Resource Adequacy Structure 5: Multiple Value Pricing

Presented by:

Michael Cadwalader

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Agenda

- Missing Money, Capacity Markets, MVP, and Structure 5
- Pricing Approaches
  - Comparative Pricing
  - Additive Pricing
  - Blended Pricing
- Illustrative Example
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Missing Money, Capacity Markets, MVP, and Structure 5

Missing Money and Current ICAP Requirements

- ICAP markets provide the missing money that is needed to ensure that current ICAP requirements are met.
  - On their own, it's unlikely that the energy and ancillary services (E&AS) markets will provide sufficient revenue to support enough capacity to meet ICAP requirements.
  - The current ICAP demand curves intend to ensure that capacity revenue will support entry when the amount of capacity provided is nearing ICAP requirements for the NYCA and Localities.
  - This need will likely continue into the future.

Missing Money and Policy Resource Requirements

- Under the CLCPA, development of certain amounts of policy resources is mandated, which may lead to another, similar missing money problem.
  - On their own, it's unlikely that the E&AS markets will provide sufficient revenue to support enough capacity to meet policy resource requirements.
  - Even if carbon pricing is implemented, there may still be missing money.

Multiple Value Pricing

- In order to remain relevant, the capacity market will need to recognize and be consistent with legally mandated requirements.
- In their November 8, 2019 comments in the Resource Adequacy Proceeding, the Joint Utilities proposed Multiple Value Pricing ("MVP"), a market-based approach for meeting these requirements.
  - Under MVP, the capacity market would provide the missing money to support capacity to meet both resource adequacy requirements and policy resource requirements to address climate change.
  - MVP would address those problems in a manner that is economically efficient.

Resource Adequacy Structures

- In the Resource Adequacy Proceeding, the DPS and NYSERDA engaged The Brattle Group to consider different resource adequacy structures, including:
  - **Structure 1:** An ICAP market with status quo buyer-side mitigation ("BSM")
  - **Structure 2:** An ICAP market with expanded BSM
  - **Structure 3:** A state-run centralized resource adequacy credit ("RAC") market without BSM
  - **Structure 4:** No centralized market; LSEs contract bilaterally for RACs
  - **Structure 5:** A co-optimized market for capacity and clean energy providers

Structure 5

- In their qualitative assessment of these approaches, Brattle provided the following additional detail regarding Structure 5:
  - "All system clean energy requirements would be achieved through a centralized, co-optimized RAC and REC procurement market."
  - "The state would establish RAC needs consistent with the 1-in-10 standard."
  - "The State would establish clean energy requirements consistent with the CLCPA that would also be imposed on retail providers."
    - These could include requirements for credits from renewable resources and storage resources, as well as requirements for credits provided by resources using certain technologies, such as offshore wind ("OSW").

Structure 5 (cont.)

- Brattle went on to explain that such an auction would "procure the least-cost combination of all resource adequacy and clean energy needs."
  - "A downward-sloping demand curve would be used to represent total system-wide demand for each product to be procured."
  - "The optimized clearing approach would ensure each seller's satisfaction with the final clearing results: [offers from] sellers earning equal or more than their offer price would clear the auction, while [offers from] sellers that would earn less than their offer price would not clear."

MVP and Structure 5

- MVP auctions would be consistent with Brattle's description of Structure 5. They would:
  - Determine the mix of resources that minimizes the amount of missing money that must be provided to meet both resource adequacy and policy resource requirements.
  - Eliminate the inefficiencies associated with the current BSM rules.
    - Offer floors for policy resources that disregard their beneficial effects on climate may lead to inefficient mitigation of those offers.
    - Mitigation in these cases is ineffectual, because BSM is intended to deter the development of the resources to which it is applied, but the CLCPA requires development of these resources.

