Two-tier Capacity Pricing

PJM PPCCSTF

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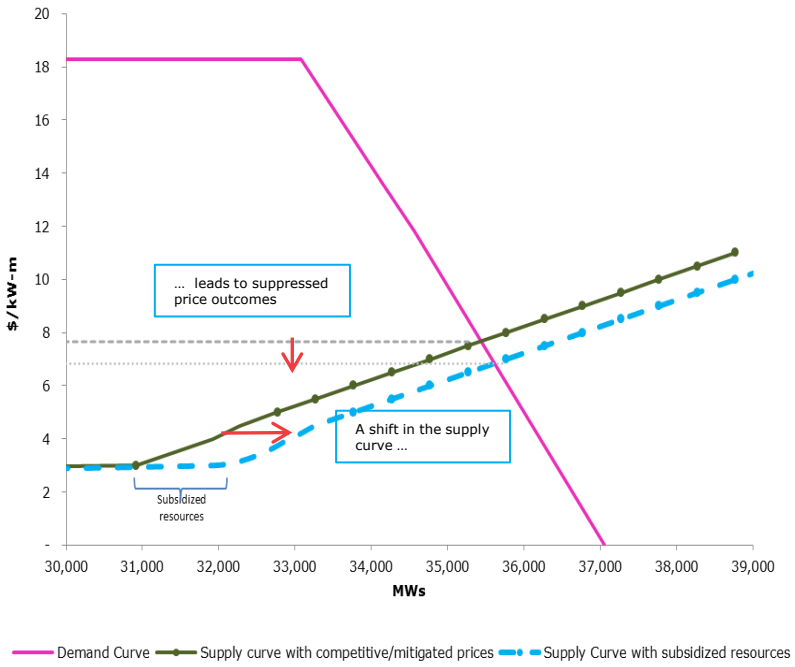
The Tension – as it shows up in forward capacity markets

State perspective:

- State-subsidized resources purchased, for example to advance environmental objectives, have capacity / reliability value, and should be 'counted' in the capacity market
- MOPR* will likely exclude these 'administrative' resources

The price-suppression effect



Market perspective:

- Market prices will be inefficiently suppressed if subsidized resources are free to participate
- MOPR preserves pricing consistent with competitive market participation

* Minimum Offer Price Rule, which acts to ensure that subsidized resources do not offer into the market below their true economic costs

Rationale for a two-tier capacity market proposal

Goals:

- ✓ Allow state-supported resources to assume a capacity commitment and contribute to meeting the PJM Reliability Requirement, while recognizing that their fixed-cost recovery is coming from outside the market
- ✓ Ensure that resources relying on market revenues experience efficient clearing prices to maintain reliability and avoid Reliability Must Run Contracts
- ✓ Ensure that all resources being counted for resource adequacy have comparable, if not identical, performance obligations
- ✓ Create a financeable capacity market structure that continues to incent investment when and where needed, even as state-supported resources proliferate

Two-tier pricing ensures reliability & continued market-based investment, while providing states the flexibility to contract to meet policy goals

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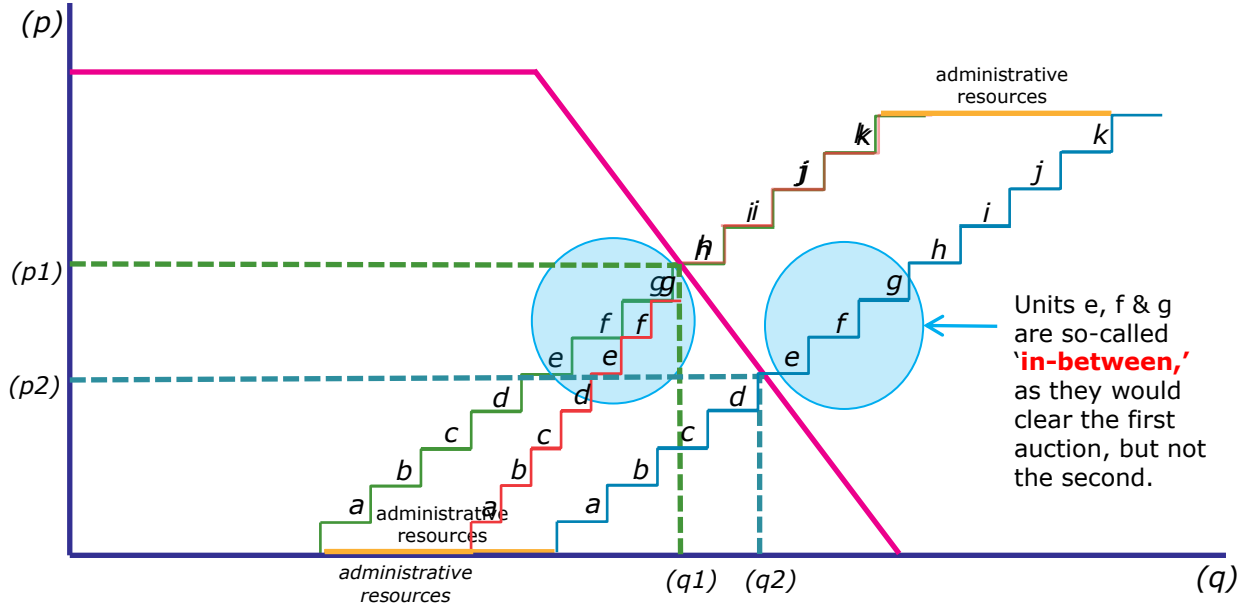
Mechanics of two-tier pricing

