NEW ENGLAND POWER POOL

AGENDA

Integrating Markets and Public Policy (IMAPP)
Plenary Meeting #3
September 14, 2016
DoubleTree Hotel, Westborough, MA

Morning Session **9:30 a.m. - 12:30 p.m.**

- **Introductory Remarks**

- **New Presentations and Updates**
  - AR/End User Sector Representative – Update on Battery Storage Proposal — presentation posted
  - Conservation Law Foundation (CLF) – New Presentation on Potential Carbon Integrated Forward Capacity Market (FCM-C) & Energy Market Carbon Pricing Solution — presentation posted
  - Exelon Update on Carbon Pricing in Energy Market — presentation posted

- **Presentation and Discussion on Draft Framework Documents**
  - Forward Clean Energy Market (FCEM) Framework — to be circulated/posted
  - FCM Two-Tiered Pricing Framework — to be circulated/posted

Lunch Break **12:30 - 1:00 p.m.**

Afternoon Session **1:00 – end of day (estimated to be 4:30 p.m.)**

- **Continuation of Presentation and Discussion on Draft Framework Documents (as needed)**

- **Discussion of Goals and Objectives**
  - Clarifying Questions on Goal Posts and Objectives Document
  - Discussion of Other Potential Objectives for NEPOOL

- **Preliminary Observations and Questions from ISO-NE and Participants on Potential Market Constructs**

- **Concluding Remarks/Discussion of Next Steps**

Battery Storage Update

NEPOOL Forum: Integrating Markets and Public Policies

September 14, 2016

Synapse NEPOOL Team

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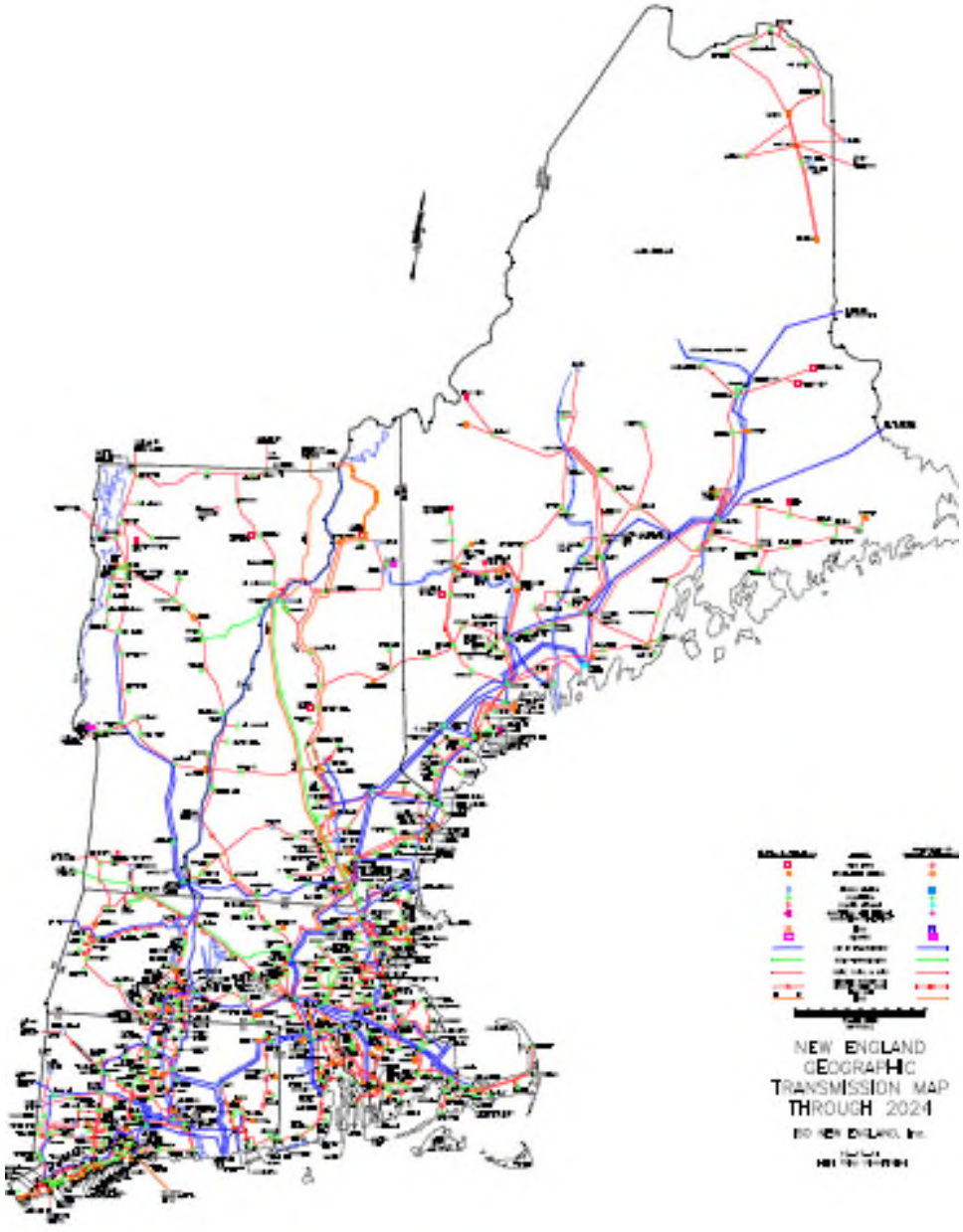
Synapse Energy Economics

- Founded in 1996 by CEO Bruce Biewald.
- Leader for public interest and government clients in providing rigorous analysis of the electric power sector.
- Staff of 30 includes experts in energy and environmental economics and environmental compliance.
- Representing NEPOOL stakeholders since 2001.



Storage at substations

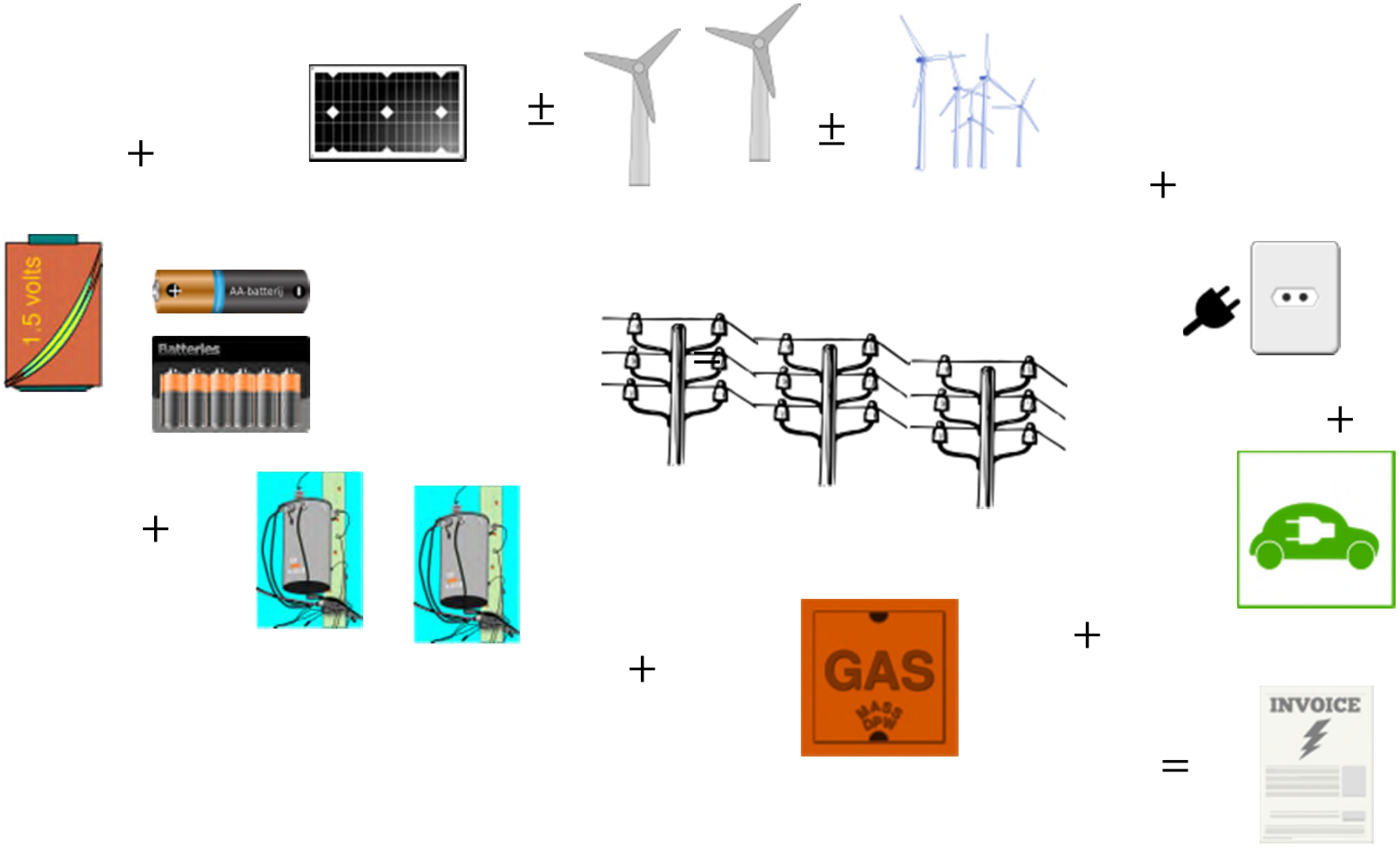
- To enable integration of zero-carbon generation with the existing fleet, install battery storage facilities at substations throughout the grid.
- Storage units would be appropriately sized depending on the size of the substation and upstream and downstream constraints.
- Dispatched to maximize delivery of zero-carbon generation.
- Fund the investments through the RNS rate. ISO can operate these facilities similar to other reliability infrastructure to address sudden changes in supply or demand

Goal

Strategic additions of battery storage at substations could:

- Maintain and improve the balancing of the grid
- Provide better integration of renewable resources with existing system resources
- Provide additional tools for both ISO and distribution system operators
- Ensure that renewable resources' energy is fully utilized
- Provide energy market and ancillary services revenues to defray costs
- To the extent that reliability is improved, some or all of the costs may qualify for RNS or LNS treatment

Issues to address



Questions?