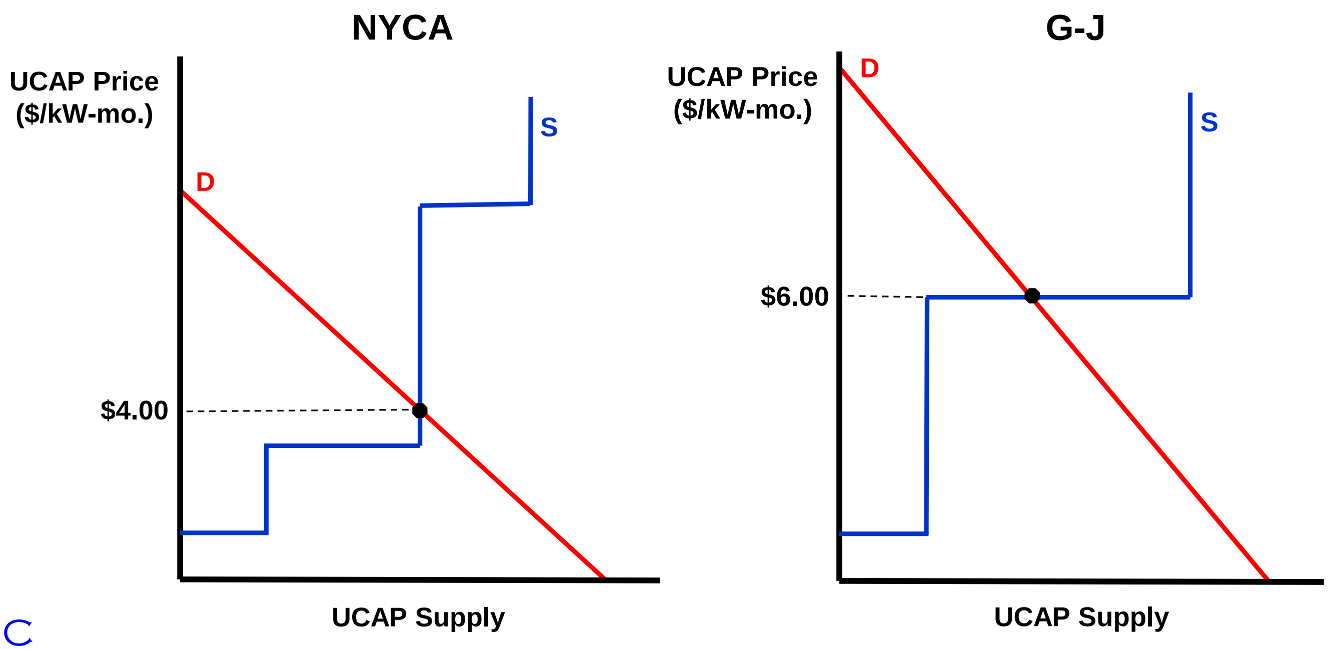
Pricing Approaches

Other Approaches

- When considering how to design the MVP proposal, we initially considered two approaches:
  - Comparative pricing
  - Additive pricing
- But both approaches encountered pitfalls.

Comparative Pricing

- The ICAP market currently uses comparative pricing.
  - Prices are determined at the intersection of each pair of supply and demand curves.
  - Each ICAP provider receives the highest of those prices for each requirement it meets.
  - In the example below, ICAP providers in the Lower Hudson Valley (“LHV”) (i.e., Zones G-I) receive $6/kW-mo., as that exceeds the $4/kW-mo. price at the intersection of the NYCA supply and demand curves.