- ✓ Capacity auction would occur in two steps. In the 1st step, all resources receiving out-of-market payments to support state policy goals would be subject to offer price mitigation. The 1st-step auction would clear a quantity q1 @ price p1 in the diagram below.
- ✓ In the 2nd step, any resources receiving out-of-market revenues and not cleared in the 1st step would be entered into the auction at their submitted (unmitigated) price. The 2nd step would establish a clearing price p2, using the same bid stack, with the only changes being to the prices of the administrative resources.
- ✓ Administrative resources that did not clear in the first-step auction would get paid p2; all other resources that cleared the first–step auction would get paid p1, including the 'in-between' units.
- ✓ All resources would receive a proportionally lower capacity obligation, to ensure that the total market cost of the auction is no higher than p1 * q1.



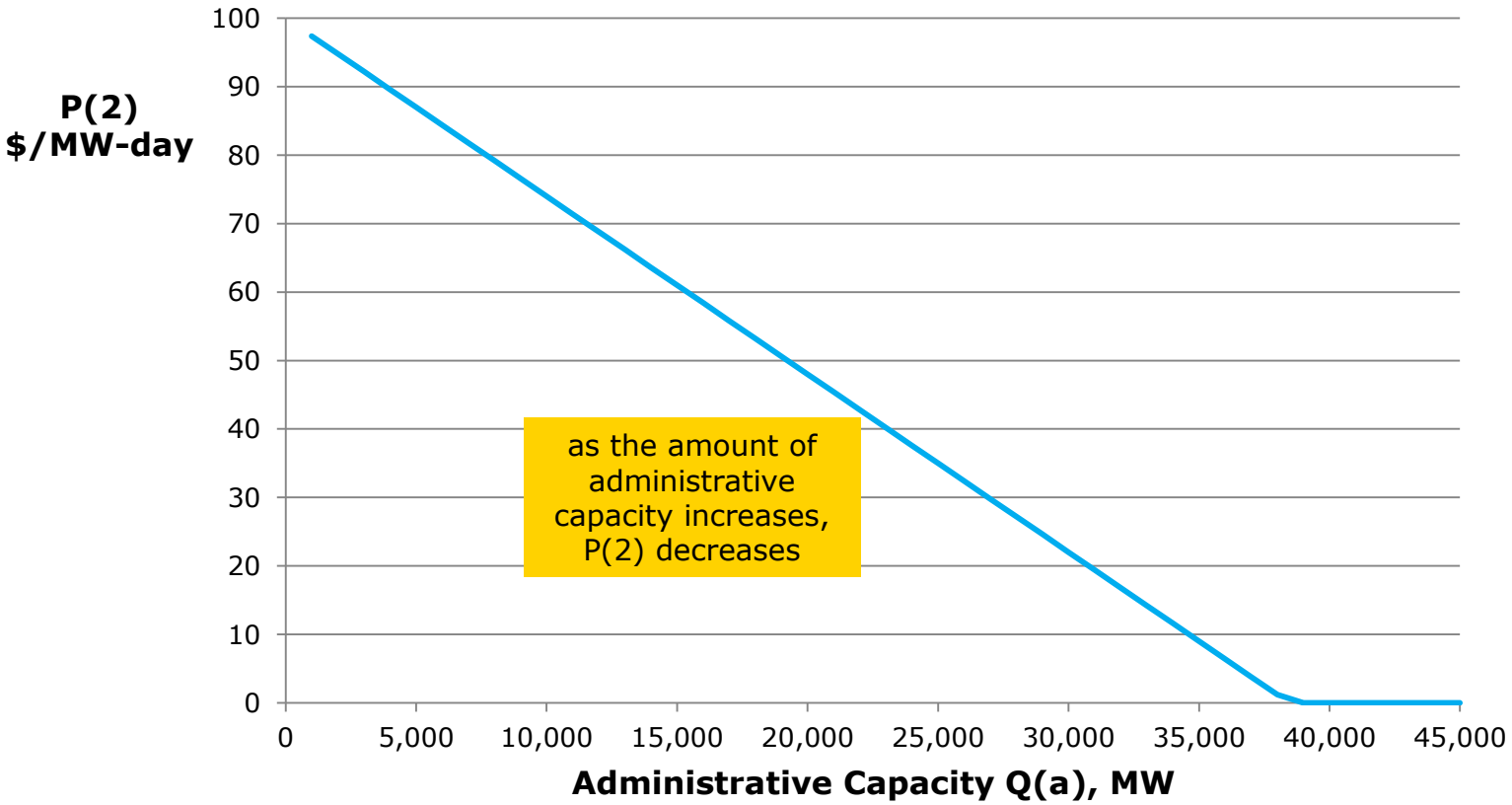
Key Features of NRG's Proposal

- Price differentiation
  - 'Administrative' resources are recovering fixed costs outside the market, so it is reasonable to compensate them differently for the capacity product
  - The price differentiation creates a natural limiting mechanism (next slide)

- Quantity pro-rating for cost containment
  - The proposal is structured to ensure that the market-settled cost of capacity is equal to (no greater than) the cost that would have occurred absent any administrative capacity (i.e., P1 * Q1)
  - Pro-rating applies equally to all resources, competitive and administrative, to spread the cost proportionally (rather than concentrating the cost on only the marginal resources that would be excluded from the market under PJM's approach)
  - Under CP, having a small quantity of unobligated capacity mitigates a resource's performance risk and/or enhances upside potential in Performance Assessment Hours

Market-Responsive Limits (1)