A Competitive Markets Design to Achieve New England's Energy Decarbonization Goals

Robert Stoddard
Senior Consultant
Charles River Associates

Jerry Elmer
Senior Attorney
Conservation Law Foundation

September 14, 2016

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The CLF Market Design Team

- Robert Stoddard (Senior Consultant, Charles River Associates)
- Brattle Group-Kathleen Spees, Judy Chang, Sam Newell
- David Bono (CLF Senior Fellow, formerly General Counsel, US Operations, Brookfield Renewable Power)
- CLF Clean Energy and Markets Team

Issues For Consideration

- Consensus Statement of the Goal of this Process
- Recommendation for Pre-design Modeling
- Revised CLF Market Design Proposal

Consensus Statement of IMAPP Goal

- Proposals, positions and comments to date suggest a diverse and divergent understanding of the primary goal of this process
- Achieving consensus on final market adjustments requires an initial consensus on the overarching goal sought to be achieved by those changes
- The Consensus Goal Statement should be simple, clear and broadly encompassing
- To date, the ISO-NE wholesale markets and planning processes have been designed to achieve two overarching objectives: reliability and economic efficiency
- The IMAPP Consensus Goal Statement must incorporate a third core objective: achieving the collective state greenhouse gas reduction targets

CLF Proposed Goal Statement

“ISO-NE electricity markets that are consistent in design and function with the New England states' shared goal of achieving an 80% reduction in greenhouse gas emissions by 2050 and that maintain reliability and cost-efficiency”

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Essential Pre-design Modeling

- States' have shared goal of 80% reduction in greenhouse gas emissions by 2050
- Electrification of transportation and buildings (heating) sectors is critical to achieving 80% by 2050
- If markets are to facilitate timely decarbonization of the electric sector, they must be designed in accordance with some understanding of what decarbonization over 34 years will look like
- It is essential that we inform proper final design by answering, in advance, critical questions around the necessary trajectory for electric sector decarbonization to achieve the economy-wide goal as well as essential attributes of a decarbonized electric system

Revised CLF Market Design Proposal

Two Components:

1) Price on Carbon in Energy Markets
   - Recognizing the true societal cost of the GHG emissions externality will send the proper signal for investment in clean forms of energy while reducing carbon in dispatch
   - Provides price signal to ensure efficient use of distributed resources and storage

2) Carbon Integrated Forward Capacity Market (FCM-C)
   - Provides an investment signal for the development of clean energy resources on a schedule consistent with the goal of 80% GHG reduction by 2050

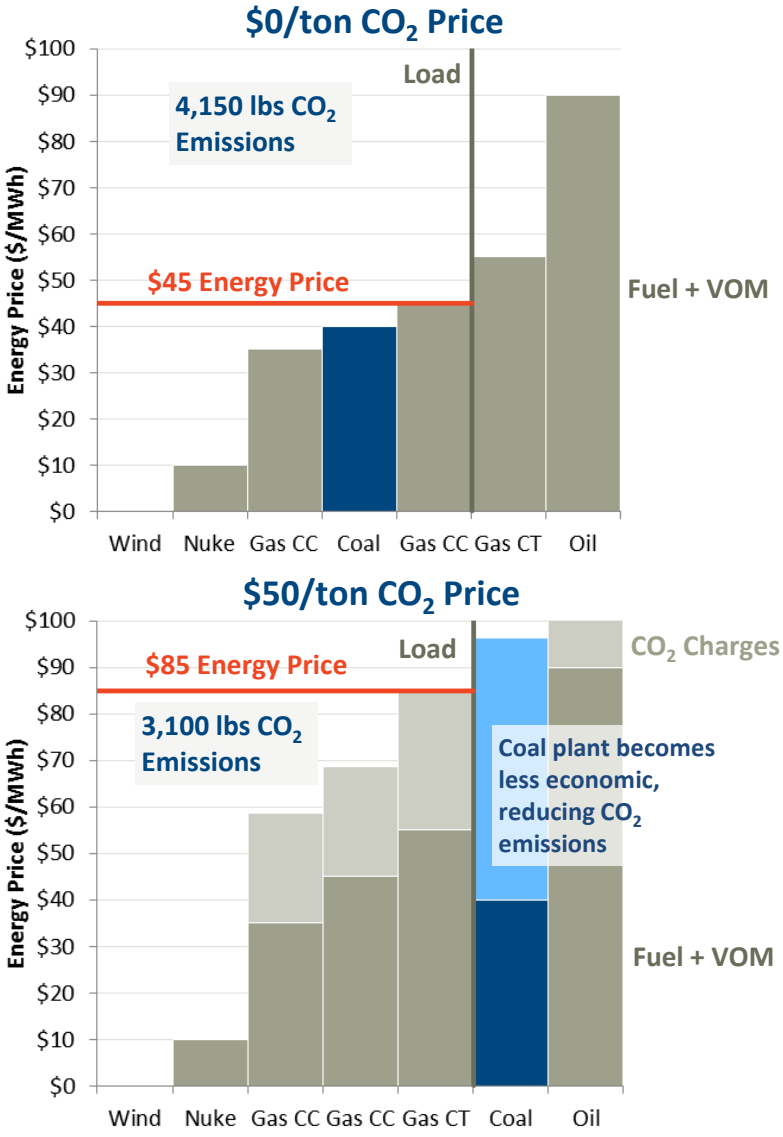
Price on Carbon in Energy Markets

- Real carbon price, not just shadow price on carbon
- Carbon price applied to generator offers will be reduced by the most recent RGGI auction price
- Approach designed to be technology neutral, rewarding low and zero carbon emitting resources
- While wholesale energy prices will reflect the carbon adder, customer cost increases will be offset by the ISO returning the carbon charges collected proportionally to state-regulated EDCs, muni/coop entities and direct wholesale customers on a monthly lump sum basis
- Seams issues will be addressed with a CO_2 price adder at the border (reflecting the difference in CO_2 prices in each market, with many details to be part of the design phase)

CO_2 Pricing Furthers State Decarbonization Goals in the Short- and Long-Term

- Short-term dispatch effect from higher-emitting resources incurring higher CO_2 charges and becoming more costly on a per MWh basis

- Will avoid dispatch of CO_2 emissions in the short-term by, for example, avoiding increased emissions from cycling; peaking DR may also be more economic than some high-emitting gas/oil peakers; and remaining coal/oil left in market dispatched less frequently



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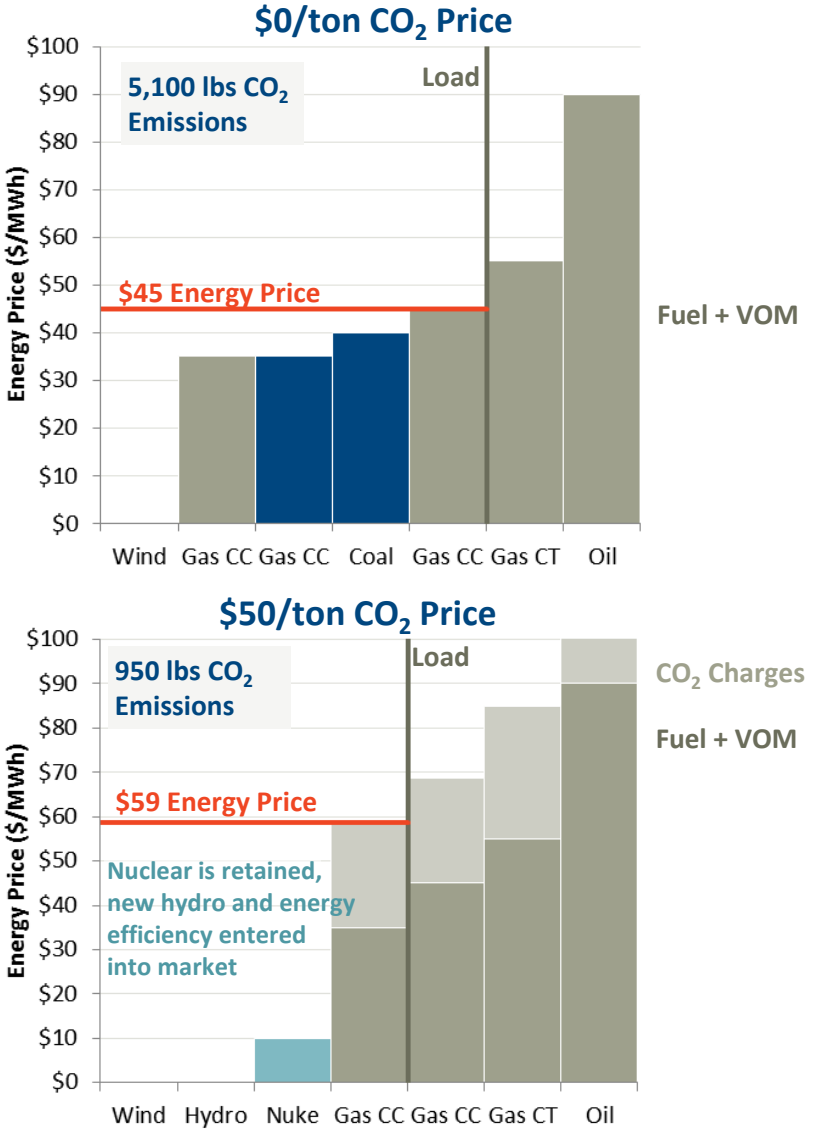
Notes: Adapted from Exelon slide 4. Each plant is 1 MW in size, with typical fuel+ VOM costs and CO_2 emissions rates.