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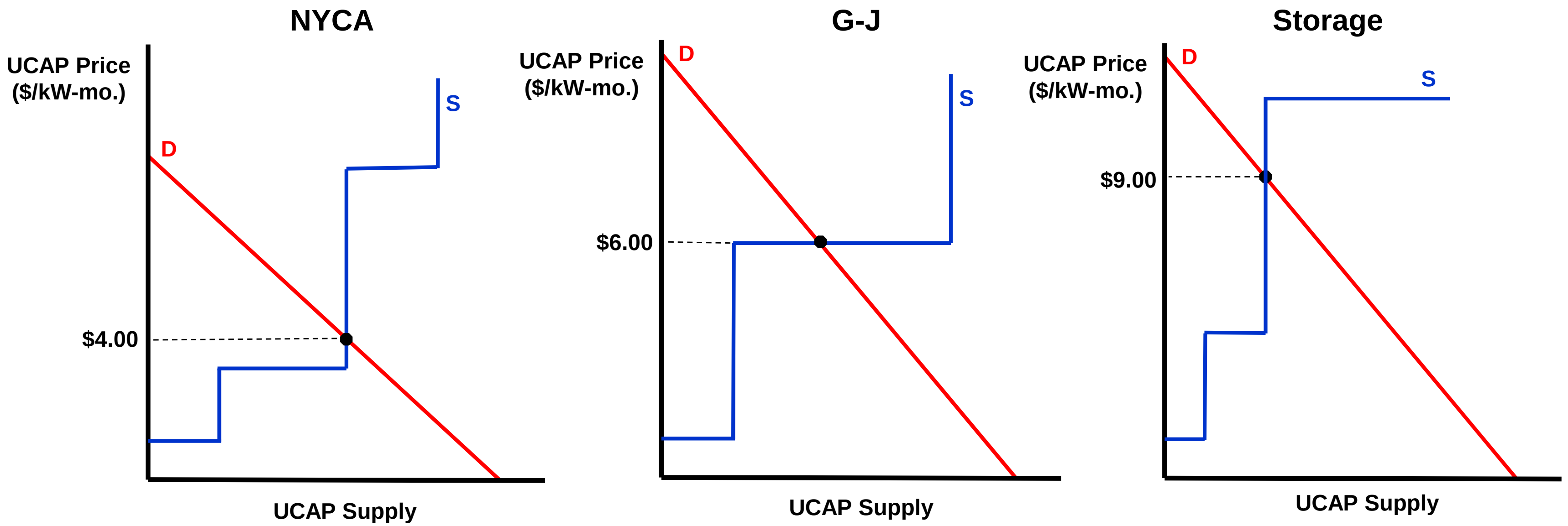
Extension to Policy Resource Requirements

- This approach could be generalized to include demand and supply curves for policy resource requirements.
  - For example, after adding a statewide storage requirement and associated supply and demand curves as shown below, providers of ICAP from storage resources in both ROS and the LHV would receive $9/kW-mo.