- As the amount of administrative capacity increases, P2 decreases

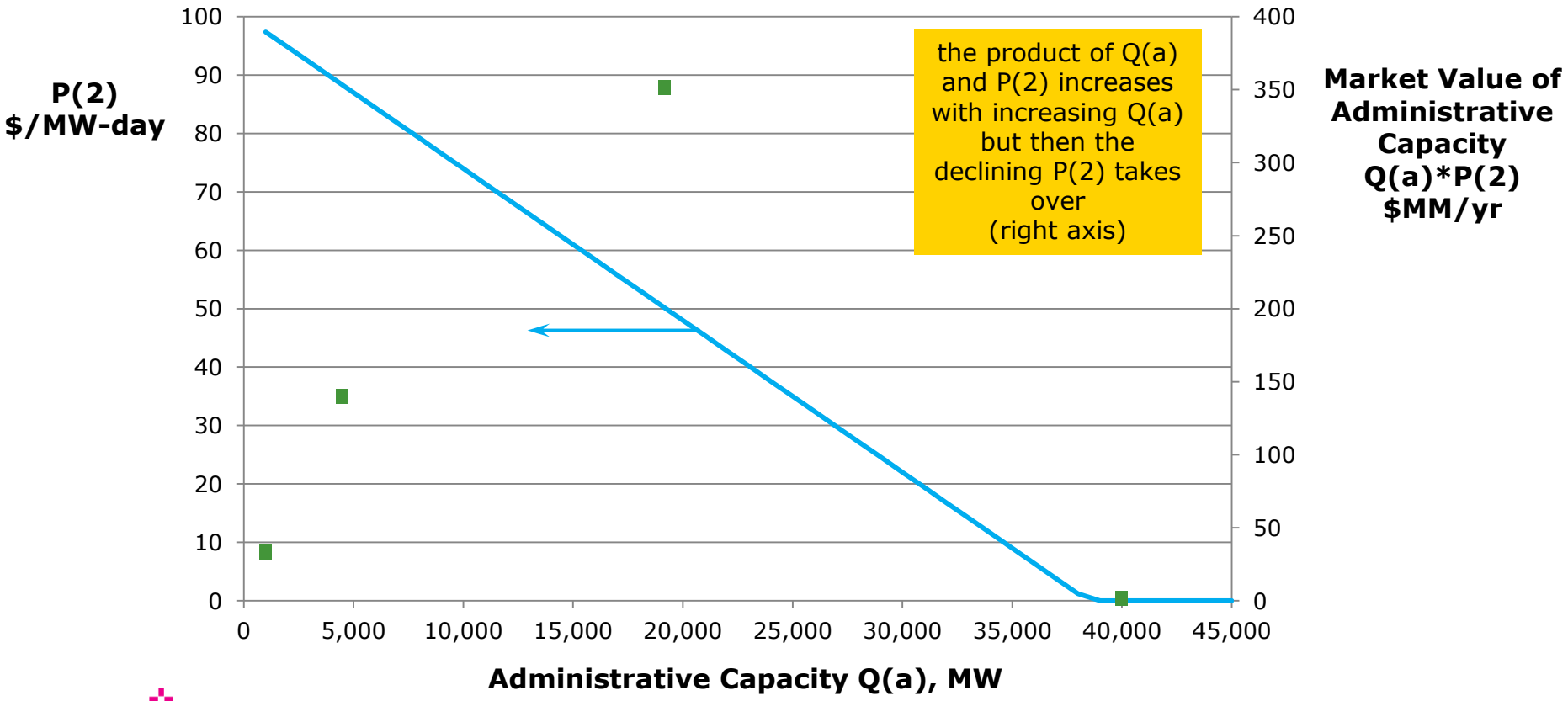


— Supply curve pricing will affect the shape of this relationship between Q(a) and P(2)