Long-Term: Price Signal Creates Incentive for Clean Energy Resource Development

- Lower-emitting and non-emitting resources will be more profitable and more attractive to investors than without a CO_2 price
- Will induce investments toward a lower-emitting resources over time
- Expected long-term effects:
  - Higher energy margins will help retain existing clean energy resources that may otherwise retire
  - Existing coal and high-emitting steam plants will face more financial pressure to retire
  - New wind, hydro, and energy efficiency will become more attractive investments (and reduce the amount of gas CCs as new entrants)
- Long-run prices and costs:
  - Energy prices can increase (due to higher CO_2 prices) or decrease (due to more entry of non-emitting resources with no fuel costs)
  - Total energy + capacity + ZEC (see later slide) prices will be high enough to support the policy objective of attracting investments in new non-emitting generation



Notes: Adapted from Exelon slide 4. Each plant is 1 MW in size, with typical fuel+ VOM costs and CO_2 emissions rates. Fleet effects are directional, but realized energy prices

Defining Price on Carbon

Based Upon:

1) **Social Cost and Willingness to Pay**: Stakeholders will determine a reasonable range of prices that could be adopted based on the social cost and willingness to pay for avoiding CO_2 emissions.
   - Starting Price: at federal government's Social Cost of Carbon (SCC): $61/ton.
   - Maximum Price: Highest CO_2 price reflecting the maximum willingness to pay to avoid CO_2 emissions (updated with inflation)
   - Minimum/Reservation Price: Lowest CO_2 price reflecting a situation where it is a relatively low cost to achieve even greater levels of CO_2 emissions earlier (updated with inflation)
2) **Quantity**:
   - ISO-NE will develop a CO_2 emission reduction trajectory consistent with the states' policy mandates of 80% reductions by 2050, in consultation with state regulators
   - CO_2 price may be adjusted upward or downward regularly (every 1-3 years?) based on whether the prior years' emissions were above or below the target, with price adjustments in increments not to exceed a pre-specified level
   - Price will adjust to meet quantity targets, but will stay within the price collar

Revenues from Pricing Carbon

- Price on carbon is designed to be revenue-neutral with respect to ISO-NE with 100% of surplus returned to load
- Money is returned proportionally to state-regulated EDCs, muni/coop entities, and direct wholesale customers
- State Regulators will oversee how these funds are used by the EDCs
  - PUCs can decide whether to use the funds for programs that benefit electricity consumers such as energy efficiency investments, provide direct customer rebates, or elect other uses
  - Energy efficiency programs should not be negatively impacted:
    1) Rebates to customers should maintain incentives for EE
    2) this has additional possibilities for states with LCP mandates, including MA, ME, VT, RI, because ambit of “Least Cost” is enlarged

CLF Carbon Integrated Forward Capacity Market (FCM-C)

- Complementary to carbon price in energy market
  - The carbon price will help reduce carbon emissions (as described in previous slides)
  - FCM-C creates additional market-based incentives for clean energy resources to be developed on a schedule consistent with 80% by 2050 goal
- Operates as a component of and simultaneous with FCA
- All suppliers bid in two quantities at a single combined price: (a) zero-emissions credits (ZECs) for zero-emitting resources (in MWh) and (b) traditional FCA capacity (in MW).
- ZEC is the “green” attribute of non-emitting resources:
  - Not bundled with energy value (additive to energy price payments)
  - Technology neutral, all non-emitting existing and new resources can produce ZECs

FCM-C Mechanics: Offer Structure

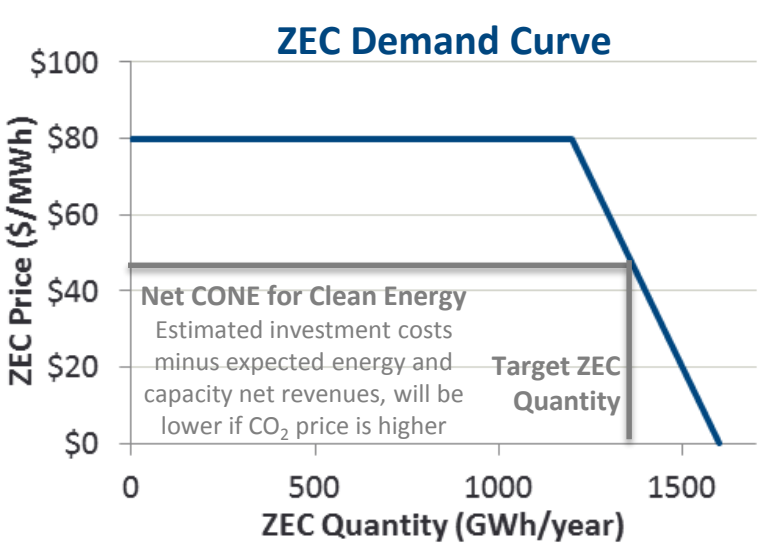
- **Offer Structure:**
  - Just as in today's FCM, resources bid a single price into the FCM-C in accordance with their revenue requirements. Offer price is in $ per nameplate MW.
  - The FCM-C recognizes this single-price bid as reflecting willingness to sell both: (1) a particular quantity of ZECs (offered in MWh) and (2) a particular quantity of traditional capacity (offered in MW). The seller should be indifferent to whether the payment comes from ZEC or capacity, as long as the total payment is equal or greater than the offer price

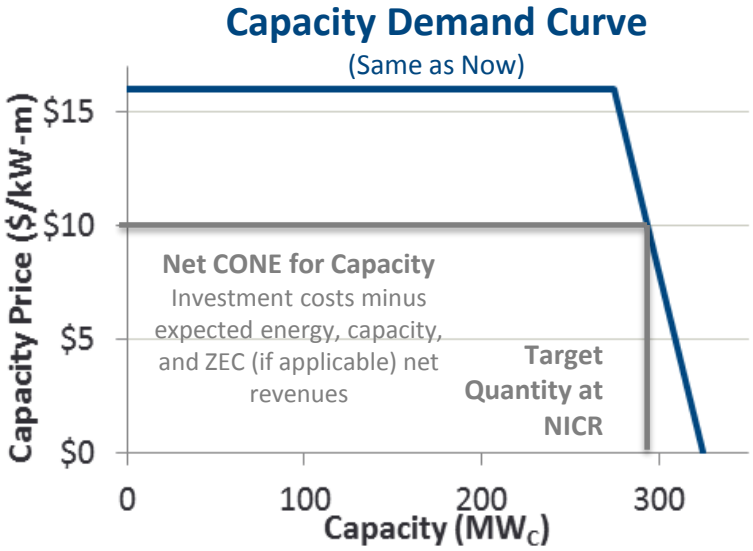
Example: Offers for Different Resource Types

		Nuke	Hydro	Gas CC	Wind
Resource Ratings					
Nameplate	*(MW_N)*	100	100	100	100
Capacity	*(MW_C)*	100	100	100	15
ZECs	*(GWh/year)*	788	438	0	263
Offer Price	*($/kW-$m_N$)*	$10	$10	$7	$10

FCM-C Mechanics: Demand Curves

- **Two Demand Curves:** (1) one for zero-emitting energy; (b) one for capacity, per current tariff
- **Capacity Demand Curve:** Same as now
- **ZEC Demand Curve:**
  - Quantity points on the ZEC demand curve are developed by ISO based on a projection developed in the CELT that determines the quantity of clean energy MWh needed, consistent with the CO_2 emissions trajectory determined by ISO-NE in consultation with state regulators
  - Price points on the ZEC demand curve are based on the "Net CONE" for the anticipated marginal non-emitting resource type. Price can fall to zero if clean energy resources are built based on the energy plus capacity prices, or can rise up to the price cap (e.g. at 1.6x the Marginal Clean Energy Resource's Net CONE) if the quantity is short





Notes: Straight-line curves shown for simplicity. No change is proposed to the current capacity demand curve shape.

FCM-C Mechanics

- **New Entry Price Lock-in:**
  - Same term of price guarantee (in both $/MWh for ZECs and $/kW-m for capacity) is offered to any new resources that clear in the auction (the same applies to traditional resources and non-emitting resources)

- **Impact on meeting NICR:**
  - Capacity value of non-emitting resources that clear in the FCM-C contribute toward meeting the NICR

FCM-C Mechanics: Joint Auction Clearing

- Capacity and clean energy needs will be jointly procured in a co-optimized fashion
- Benefits of joint procurement:
  - Minimize total capacity + ZEC procurement costs, reducing system and customer costs compared to non-integrated procurement
  - Enable suppliers to avoid risk of selling capacity without knowing ZEC price (and avoid selling ZECs without knowing capacity price)
- Using same optimization framework as in current capacity auctions (with one more constraint)

Co-Optimized Procurement

- **Objective Function:** Minimize capacity + ZEC procurement costs (or more accurately, "maximize social surplus")
- **Constraints:** Same as in current optimization, no additional locational constraints applied for ZECs
- **Prices:** Marginal cost of procuring additional ZECs and/or capacity (same as now)

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Notes: *In the context of downward-sloping demand curves, the actual objective function is "maximize social surplus" or area under the demand curves for ZEC and capacity minus .

