

A Thought Experiment in FCEM

NEPOOL IMAPP Stakeholder Process

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Goals and Rationale for FCEM

- ✓ Facilitate cost-effective entry and financing of new renewable energy projects, and compensation for existing, non-contracted renewable energy resources
- ✓ Provide renewable project developers with a high-quality revenue stream to support financing, and a predictable market structure for revealing value and prices over time
- ✓ A standardized, repeatable market will enable scaling of the entry of renewables by moving beyond one-off solicitations and customized, negotiated agreements
- ✓ Visibility of a forward demand quantity and pricing creates confidence of developers and investors, and will support a pipeline of early development efforts

Open, competitive process fosters confidence *in all parties* of the cost-effectiveness of the selected projects and the opportunity for innovation and competition among projects



Goals for Today

- ✓ Take a deeper dive into the design of FCEM – to identify further questions and suggest further details
- ✓ Illustrate a framework and a process for thinking about FCEM design elements
 - ✓ Present a concrete example as an aid to getting deeper into the design
 - ✓ Design choices and interdependencies
 - ✓ Important details
 - ✓ Interactions with other markets
- ✓ Follow the Sept 14 Framework Document outline¹; major differences are in **bold**

Today's discussion is only an illustrative starting point
and is *not* a proposal

1 http://nepool.com/uploads/IMAPP_20160914_Framework_FCEM.pdf



Goals for Further Development

- ✓ The FCEM should not be limited to a single 'class' in the states' RPS
 - ✓ the focus on a single REC product today is intended to enable the consideration of design choices in a more tangible example, not to preclude a broader market definition
- ✓ The FCEM should be integrated and co-optimized with FCM, as CLF is proposing, if possible
 - ✓ The focus on FCEM today is not intended to preclude co-optimization
- ✓ The Net ICR (resource adequacy) is a function of unit characteristics; how does it change as penetration of variable renewables increases?



Outline – Framework Document

- ✓ General Understandings
- ✓ Product Definition
- ✓ Procurement Requirements
- ✓ FCEM Auction
- ✓ FCEM Obligations and Payments
- ✓ Relationship to FCM
- ✓ Cost Allocation

Intent is to follow the outline and structure of the
September 14 Framework Document



General Understandings

- ✓ FCEM to be governed by FERC-approved tariffs
- ✓ FCEM to procure renewable resource commitments to meet state policy goals through a competitive, financeable structure
- ✓ FCEM could work in tandem with other mechanisms, such as a two-tier pricing mechanism in FCM



Product Definition

- ✓ **Class 1 RECs, as defined by the New England states. New and existing resources eligible as Class 1 resources in any state would be eligible for FCEM**
- ✓ The obligation on selected resources is to deliver the specified number of **RECs** in the delivery year, which will be measured by ISO-NE as the MWh produced by the resource, with **no temporal differentiation**
- ✓ **Why perform this thought experiment with Class 1 RECs?**
 - ✓ **i) they are already defined in the six states, with clear eligibility and numerical requirements;**
 - ✓ **ii) they are generally interchangeable within (and beyond) the region; and**
 - ✓ **iii) they trade in a spot/prompt market for RPS compliance, providing a price and mechanism for settling imbalances in forward positions**



Procurement Requirements

- ✓ Process for setting requirements would be defined in ISO-NE Tariff
 - ✓ Total annual **Class 1 REC requirements** as established by the states
- ✓ No locational or other clearing constraints
- ✓ **This annual net REC requirement could set the 'target' quantity (Q) in a downward-sloping demand curve**
- ✓ **The 'target' price of the demand curve could be based on the estimated equilibrium value of Class 1 RECs (currently ~\$35)**
- ✓ **The demand curve would be a straight line between the 'target' value of (Q, [\$35]), and a 'maximum cost' point at (0.75Q, [ACP]). To the left of the 'maximum cost' point, the line would be flat at the ACP level. To the right of the 'target' point, the line would continue downward at the same slope until it intersects the quantity axis at a price of \$0/MWh.**

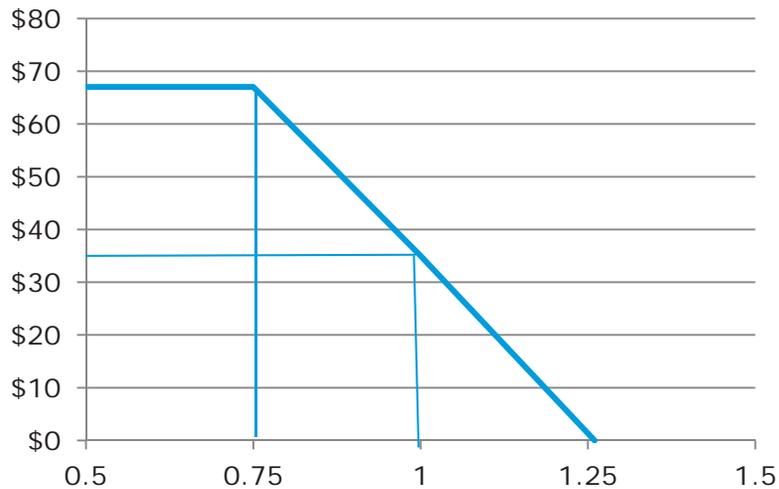
All illustrative values are subject to modification and refinement – the purpose here is to begin to make FCEM more tangible