Source: NRG analysis. Assumes P(1) = $100/MW-day; VRR slope of $0.26/MW-day per MW.

Market-responsive Limits (2)

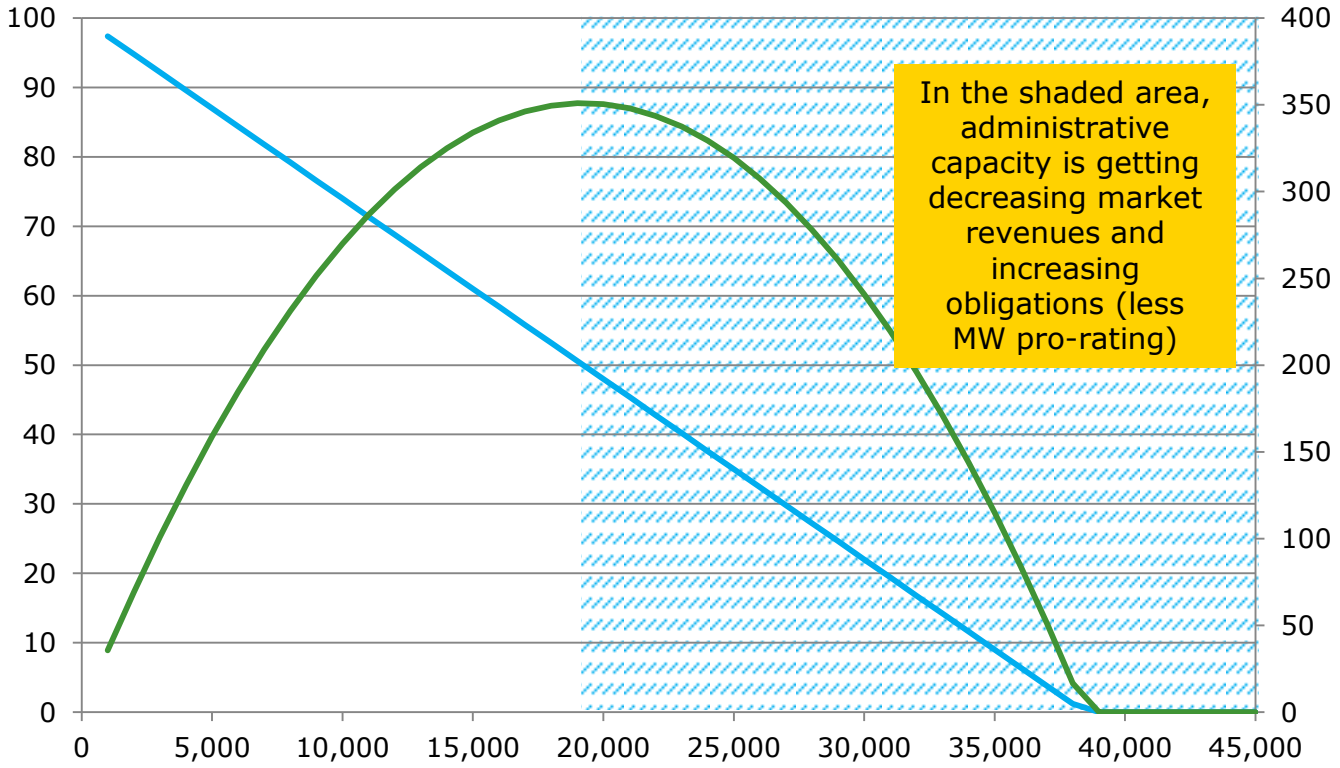
- The market value of the administrative capacity ultimately goes to zero as P(2) goes to zero