FCM-C Example: ZEC Price Formation

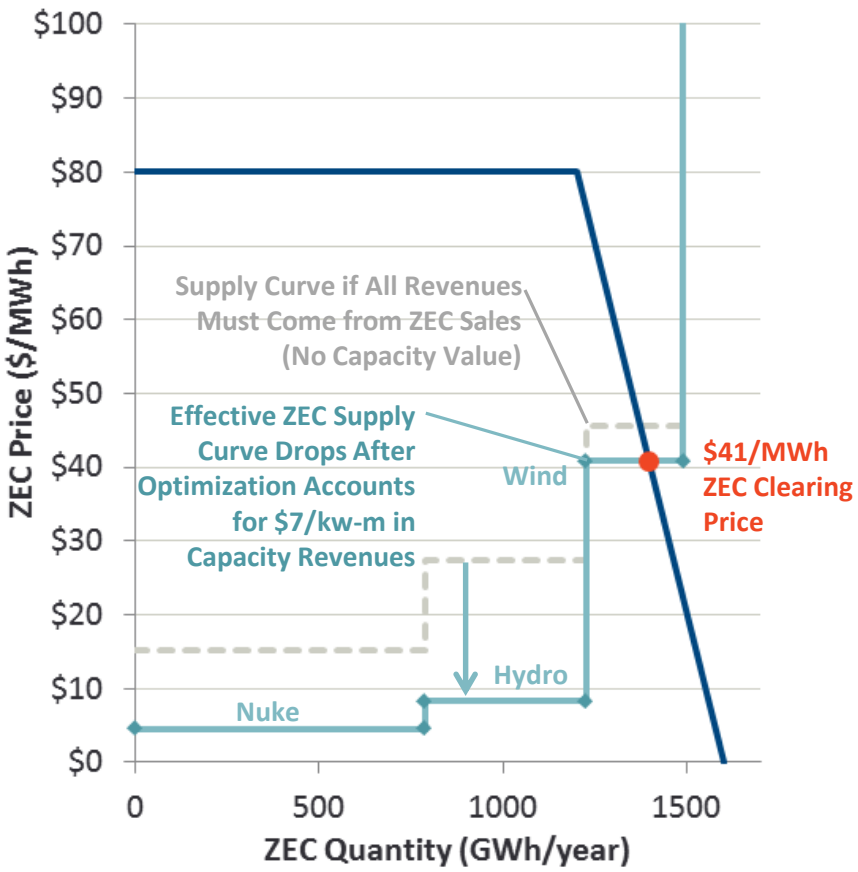
- If procuring ZECs independent of capacity, suppliers would need to take a risk on expected capacity revenues
- Joint procurement will account for capacity revenues by resource type, resulting in lower ZEC prices if capacity prices are higher

Resource Offers

		Nuke	Hydro	Gas CC	Wind
Resource Ratings					
Nameplate	*(MW_N)*	100	100	100	100
Capacity	*(MW_C)*	100	100	100	15
ZECs	*(GWh/year)*	788	438	0	263
Offer Price	*($/kW-m$_N$)*	$10	$10	$7	$10

ZEC Price Formation

ZEC Supply Curve Before and After Accounting for and Without Joint Clearing



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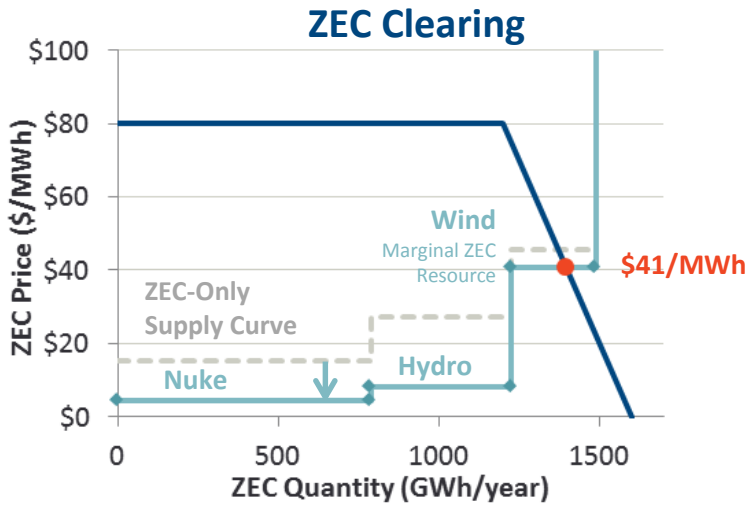
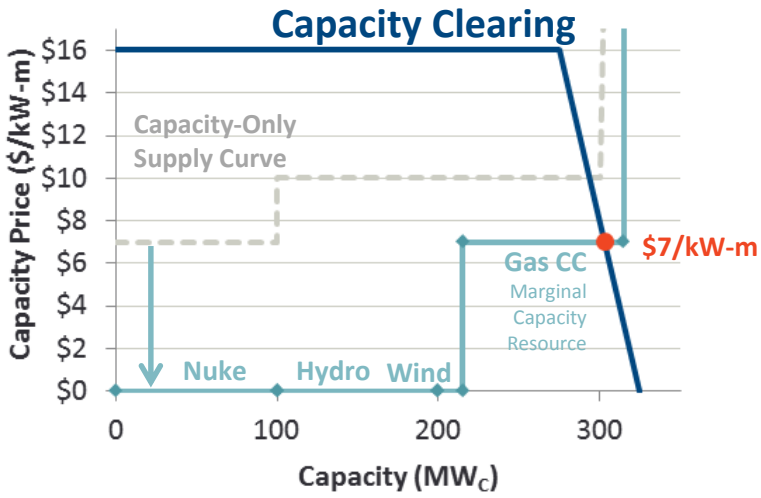
FCM-C Example: ZEC & Capacity Price Interactions

- Interaction between ZEC and capacity prices is offsetting: high ZEC prices translate to low capacity prices (and vice versa)
- ZEC + capacity payments are expected to be high enough to cover the investment costs for all cleared resources
- Results in cost-minimizing procurement between the two products

Resource Offers and Clearing Results

		Nuke	Hydro	Gas CC	Wind
Resource Ratings					
Nameplate	(MW_N)	100	100	100	100
Capacity	(MW_C)	100	100	100	15
ZECs	(GWh/year)	788	438	0	263
Offer Price	($/kW-m_N$)	$10	$10	$7	$10
Revenues					
ZECs	($M/year)	$32	$18	$0	$7
Capacity	($M/year)	$8	$8	$8	$1
Total	($M/year)	$41	$26	$8	$8
Total	($/kW-m_N$)	$34	$22	$7	$10





Notes: Supply curve for ZECs reflects minimum ZEC price that each resource is willing to accept, given the capacity clearing price. Similarly, supply curve for capacity reflects minimum capacity price each seller will accept once the ZEC price is known.

CO_2 Price and FCM-C Interactions

- CO_2 pricing and FCM-C markets will work together to decarbonize the electricity system
- Should not be viewed as additive to customer costs, since prices will be offsetting. Together, these markets will pay the variable and fixed costs needed to attract new clean energy resources, but no more
- For example, higher CO_2 prices will translate to:
  - Lower ZEC prices needed to attract clean energy (and more clean energy entering in the ZEC demand curve)
  - More clean energy entering will result in lower capacity prices
- Combined effects will create both short-term and long-term decarbonization incentives, as required under state policy

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FCM-C Mechanics: Offer Review Trigger Price Modifications

- **ORTP Modified**:
  - CLF recommends returning the ORTP to its original purpose, to prevent artificial price suppression from those with a net negative position in the market
  - ORTP will be reformed to only apply to entities that have an incentive to suppress capacity and/or ZEC prices (such as net short entities, agents of the state, or their contractual counterparties). Developers that would enter the market on a merchant basis, without a net short position, and/or without a contractual counterparty will not be subject to the ORTP
  - The 200 MW (600 MW cumulative) renewables exemption will continue to apply for resources procured under any state-mandated PPAs or specialized procurements under payment mechanisms that are not broadly available to all non-emitting resource types

Advantages of FCM-C over other proposals

- Integrated clearing with FCA
  - No guess-work for renewable developers
  - Lowest cost *joint* solution to meet reliability & GHG goals
  - No distortion of capacity prices
  - Reduces tariff development
  - Minimal need for additional market monitoring
  - Aligns price lock-in period for new clean resources
- ZECs vs. CFD
  - Consumers hedge only the zero-carbon attribute value of the product
  - Suppliers retain commodity energy price risk

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Next Steps towards FCM-C Implementation

- Process for setting ZEC demand curve
- ZEC imbalance market or mechanism
- ZEC unit qualification standards
- Seams issues
  - Qualification of imports to offer ZECs in FCM-C
  - Proof of delivery of imported ZECs
  - Attribute stripping on exports

All FCEM proposals need to address these points

Questions?

Using a carbon price to cost-effectively meet clean generation goals in New England - Update

September 14, 2016

Carbon component to LMP enhances visibility of carbon price and provides settlement value for forward emission products

- Under the carbon price proposal, every energy bid will have a carbon component determined by the carbon price (which is fixed for all resources) and the unique carbon emission rate of the resource in question
- Because the carbon component will be explicit in each bid, in determining the Locational Marginal Price of energy for each node on the system, the ISO can add a fourth component to the LMP
  - Currently, LMP = Energy Component + Congestion Component + Loss Component
  - Which becomes, LMP = Energy Component + Congestion Component + Loss Component + Carbon Component
  - Where the carbon component is the marginal cost of carbon emissions at the particular locational node in question
- Explicitly breaking out a carbon component to LMP is a useful enhancement because:
  - It makes visible the locational and time-varying cost of carbon emissions and thus provides a more precise signal for carbon reducing investments and behaviors
  - It can be used as a separate settlement price point for forward emission reduction products such as the Forward Clean Energy Market, should one be adopted

Design principals for the Forward Clean Energy Market

- A price on carbon is compatible with the Forward Clean Energy Market proposal
- There are a number of design principles that would enhance the efficiency and workability of the FCEM concept, particularly if combined with a price on carbon
- Specifically, the FCEM should:
  - Be structured as a single price clearing auction for a single ISO-wide product
  - Procure a clean-energy attribute product (similar to a REC) rather than an all-in energy product
    - Compensation for energy (including any carbon component in the energy price) should flow through the energy market as it does now and should not be part of the FCEM product
    - The attribute product should be denominated in MWhs, and payment should only be made if the resource actually produces
  - Not be time or location-differentiated – This is unnecessary if the FCEM product is an attribute product because the energy market will provide the necessary price signals to time/location differentiate resources
  - Be open to all new and existing zero-carbon resources, including nuclear, and should not discriminate between new and existing resources
  - Procure three-years forward for a one-year term, possibly with a multi-year price lock for new build resources, similar to the FCM
  - Procure a quantity of existing and new zero-carbon resources that is consistent with state carbon emission reduction goals

FOR DISCUSSION PURPOSES ONLY
SEPTEMBER 12, 2016 DRAFT

Forward Clean Energy Market (FCEM) Framework Document

Except as specifically defined within this Forward Clean Energy Market ("FCEM") Framework Document (the "FCEM Framework Document"), the capitalized terms are from the ISO New England Inc. Transmission, Markets and Services Tariff (the "Tariff") or other operative documents, and are subject to change from time to time pursuant to those documents.