Procurement Requirements (2)

Illustrative FCEM Demand Curve:

- ✓ **1.0 Requirement = Aggregate state Class 1 REC requirements**
- ✓ **Assumes 'equilibrium' price of \$35/MWh**
- ✓ **Assumes 'cap' price of \$67/MWh**
- ✓ All parameters subject to further development



Estimated Aggregate New England States' Class 1 REC Requirements

	Class 1 RECs (GWh)	Class 1 RECs as Percent of Load
2018	18,709	14%
2019	20,293	15%
2020	21,159	16%
2021	21,873	16%
2022	22,611	17%
2023	23,365	17%
2024	24,142	18%
2025	24,929	18%

Values are for illustrative purposes only, based on current New England state RPS parameters and prices

nrg[®] FCEM Auction

- ✓ FCEM would procure forward commitments to produce energy that would generate **Class 1 RECs**
- ✓ FCEM auctions would occur ~3.5 years prior to the commitment period, with FCEM results known prior to FCM final offer deadlines*
- ✓ FCEM qualification and FA schedules and processes comparable to FCM, as defined in ISO-NE Tariff
- ✓ ISO-NE qualification would determine maximum qualified MWh for each eligible resource
- ✓ **Physical, resource-specific qualification (like FCM)**
- ✓ Trading of FCEM obligations permitted through bilateral transactions
- ✓ FCEM offers, in \$/MWh, **would be based on a similar concept as FCM, ie, total project going-forward costs less anticipated market revenues***

* Subject to adjustment if a joint, co-optimized FCEM/FCM structure can be developed



FCEM Auction (2)

- ✓ FCEM clearing price also in \$/MWh
- ✓ To facilitate financing, new FCEM resources could elect a price lock-in period of up to **[15] years**
- ✓ FCM Auction Mechanics:
 - ✓ No strong preference; sealed-bid as default
- ✓ FCEM Mitigation:
 - ✓ **Presume resources participating in FCEM would not have a PPA or other state financial support, so mitigation of resources entering FCEM should be unnecessary**
 - ✓ If IMM detects new FCEM resources with OOM revenues, apply mitigation based on Appendix A.21



FCEM Obligations and Payments

- ✓ FCEM payments based on MWh output times FCEM clearing price, **separate from energy and capacity**
- ✓ **Pay twice-weekly based on meter reads; true-up to minted RECs**
- ✓ **Collect FCEM costs from LSEs in the same twice-weekly cycle**
- ✓ **ISO-NE payments to FCEM resources would also include energy LMP (DA or RT, as appropriate)**
- ✓ **FCEM clearing price paid only for 'obligation' MWh; no FCEM payment for over-production**
- ✓ Each resource with an FCEM obligation would be subject to charges for under-delivery of its annual commitment, **in the form of Class 1 RECs purchased bilaterally or the ACP**
 - ✓ **LD collections would be applied to reduce the cost of FCEM allocated to LSEs**



Relationship to FCM*

- ✓ **Resources clearing in FCEM could, but would not be obligated to, participate in the subsequent FCM auction**
 - ✓ Could participate up to the maximum FCM Qualified Capacity, as determined by ISO-NE

FCM Mitigation Adjustments:

- ✓ **A cleared new FCEM resource participating in FCM, that had not previously cleared in FCM, would participate with a \$/kW-mo offer price equivalent to its \$/MWh FCEM offer price**
- ✓ **FCEM could work in conjunction with a two-tier pricing mechanism in FCM; FCEM resources not clearing in 'tier 1' could obtain a CSO and be paid the lower 'tier 2' price, and participate under those rules until cleared in tier 1**
- ✓ ISO-NE would continue to be responsible for the qualification and determination of the resource adequacy contribution of FCEM resources participating in the FCM

* Subject to adjustment if a joint, co-optimized FCEM/FCM structure can be developed



Recap

- ✓ The FCEM concept has great promise as a more transparent, competitive means to use centralized market structures to achieve state clean energy policy objectives
- ✓ Our goal today was to present some further detail and considerations based on several design choices
- ✓ Discussion of those choices will undoubtedly continue, but hopefully we've identified further important details and interactions that need to be considered in any FCEM design
- ✓ Whether FCEM is considered 'in-market' or 'out-of-market,' it is critical that FCM continue to achieve its objective of supporting resources needed for adequacy

Today's discussion is presented as an illustrative starting point, not a definitive proposal



Questions?