Source: NRG analysis. Assumes P(1) = $100/MW-day; VRR slope of $0.26/MW-day per MW.

Market-Responsive Limits (3)

- Because of the price differentiation there is a logical upper limit on the quantity of administrative capacity
  - This limit increases with higher P(1), ie, as the market is increasingly short



Source: NRG analysis. Assumes P(1) = $100/MW-day; VRR slope of $0.26/MW-day per MW.

Summary

- NRG's MW pro-rating approach to two-tier pricing is preferable because it:
  - does not rely on one price to select resources but pays them a different price
    - bidding incentive issues
  - does not concentrate risk of exclusion on resources at the margin
    - risk translates to cost
  - creates potential value to resources in a performance-based capacity construct
    - lower performance risk (or potential performance upside) translates to lower cost
  - contains a mechanism that limits the incentive to continue adding administrative resources

Questions?

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Adjustments in Response to Stakeholder Feedback

- Minimum EFORd
  - Create an EFORd floor to address concerns related to bidding behavior
  - Mimic existing language of Tariff for maximum EFORd
  - *Eg*., Offers may include an EFORd no lower than the lower of 1-year value or 5-year average

- Capacity Commitment Prorata Application
  - Clarify application of prorata reduction of capacity commitments
  - Commitment reduction based on MWs cleared in Step 2 applied across RTO

- Definition of "Actionable Subsidy"
  - Mimic existing Tariff language (*please see matrix*)

Responses to Stakeholder Proposal Questions (1/5)

- How do you define the problem that you are trying to solve with your proposal?
  - Please see slides 2 and 3.

- Does your proposal accommodate resources with state government preferences on a non-discriminatory basis? How?
  - This two-tier pricing approach accommodates state government preferences by design. The reference price application and access to Step 2 pricing are available equally to any state-preferred resource whether new or existing.

Responses to Stakeholder Proposal Questions (2/5)

- Will your proposal encourage or frustrate state policy objectives or other subsidies?
  - The NRG two-tier proposal is not designed to either encourage or frustrate state policy objectives. This model will accommodate participation by any state-preferred resource that is not economic in RPM.

- What is your definition of an actionable subsidy (you may include specific factors such as MW or economic thresholds, timing of payment, rate and reasons for the subsidy, etc.)?
  - Please see the most recent iteration of the CCPPSTF matrix, tab 2.

- What impact does your proposal have on energy markets?
  - No direct impacts.

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Responses to Stakeholder Proposal Questions (3/5)

- Will your proposal result in or mitigate long term price suppression in the capacity market and/or the energy market?
  - The intent of this proposal is to mitigate price suppression in PJM's capacity market while accommodating state policy preferences.

- How do you think your proposal will impact bidding behavior?
  - The proposal has been updated to address concerns raised by stakeholders regarding market participants adjusting EFORd values. We anticipate bidding incentives to continue to align with bidding actual going-forward costs.

Responses to Stakeholder Proposal Questions (4/5)

- Please address the effects of your proposal on potential market manipulation.
  - The proposal maintains all existing market mitigation rules and addresses efforts to suppress price due to out-of-market impacts.

- Please address the potential for "leakage" (the effects of one jurisdiction's actions on other jurisdictions).
  - There is no "leakage" from the perspective of total payments. Step 1 determines the total cost of the capacity market and that total cost is held constant through Step 2.

- What is the preferred implementation timing?
  - Base Residual Auction 2021/2022

Responses to Stakeholder Proposal Questions (5/5)

- For repricing proposals, please explain your treatment for "in between" resources and why you believe it is the right approach ("in between" resources are those that did not clear in one stage of a repricing proposal but offered at a level less than the final clearing price determined in a second stage).
  - Please see slides 3-5 and 9.

- How does your proposal address RPS, RGGI, ZEC and REC programs.
  - RPS programs are unaffected. The impact on the remaining programs depends on their individual designs consistent with the definition of "Applicable Subsidy".