I. General Understandings

A. The intention of this FCEM Framework Document is to provide a conceptual framework that would be used to develop, design and implement a forward clean energy market in New England's wholesale electricity markets.

B. It is intended for the FCEM, including any payments, obligations and requirements, to be governed and assured under FERC-approved Tariff rules.

C. The intended goal of FCEM is to procure clean energy delivery commitments to efficiently achieve desired state [clean energy][carbon emission] policy goals.[1] Over the long-run, such a construct is intended to help the New England States to achieve their [clean energy][carbon emission] goals through the competitive wholesale power markets.[2]

D. FCEM could be a complement to other concepts, such as carbon pricing in the energy market and/or an energy storage proposal and/or FCM two-tiered pricing and/or other potential market constructs, or could be considered as a stand-alone construct.

II. Create a Forward Clean Energy Market ("FCEM")

A. Similar to the existing Forward Capacity Market ("FCM") construct, FCEM proposes the procurement of forward commitments to deliver clean energy through a competitive auction-based central procurement administered by ISO New England (ISO-NE).

B. <u>Product Definition</u>:

1) Eligible Resource Type(s):
New and existing zero-carbon emitting generating resources

[1] Term "goal(s)", once clarified, would become a defined term in this FCEM Framework Document.

[2] The FCEM concept could potentially work without regard to whether the States are also pursuing "outside-of-the-market" actions, such as the procurement of resources through long-term contracts, or other state-sponsored mechanisms, such as RPS standards and RGGI. FCEM could potentially provide an efficient market construct to assist the States in managing and achieving public policy objectives through competitive market mechanisms.

2) Time of day (load shape) distinctions:
   OPTION B.2A. Any hour product
   OPTION B.2B. Off-peak, mid-day peak, and peak products
3) Annual product

C. Procurement Requirements

1) The process for establishing the total quantities of energy to satisfy FCEM would be set forth in ISO-NE Tariff.
2) The FCEM auction purchasing requirements would be established by the States. [Under OPTION B.2B with a time-of-day differentiated product, the ISO-NE would translate those requirements into requirements distributed across off-peak, midday and late-day peak products. [3]]
3) No requirement distinctions/auction clearing constraints, other than meeting product definition.[4]
4) Demand curve:
   OPTION C.4A. Vertical curve
   OPTION C.4B. Vertical curve with price collar
   OPTION C.4B. A sloped demand curve(s) or other form of mechanism could be considered as part of the FCEM design

D. FCEM Auction

1) FCEM auction would procure forward commitments to deliver targeted MWh of clean energy.
2) Annual FCEM auctions would be conducted approximately 3.5 years prior to commitment period, and prior to the annual Forward Capacity Auction (FCA) for the same commitment year, with results determined and communicated in time so that FCEM clearing prices can be factored into the offering and potential review of resource bids into the FCM.
3) Eligible FCEM resources would be subject to qualification schedules and processes and financial assurance requirements as established in the Tariff and administered by ISO-NE.
4) ISO-NE would determine, as part of the FCEM qualification process, the qualified MWh for each eligible resource, adjusted annually based on actual performance.

[3] This optional, additional language reflects FirstLight Power Resources' proposal to procure time-differentiated products in a FCEM.

[4] Proponents of this FCEM Framework Document propose to have a single product definition that maximizes the opportunities for competition in satisfying the clean energy requirements. If the States wish to have more differentiated product definitions and, therefore, submarkets, we request that they provide that additional information as soon as possible.

5) OPTION D.5A. Resource-specific bidding (like FCM).
OPTION D.5B. Similar to the existing locational Forward Reserve Market, FCEM offers could be submitted on a portfolio basis so that seller would be permitted to designate output from one or more resources to meet its clean energy delivery obligation.
6) Similar to the FCM, FCEM resources would be able to trade or shed their FCEM commitments with other FCEM qualifying resources through bilateral arrangements.
7) The FCEM offer price would be the price in $/MWh at which a participant is willing to accept a clean energy supply obligation, which would be defined in the Tariff.
8) FCEM clearing price = $/MWh
9) To facilitate financing and construction, new clean energy resources clearing the auction could choose to lock-in the FCEM clearing price for up to:
OPTION D.9A. One annual commitment period
OPTION D.9B. Seven annual commitment periods (like FCM)
OPTION D.9C. Ten or more annual commitment periods
10) FCEM Auction mechanics:
OPTION D.10A. Use descending clock auction process like FCM.
OPTION D.10B. Use sealed bid auction process.
11) FCEM Mitigation:
OPTION D.11A. Apply a Minimum Offer Price Rule (MOPR) to new resource offers in the FCEM.
OPTION D.11B. No mitigation with possible price collar or other price sensitive demand index (e.g., sloped demand curve).

E. FCEM Payments & Obligations

1) FCEM payments would be provided only when the energy is delivered from a resource with a FCEM supply obligation. Total payment dependent on volume of MWh of delivered energy from that resource.
2) Energy cleared in the FCEM auction would be paid:
OPTION E.2A. a fixed payment per megawatt-hour delivered; additional and separate from ISO New England energy market or capacity market payments.
OPTION E.2B. the higher of the FCEM auction clearing price or Day-Ahead LMP or Real-Time LMP (applicable to market that resource cleared in) at the time the energy is delivered in the applicable commitment period.
3) Each resource with a FCEM obligation would be required to produce within the [commitment period][year] the MWhs of clean energy that corresponds to its obligation.
4) If the resource fails to satisfy its obligation, the following would occur[5]:
OPTION E.4A. The FCEM resource would incur a non-performance charge where obligations are not satisfied [(e.g., fails to satisfy at least [90%] of its

[5] Market design/rules will need to address how import resources in the FCEM would be treated.

annual delivery commitment)], in addition to lower FCEM payments because fewer MWhs were delivered than the corresponding obligation.
OPTION E.4B. The FCEM resource would receive lower FCEM payments if it delivered fewer MWhs than its corresponding obligation[6] and its qualified MWh for future commitment periods would be adjusted to reflect its actual production levels.

F. Relationship to the Forward Capacity Market

1) Participation in the FCM:
OPTION F.1A. Voluntary participation: Resources clearing in the FCEM could, but would not be obligated to, participate in the subsequent FCM auction for the same commitment period.
OPTION F.1B. Mandatory participation: Resources clearing in the FCEM would be obligated to participate fully in the subsequent FCM auction for the same commitment period.[7]
2) FCM mitigation adjustments[8]:
OPTION F.2A. FCEM revenues would be treated as "in-market" in the MOPR determination for FCEM resources also seeking qualification for participation in the FCM.
OPTION F.2B. FCEM revenues would be treated as "out-of-market" for MOPR purposes.
3) ISO-NE would continue to be responsible for the qualification/determination of the resource adequacy contribution of FCEM resources participating in the FCM, regardless of the amount of clean energy cleared by such resources in the FCEM auction.

G. Cost Allocation

1) FCEM charges would be allocated to the appropriate load-serving entities ("LSEs") in the state for which the clean energy was procured in the FCEM.

[6] [If the FCEM resource delivered more MWhs than its corresponding obligation, that resource may receive higher FCEM payments.]

[7] Some FCEM resources might not initially be able to qualify for FCM depending on their ability to pass ISO-NE's overlapping impact test.

[8] Whether FCEM revenues are considered "in-market" or "out-of-market" would likely depend on whether the product definition or distinction requirements are changed in Sections II.B.1 and II.C.3 (as well as whether there are related mitigation changes made as part of the IMAPP effort, such as a two-tiered pricing mechanism in the FCM). As an example, vintage and locational distinctions may require FCEM revenues associated with such requirements to be treated as "out-of-market" for purposes of the MOPR in the FCM.

Framework Document – Two-Tier FCM Pricing

Except as specifically defined within this Two-Tier FCM Pricing Framework Document (the "Framework Document"), the capitalized terms are from the ISO New England Inc. Transmission, Markets and Services Tariff (the "Tariff") or other operative documents, and are subject to change from time to time pursuant to those documents.

I. General Understandings

A. It is the intention of the parties supporting this Framework Document that the understandings herein will take effect as stated beginning for Forward Capacity Auction ("FCA") 12.

B. The purpose of the Two-Tier FCM Pricing mechanism is to:

   a. Enable states to pursue public policy objectives;

   b. Protect price formation / competitive signals in the Forward Capacity Market; and

   c. Avoid or manage the over-procurement of capacity resources.

C. In addition to this Two-Tier FCM Pricing mechanism, New England stakeholders are evaluating additional market design changes to address the Integration of Markets and Public Policy, including a Carbon Pricing Mechanism for the energy markets and a Forward Clean Energy Market. Two-Tier FCM Pricing is understood to be complementary to these other design changes, and not an alternative to, or substitute for, them.

II. Two-Tier FCM Pricing

A. To achieve the objectives of Two-Tier FCM Pricing, the FCA would be modified to occur in two stages. All resources would be subject to offer price mitigation in the 1st stage, as described in Market Rule 1 Appendix A.21.

   a. Eliminate the 'Renewable Technology Resource' provisions in Sections III.13.1.1.1.7, III.13.1.1.2.9, III.13.1.1.2.10, III.13.1.2.3.1.3, III.13.1.2.3.1.4, III.13.1.5, and III.13.2.3.2(iv) of the ISO-NE Tariff.

   b. Expand the applicability of Appendix A.21 to include Existing Resources.

   c. Under Appendix A.21, "Out-of-market revenues are any revenues that are: (a) not tradable throughout the New England Control Area or that are restricted to resources within a particular state or other geographic sub-region; or (b) not available to all resources of the same physical type within the New England Control Area, regardless of the resource owner," or

"supported by a regulated rate, charge, or other regulated cost recovery mechanism"

B. The 1st stage of the auction would clear based on a supply curve using minimum offer prices established through the application of Appendix A.21. The result of clearing the 1st stage would be a quantity Q1 at price P1.

   a. The product of P1 x Q1 would establish a reference value, C1, the total cost of the FCM base payments in the absence of 'out of market' revenues.

