.gov/doc/ma-doer-fcem-design-proposal/download>
- Stakeholder Comments
  - Available at <https://www.mass.gov/doc/public-commentsforward-clean-energy-market-design-proposal/download>