Comparative Pricing is Inefficient

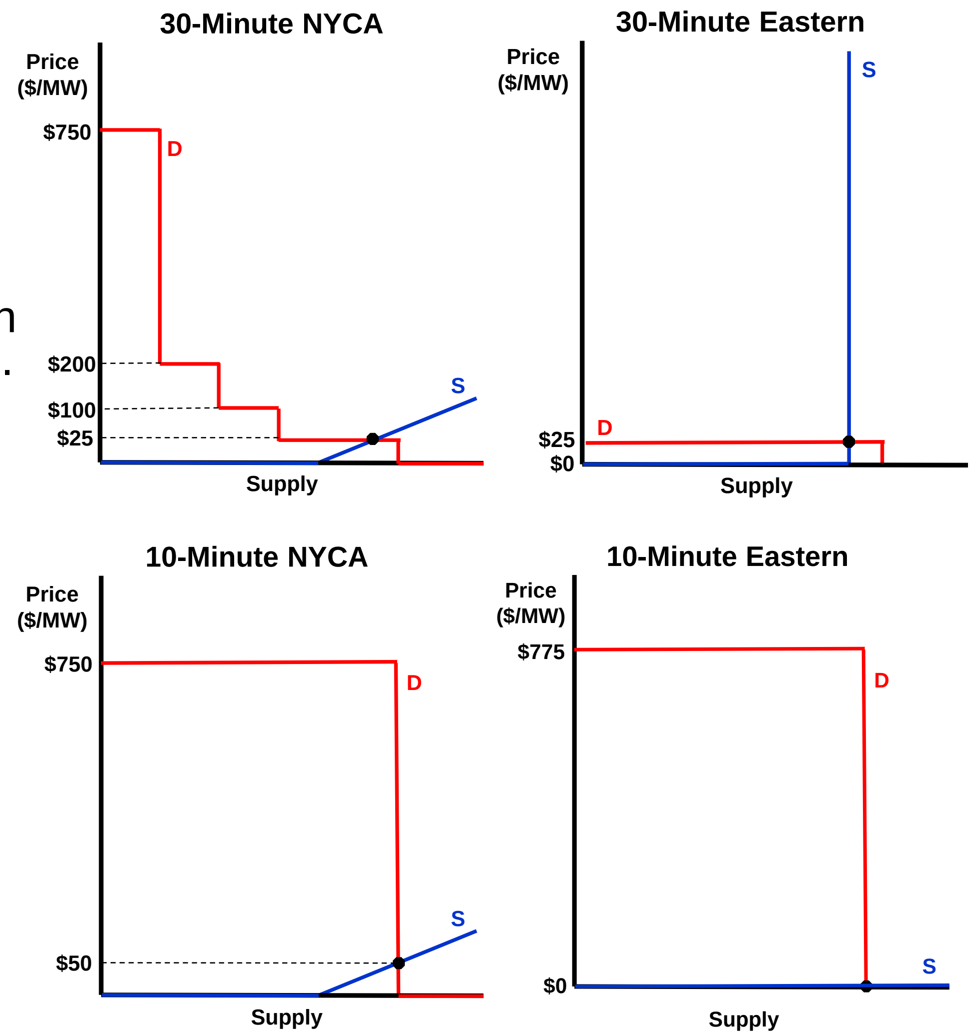
- But this approach is inefficient.
  - Portfolio A consists of a storage resource in the LHV that provides 1 MW of UCAP and a non-storage resource in ROS that provides 1 MW of UCAP.
  - Portfolio B consists of a non-storage resource in the LHV that provides 1 MW of UCAP and a storage resource in ROS that provides 1 MW of UCAP.
- Both portfolios provide 2 MW of UCAP, 1 MW of which is storage and 1 MW of which is in the LHV. But the owners of the portfolios receive different amounts of capacity revenue.
  - The owner of Portfolio A would receive \$9/kW-mo. × 1000 kW/MW + \$4/kW-mo. × 1000 kW/MW = \$13,000/mo.
  - The owner of Portfolio B would receive \$6/kW-mo. × 1000 kW/MW + \$9/kW-mo. × 1000 kW/MW = \$15,000/mo.

Comparative Pricing is Inefficient (cont.)

- This inefficiency arises because resources that count towards both locational ICAP requirements and policy ICAP requirements will be paid a price that reflects only one of those sources of value.
  - As a result, developers of resources have no incentive to incur any costs that will permit their resource to count towards both locational and policy ICAP requirements.
  - In this example, storage resources in both ROS and the LHV are both paid $9/kW-mo., so developers of storage resources have no incentive to incur any costs to locate in the LHV.
  - Developers of non-storage resources have such an incentive. They receive $2/kW-mo. more for resources that are in the LHV.
- The pricing method should provide efficient incentives by reflecting the value of a resource with respect to both locational and policy resource requirements.

Additive Pricing

- An alternative is additive pricing, which the OR market currently uses.
  - Each OR provider receives the sum of the prices at the intersections of the supply and demand curves for each requirement it counts toward.
- Given the demand curves at right (revised demand curves are pending at FERC) and the supply curves, the price of:
  - 10-minute eastern reserve (which meets all four requirements) is $25 + $25 + $50 + $0 = $100/MWh.
  - 10-minute western reserve is $25 + $50 = $75/MWh.
  - 30-minute eastern reserve is $25 + $25 = $50/MWh.
  - 30-minute western reserve is $25/MWh.