C. In the 2nd stage, the mitigated supply offer prices of resources receiving out-of-market revenues would be entered into the auction as price-takers. There would be no changes to other resources' offers. The 2nd stage would establish a payment rate P2, defined as the Second-Tier Payment Rate. The MW quantity of resources that did not clear in the 1st stage but clears in the 2nd stage as price-takers is defined as Q2.

D. All resources that cleared in the 1st stage (Q1) would be paid P1, the FCA Capacity Clearing Price. Resources that did not clear in the 1st stage but cleared in the 2nd stage as price-takers (Q2) would be paid P2, the Second-Tier Payment Rate.

E. All cleared resources from either stage of the FCA would have a Capacity Supply Obligation for the associated Capacity Commitment Period, with all attendant rights and obligations as defined in the ISO-NE Tariff.

F. Offer floor mitigation pursuant to Appendix A.21 would apply in subsequent years to resources receiving out-of-market revenues until the resource clears in the 1st stage of an FCA. Once a resource clears in the 1st stage of an FCA, it would become an Existing Resource under the ISO-NE Tariff.

III. Market Cost and Quantity Management

A. Generally, Two-Tier FCM Pricing will result in a quantity of CSO, and a cost, higher than would otherwise occur in clearing the FCA. Pro-rating the FCA results as described in this section is intended to:

   a. reduce risk for potential 'in-between' resources and maintain incentives for marginal cost offer behavior;

   b. Allocate equally to all resources the cost of participation in the market by resources receiving 'out of market' revenues; and

   c. Ensure that the total cost of FCM base payments is equal to the reference cost of the auction in the absence of resources receiving out-of-market revenues as defined above, C1 = P1 x Q1.

B. The MW quantity of the Capacity Supply Obligations of resources cleared in both stages of the FCA shall be pro-rated by applying the following ratio to each resource's CSO.

C. Two-Tier Pro-Rating Ratio = $\frac{(P1 \times Q1) + (P2 \times Q2)}{C1}$

D. The Qualified Capacity of resources that does not receive a CSO due to the pro-rating described in this section would be eligible for reconfiguration auctions and CSO bilaterals, including resources receiving out-of-market revenues that have not yet cleared in the 1st stage of an FCA.

IV. Further Understandings

A. All FCM qualification schedules and processes will remain unchanged, except as may be necessary to ensure sufficient offer information to complete both stages of FCA clearing.

B. All zonal constraints will be enforced. Zones will be cleared as a variable quantity constraint using the same Zonal and Regional demand curves (based on Marginal Reliability Impact or otherwise) as in place in the ISO Tariff for the applicable FCA.

Energy Market Advisors LLC

To: NEPOOL Stakeholders

From: Brian Forshaw on Behalf of Public Power Systems

Date: September 13, 2016

Subject:Public Power Framework Document – Two-Tier FCM Pricing

During the IMAPP meeting on August 11, 2016, the region's public power systems proposed restructuring the Forward Capacity Market to a Voluntary-Residual market design. At the PJM Grid 20/20 meeting, PJM issued a paper that outlined potential modifications to their capacity market construct that would allow public policy resources (which may be receiving out of market revenues) to clear in the capacity market while still determining a single capacity price that reflects competitive entry. Under the PJM construct, public policy resources would offset the capacity load obligations of designated load assets, and such resources would not receive a capacity payment. A copy of the PJM paper has been posted on the NEPOOL web site and is attached for your convenience.

In addition, NRG has developed a Two-Tier FCM Pricing proposal (scheduled to be explained in greater detail at the September 14, 2016 IMAPP meeting) that determines two FCM prices, one for public policy resources and another for all other resources. The approach outlined by NRG would utilize a two stage process to determine prices and quantities. To accommodate so-called "in between" resources, the NRG proposal would pro-rate Capacity Supply Obligations to achieve a quantity it believes reflects the quantity that would be procured under competitive conditions.

Potential Public Power Two-Tier Pricing Alternative

The Public Power alternative attempts to integrate features of the PJM approach into the basic structure outlined by NRG. A draft Framework Document describing these changes is attached. ***Note that due to the limited time to pull together this proposal, the Framework Document is still being reviewed and evaluated by members of the Publicly-Owned Entities Sector. As a result, elements of this proposal may be modified in the future and entities within the Sector may take different positions.***

Major differences between the public power proposal and the NRG proposal is as follows:

- Public power would add a category of Certified Load Asset Resources to the resources subject to offer price mitigation described in Section II.A.
    - Such resources would forgo Forward Capacity Market payments and instead reduce the Capacity Load Obligation of a designated Load Asset Owner.
    - The Renewable Technology Resource Exemption would remain in effect and be applied during the 2nd stage auction process described below.
- Public Power would reverse the order of the stages from the NRG proposal.

- Stage 1 would have the resources identified in Section II.A. entered into the auction as price takers. The results of this stage would determine the resources receiving a CSO and a price (P1) that would be paid to resources described in Section II.A that would receive a payment from the Forward Capacity Market.

- Stage 2 would clear based on the supply curve using the minimum offer prices established through the application of Appendix A.21. The price (P2) would be applied to all resources that received a CSO in Stage 1 that were not identified in Section II.A.

- Resources with an offer price below P2 that did not clear in stage 1 would not receive a CSO.

We will be prepared to provide clarification and further information at the October 6, 2016 IMAPP meeting

AUGUST 18, 2016

PJM CONFERENCE &
TRAINING CENTER

AUDUBON, PA

Potential Alternative Approach to Expanding the Minimum Offer Price Rule to Existing Resources

Stu Bresler

Senior Vice President – Operations and Markets
PJM Interconnection

August 11, 2016

Framework Document – Two-Tier FCM Pricing

Except as specifically defined within this Two-Tier FCM Pricing Framework Document (the "Framework Document"), the capitalized terms are from the ISO New England Inc. Transmission, Markets and Services Tariff (the "Tariff") or other operative documents, and are subject to change from time to time pursuant to those documents.

I. General Understandings

A. It is the intention of the parties supporting this Framework Document that the understandings herein will take effect as stated beginning for FCA12.

B. The purpose of the Two-Tier FCM Pricing mechanism is to:

   a. Enable states to pursue public policy objectives;

   b. Protect price formation / competitive signals in the Forward Capacity Market; and

   c. Avoid or manage the over-procurement of capacity resources.

C. In addition to this Two-Tier FCM Pricing mechanism, New England stakeholders are evaluating additional market design changes to address the Integration of Markets and Public Policy, including a Carbon Pricing Mechanism for the energy markets and a Forward Clean Energy Market. Two-Tier FCM Pricing is understood to be complementary to these other design changes, and not an alternative to or substitute for them.

II. Two-Tier FCM Pricing

A. To achieve the objectives of Two-Tier FCM Pricing, the Forward Capacity Auction ("FCA") would be modified to occur in two stages. All resources would be subject to offer price mitigation in the 2nd stage, as described in Market Rule 1 Appendix A.21.

   a. The 'Renewable Technology Resource' provisions in Sections III.13.1.1.1.7, III.13.1.1.2.9, III.13.1.1.2.10, III.13.1.2.3.1.3, III.13.1.2.3.1.4, III.13.1.5, and III.13.2.3.2(iv) of the ISO-NE Tariff will remain in effect and be applied during the 2nd stage of the auction below.

   b. Expand the applicability of Appendix A.21 to include Existing Resources.

   c. Under Appendix A.21, "Out-of-market revenues are any revenues that are: (a) not tradable throughout the New England Control Area or that are restricted to resources within a particular state or other geographic sub-region; or (b) not available to all resources of the same physical type within the New England Control Area, regardless of the resource owner," or "supported by a regulated rate, charge, or other regulated cost recovery mechanism"

   d. Certified Load Asset Resources are resources certified by States and/or Load Asset Owners as having been procured to meet the Capacity Load Obligations associated with specified Load Assets. Certified Load Asset Resources would offset the Capacity Load Obligations of the designated Load Assets and would not receive

Forward Capacity Market payments. The Internal Market Monitor will review all Certified Load Asset Resources to confirm that such resources are appropriately tied to the designated Load Assets

B. In the 1st stage, the mitigated supply offer prices of resources identified in Section II.A. above would be entered into the auction as price-takers. There would be no changes to other resources' offers. The 1st stage would establish the total quantity of resources to receive a Capacity Supply Obligation in the FCA and a price P1 (to be applied to certain resources identified in Section II.A.c. above.)

C. The 2nd stage of the auction would clear based on a supply curve using minimum offer prices established through the application of Appendix A.21. The result of clearing the 2nd stage would be the price P2.

D. Resources that entered the auction pursuant to the provisions of Section II.A.c. above would be paid P1. Certified Load Asset Resources would be compensated by their designated Load Asset Owners and would not receive Forward Capacity Market payments. All other resources would be paid P2.

E. All cleared resources from either stage of the FCA would have a Capacity Supply Obligation for the applicable Capacity Delivery Period, with all attendant rights and obligations as defined in the ISO-NE Tariff.

F. Offer floor mitigation pursuant to Appendix A.21 would apply in subsequent years to resources receiving out-of-market revenues until the resource clears in the 2nd stage of an FCA.

III. Market Cost and Quantity Management

A. Resources with Supply Offers below the P2 price and that also did not receive a CSO in the 1st stage have been referred to as "in between" resources. Such resources would be treated as follows:

   a. In between resources will not receive a Capacity Supply Obligation in the primary FCA; and

   b. In between resources would be able to participate in Reconfiguration Auctions and other market opportunities for resources that have cleared in the primary auction.

IV. Further Understandings

B. All FCM qualification schedules and processes will remain unchanged, except as may be necessary to ensure sufficient offer information to complete both stages of FCA clearing.

C. All zonal constraints will be enforced. Zones will be cleared as a variable quantity constraint using the same Zonal and Regional demand curves (based on Marginal Reliability Impact or otherwise) as in place in the ISO Tariff for the applicable FCA.

I. Objective

As identified in the second part of the Resource Investment in Competitive Markets paper issued by PJM in May 2016, regulators and lawmakers may wish to pursue valid public policy objectives through out-of-market subsidies to generation resources. When resources, receiving out-of-market subsidies, offer into wholesale markets at prices that are below their actual costs, they have the potential to suppress wholesale market prices. Over the long term, these subsidies could have a detrimental impact on the ability for competitive wholesale markets to successfully achieve their objective of stimulating the new investment required to maintain long-term resource adequacy. The purpose of this document is to describe a potential, alternative approach to accommodating such regulatory action in a manner that allows competitive wholesale markets, specifically the capacity market, to continue to commit the appropriate amount of resources necessary to maintain resource adequacy while establishing price signals that accurately reflect supply and demand fundamentals and therefore provide support to maintain existing and develop new economic capacity to meet reliability needs.

II. The Range of Potential Solutions

There appear to be two extremes as to potential solutions the wholesale competitive markets might adopt with respect to this issue. The first would be simply to accept that these subsidies will occur, and not make any wholesale market rule changes to address the impact these public policy actions have on PJM's markets. This approach essentially would accept that subsidies will cause certain generation resources to remain in operation even though they are not competitive in the wholesale market. The wholesale market would then procure the residual quantity of resources necessary to maintain long-term resource adequacy. The potential flaw in this approach is the uncertainty the prospect of subsidies introduces into the wholesale market and its ability to attract investment capital. The fact that, at any time, regulatory agencies could introduce a subsidy for certain resources that would suppress wholesale market prices will very likely eliminate the willingness for competitive suppliers to enter the wholesale market. Therefore, when the subsidies end, the competitive entry may no longer be available to meet the resource adequacy needs of the system.

The other extreme would be to implement rule changes that would expand the Minimum Offer Price Rule (MOPR) that currently applies only to planned natural gas-fired resources such that it would apply to all existing resources as well. This may seem to some like an attractive approach because it would get the prices "right" from the standpoint of establishing and maintaining the competitive price signal on which new entry relies. In the long term, new entry will continue to be necessary in order to fill the gap when existing resources are no longer economically efficient and therefore retire.

However, application of the current MOPR to existing resources has the likely down side of resulting in the commitment of more resources than are necessary to maintain reliability. This would occur whenever a resource for which the offer price is increased under the MOPR rule does not clear, but the regulatory agency decides to subsidize the resource and keep it operating anyway. In this scenario the wholesale market still clears adequate resources to maintain reliability in addition to the subsidized resource. As a result, if and when the subsidizing regulatory agency decides to keep the resource operating anyway, the system has more capacity available to it than it needs to maintain reliability. Further, the load to which the cost of the subsidies is allocated would pay twice for capacity, once through the wholesale auction and again due to the subsidy allocation. Finally, notwithstanding the

Supreme Court's recent *Hughes* decision, the extent to which the scope of MOPR could be expanded presents a legal uncertainty.

III. An Alternative

PJM believes there may be an alternative solution that balances the goals of maintaining the correct price signal to incentivize and maintain the competitive entry necessary to achieve long-term resource adequacy while also committing only the quantity of capacity necessary in any given delivery year. A two-stage approach to determining cleared commitments and clearing prices in a single capacity auction could potentially balance these objectives. In this design, resources would submit one set of offers into a single capacity auction as they do today. However, the cleared capacity commitments and the clearing prices would be determined in separate stages of this single auction.

Stage 1

Subsidized resources would be removed from the auction along with a commensurate amount of demand with respect to the quantity and location of the removed supply (herein called "related demand"). The capacity auction mechanism would then be executed without these resources and without the related demand in order to establish the quantity of resources required to meet the reliability needs of the system for the subject delivery year. The results of the first stage of the auction would be unit-specific commitments to provide capacity for the relevant delivery year.

Importantly, the subsidized resources would also take on capacity commitments for the delivery year, with performance requirements identical to those resources that cleared the first stage of the auction. However, the subsidized resources that were held out of the first stage of the auction would receive no revenue from the PJM capacity market. Rather, the regulatory authority that had determined that these resources should be subsidized would determine how these resources would be compensated and be solely responsible for providing that compensation. Similarly, the related demand would also not be responsible for paying the clearing price for capacity resulting from the auction, because the regulatory agency subsidizing the resources would decide what price customers representing the related demand should pay for the capacity associated with the subsidized resource and charge that price in retail rates. Conceivably, the retail regulator could establish a rate for the subsidized capacity that mirrors the auction clearing price (calculation of that price is described below) to which any additional subsidy could be applied.

Stage 2

The subsidized resources and the related demand would be re-inserted in stage 2. However, the resources would be inserted at a reference price that approximates what a competitive offer for those resources would be absent any subsidy. The reference price at which each subsidized resource was entered into stage 2 of the auction would be a technology-based, locational approximation for each resource's going forward costs, similar to the default Avoidable Cost Rates currently in the PJM Tariff. The result of stage 2 would be the price that each resource that cleared in the first stage of the auction was paid for its committed capacity for the relevant delivery year.

Resources that offered at a price below the auction clearing price in the second stage but that did not receive a commitment from the first stage would not receive a commitment and would not be paid through the auction.

Figure 1. Offered Supply and Demand Curve

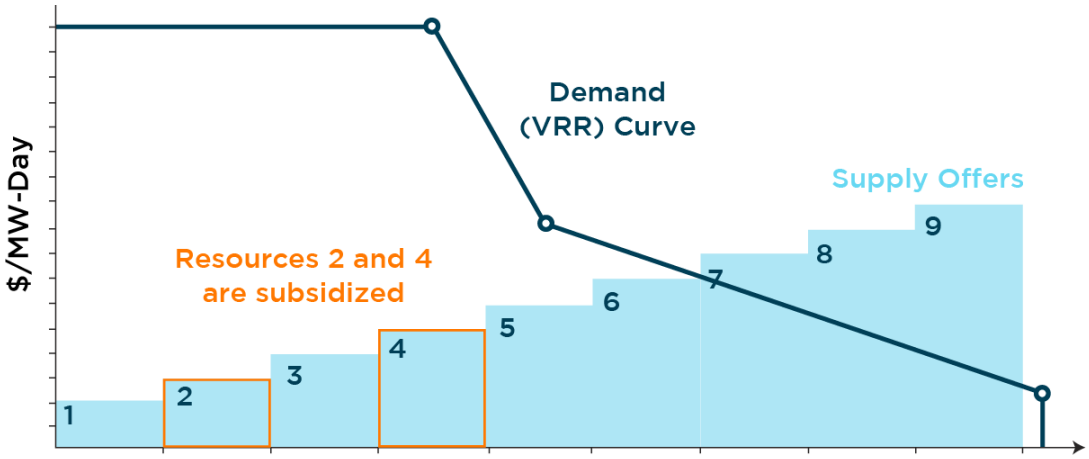


Figure 2. Stage 1: Subsidized Supply Offers and Equivalent Demand Removed

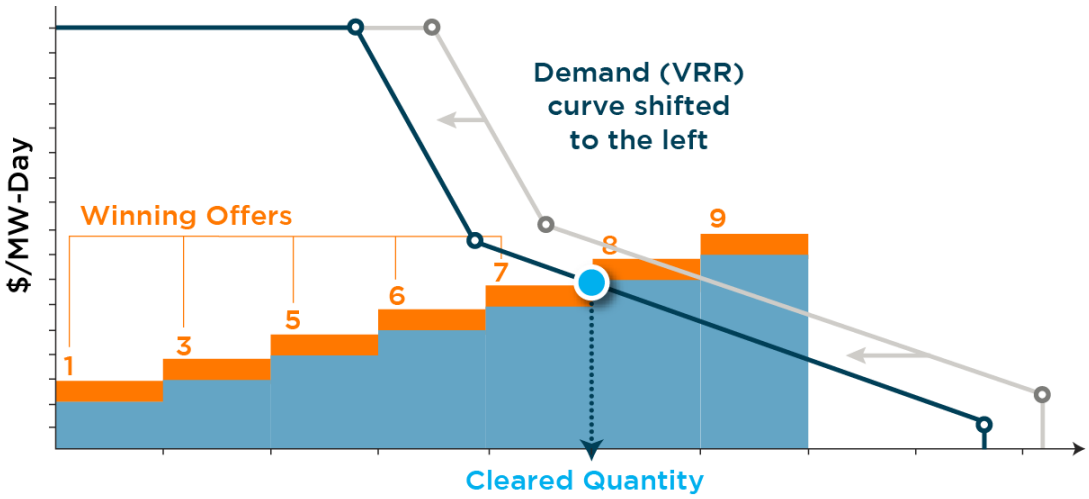
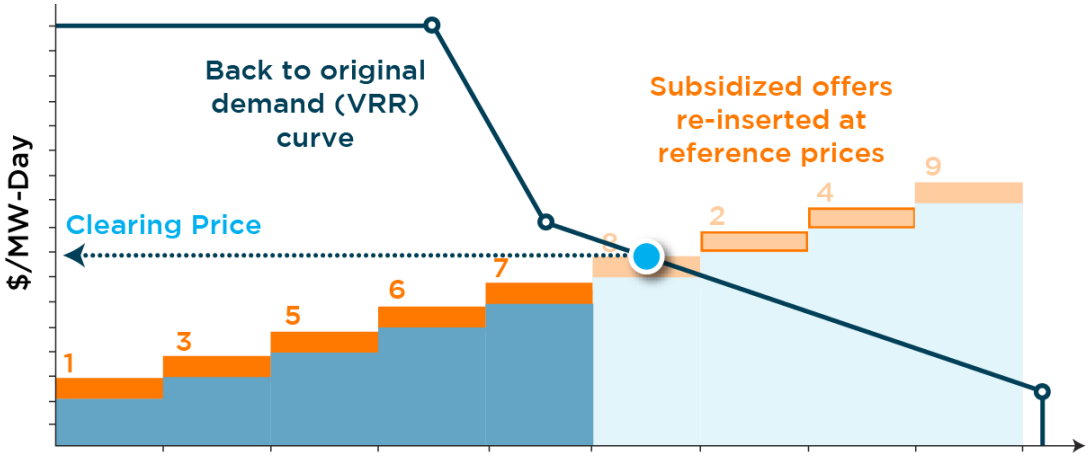


Figure 3. Stage 2: Subsidized Offers Re-Introduced at Reference Prices; Original Demand Curve Used



IV. Benefits of this Alternative

As noted above, the primary benefits of this approach would be that both the quantity of resources committed to serve the resource adequacy needs of the system and the price signal established by the auction would be correct. The total quantity of resources committed would be the same as would be committed without any subsidized resources, because the sum of the subsidized quantity of resources and the quantity committed through the auction would total the same quantity as if all resources were cleared through the auction. The price signal would be correct because the effect of the subsidies would be removed by clearing the second stage of the auction with the subsidized resources offered in at a competitive level. Further, establishing that competitive level through the use of a standardized reference price that would be codified in the PJM Tariff would eliminate the need to establish such a competitive offer for each subsidized resource through a process such as the one currently utilized for the establishment of unit-specific Avoidable Cost Rates. The subsidized resources and the subsidizing regulatory authority likely would be relatively indifferent to the level of the reference prices because the resource would not be receiving revenues from the capacity market in any case. The regulatory entity will have already decided to compensate the resource as necessary in order to maintain it in operation. The related demand would be indifferent as well, because that demand would be paying the full cost of keeping the subsidized resource in operation whether it is partially through capacity payments to PJM and partially through another cost allocation, or whether it is entirely through an alternative cost allocation.

V. Drawbacks to this Alternative

The primary drawback to this alternative is the potential of increasing the likelihood that resources could offer into the capacity market at a value lower than the clearing price determined through stage 2, but not clear in stage 1 (and thus not receive a capacity commitment). This situation can and has occurred in the past due to the ability for Market Sellers to specify a minimum quantity (referred to as a “minimum block”) for a resource that must clear in order for any of the resource to clear. There have been cases where the auction has skipped over resources with a minimum block offer because it was a less costly solution to determine a slightly higher clearing price with a smaller quantity of capacity. However, the two-stage concept described here could and likely would increase the probability of that situation occurring more frequently and for more resources. It is unclear whether this potential would have any significant impacts on resource offer behavior in the capacity auctions.

VI. Issues to be Resolved

The most significant issue to be resolved is the definition of what constitutes a subsidized resource. This issue would need to be resolved to implement any potential solution, with the exception of the “do nothing” approach, and drawing the line between subsidies to which any such rule applies and those to which it does not will be difficult. The potential approach identified here may have the potential benefit of incentivizing regulatory authorities and resources to self-identify and essentially pull themselves out of the auction rather than risk engaging in a protracted proceeding to determine whether such a rule applies to them. This approach might provide that incentive because it expressly eliminates the commitment of more resources than necessary, and therefore eliminates the risk that the load to which the cost of a subsidy would be allocated would pay twice for capacity: once through the capacity auction and again as a result of the subsidy.

The reference prices at which subsidized resources would be re-inserted into the auction for stage 2 would also need to be determined. This could be a relatively straightforward exercise that would be updated periodically along the same lines as the default Avoidable Cost Rates already in the PJM Tariff.

As noted at the outset of this document, this potential alternative approach deals only with the impacts of subsidies in the capacity market. Whether and how impacts of subsidies should be dealt with in other markets, such as the energy market, likely will need to be examined as well.

Initial ISO IMAPP Comments

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Initial ISO IMAPP Comments – Presentation Outline

- Important first considerations: Problem statement, design principals and objectives.
- ISO initial observations and questions on several IMAPP solution ideas to date.
- ISO values stakeholder's efforts to identify workable approaches to the integration of markets and public policy.
- IMAPP has identified several solution approaches that merit further discussion.
- In the spirit of facilitating productive discussion, ISO will highlight today some of the central issues to be addressed as we move forward together.

Coming to Agreement on a Problem Statement that is Clear is Invaluable

- For the 'Framework' document, a clear and concise overarching problem statement would be beneficial.
  - For example: A *possible* problem statement could be:
    How can the region simultaneously achieve both its environmental objectives and reliability objectives competitively and cost-effectively, when the ISO's mission does not stipulate the former and requires the latter?
- The ISO is eager to understand stakeholders' preferred problem statement.
- A clear, concise problem statement enables the ISO to assess how well solutions that it can implement would solve them.
  - It defines the task ahead

Design Principles are an Important Next Step

- Design principles are useful to specify at the outset. Many are possible.
- As an initial observation, at least three seem applicable to IMAPP solutions.
  - **Objective Clarity.** Successful market designs require a clear and precise objective. This guides the ISO's detailed design decisions, and sets the 'yardstick' of success.
  - **Compatibility**. Solutions should be compatible with the ISO's mission: Efficient markets, reliable bulk power system, (plus environmental objectives?)
  - **Non-Discriminatory and Jurisdictional.** Solutions requiring ISO administration should be expected to be deemed non-discriminatory and jurisdictional.
- What other principles are critical to be applied to the proposals?
- Is design success a reduction in carbon emissions, a reduction in state contracting, or both? Something else?

Three IMAPP "categories" of solution ideas to date

- ISO sees three "categories" of solution ideas emerging.
- Two address carbon emissions with energy market focused solutions, and the third addresses capacity market impact of out-of-market subsidies:
  - Carbon shadow pricing
  - Forward clean (low-carbon) energy market, or FCEM
  - New capacity auction rules/ repricing strategies (e.g., multi-tiered FCM pricing)
- As conceptual proposals, these are not mutually exclusive.
- Will need careful attention to how these designs would interact.

IMAPP IDEAS: ISO OBSERVATIONS AND KEY QUESTIONS

Carbon Shadow Pricing: Initial ISO Observations

- *See* Exelon and Synapse presentations (8/11 and 8/30).
- Mirrors successful SO2 and NOx emissions-reductions programs – implementation differs (emissions are priced without tradeable allowances), but effect on emissions is similar.
- Likely to integrate harmoniously with existing energy and capacity market designs.
- Likely to be technically feasible.
- Jurisdictional questions.

Carbon Shadow Pricing: Key Clarifying Questions

- **Emissions price?** How would the emissions 'price' (in $ per ton) be determined and by whom? How frequently would it be adjusted and by what mechanism?
- **Rebate allocation?** How would NEPOOL allocate the emitters' payments among participants? Is there a defendable basis for any non-uniform allocation?
- **Design linkages?** Should the shadow price be used to settle FCEM obligations?
- **Policy linkages?** This directly reduces carbon emissions (perhaps substantially); how would it change current or potential future state subsidies and OOM contracting and other related structures such as RGGI and RECs?

Forward Clean Energy Market: Initial ISO Observations

- *See* presentations (8/11, 8/30) from NationalGrid, NextEra, Renew, Synapse, FirstLight
- Presentations suggest various possibilities so designs are understandably not clear yet at this stage.
- Could mirror the long-term contract structure(s) that LSEs use to procure energy from renewable sources; or could be different.
  - Should have good reasons for differences.
- This *forward contract settlement structure* greatly affects many things: risk allocation between consumers and suppliers, total procurement costs, suppliers RT production incentives (therefore carbon abatement), the initial FCEM auction design and bid format, and the ISO's LMPs (potentially).
- Many FCEM possibilities may be technically feasible.

Forward Clean Energy Market: Key Clarifying Questions

- **Jurisdictional issues?** Could the ISO jurisdictionally administer a 'stand-alone' centralized market for clean resources (i.e., that are not needed for reliability)?
- **What (exactly) is the product, and how does it settle?** These are the *primary* questions to square away first to develop a viable forward product market.
- **What is the FCEM's contractual structure? Is it:**
  - A Contract for Differences against the Real Time LMP? Or the carbon component of LMP?
  - An "energy put" against the LMP (i.e., "greater of" pricing)?
  - Obligation (of sellers) to buy-out any non-delivered forward clean energy commitments (or clean energy credits) at an alternative compliance rate?
  - A simple formula payment (set premium price, paid plus LMP)?
  - Some other, non-standard settlement structure?

Forward Clean Energy Market: Key Clarifying Questions

- **Eligibility (qualification rules) governance?** Who determines what resources are eligible, and how? Technology changes rapidly; state policies can change; market rules don't foresee everything.
  - Can it discriminate between new and existing in eligibility?
- **Policy linkages?** Unclear if a FCEM is *in addition to,* or *a substitute for,* state subsidies and OOM contracting; how does/would MOPR apply to FCEM resources in the FCA?

New Capacity Auction Rules ("Tiered Pricing"): Initial ISO Observations

- *See* NRG presentation (8/30), and PJM Discussion Paper (8/18), which explain two (somewhat different) 'multi-tiered' capacity pricing approaches.
- These proposals related to capacity market pricing (or re-pricing) address the impact of renewable (or other) subsidies or out-of-market purchases on the ISO/RTOs' capacity markets but do not specifically address carbon emissions reduction objectives.
- These also seek to address concerns that renewables initiatives and 'as is' MOPR rules would "over-procure" more than the demand curve.

New Capacity Auction Rules: Key Questions

- **What's the compensation objective and rationale?**
  - To provide a price signal for adequate future investment over the long term?
  - To pay non-subsidized resources the capacity price that would prevail in the absence of (some or all) subsidies?
- **Price discrimination issues?** Can the ISO pay different prices for the same obligation in the FCA, or is the product differentiated? How would legal *and* economic issues be addressed?
- **Bidding incentive problems?** Do suppliers have proper bidding incentives (to bid their cost of supplying capacity) in the FCA under these mechanisms? How would that be ensured?
- **What defines a subsidized resource?** Is it necessary for the ISO to identify what resources are 'subsidized'? How would that be done?

Closing Thoughts

- **IMAPP initiative.** This process provides a valuable forum for identifying conceptual ideas and for ongoing discussions to refine the objectives, principles, and solution ideas.
- **Expectations.** Achieving significant change in the short term will be extremely challenging.
  - New products, market designs, and software always takes time (years) for detailed development, vetting, regulatory approval, and implementation.
- **State subsidies and OOM initiatives**. How these solution approaches would (or should) alter states' subsidies and OOM contracts merits further understanding and discussion.

Questions