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Extension to Policy Resource Requirements

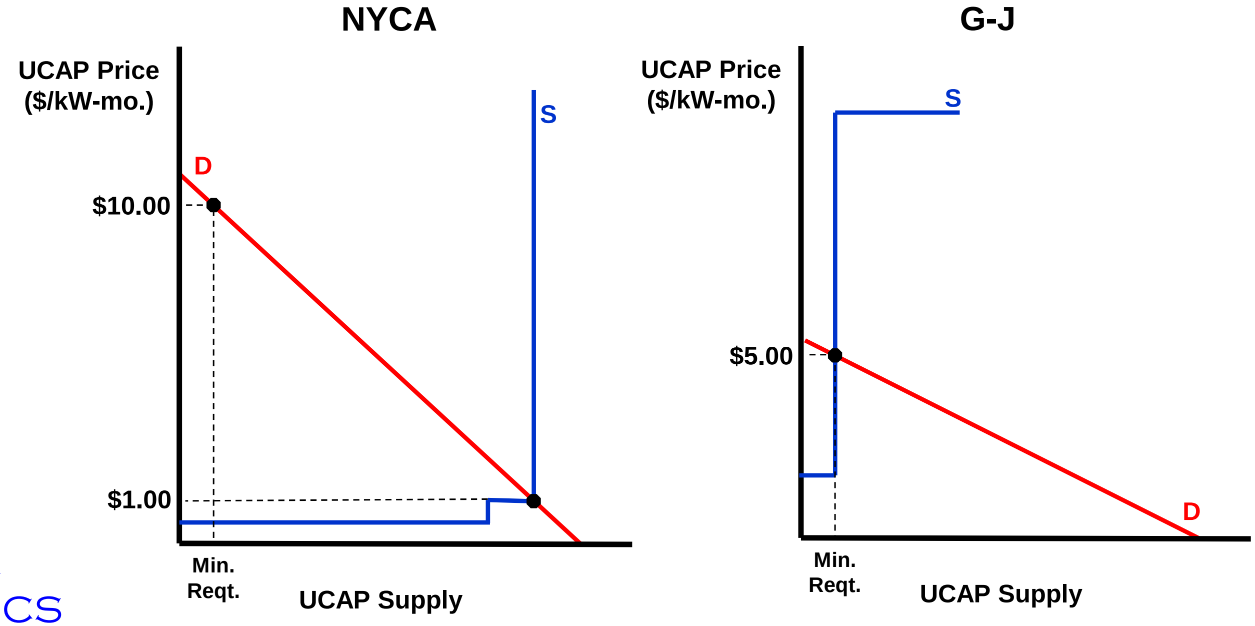
- We could adapt the additive approach to apply to ICAP markets that use demand curves that apply both to resource adequacy and policy resource requirements.
  - This would remedy the efficiency problem, as the prices would reflect both sources of value.
- But it would be necessary to modify the demand curves. Instead of reflecting the net cost of developing a resource, they should reflect the difference between:
  - The net cost of developing a resource to meet a given capacity requirement and
  - The net cost of developing a resource that doesn't meet that particular requirement, but is otherwise identical.

Extension to Policy Resource Requirements (cont.)

- Otherwise, resources could be overpaid.
  - Suppose that the developer of an ROS resource (that doesn't count toward policy requirements) requires \$10/kW-mo. in capacity revenue to break even, while the developer of such a resource in the LHV requires \$15/kW-mo.
    - If these demand curves weren't modified, and both the NYCA and G-J ICAP markets were at their respective minimum requirements, the LHV capacity price (using the additive approach) would be \$25/kW-mo.!
    - So the price on the G-J demand curve that corresponds to the G-J minimum requirement should reflect just the \$5/kW-mo. difference between these costs, not the full \$15/kW-mo.

Additive Pricing May Not Provide the Missing Money

- However, this means that additive pricing often won't provide the missing money when it's needed. For example, suppose that:
  - The supply of UCAP in the NYCA greatly exceeds the requirement, so the price of ROS UCAP is $1/kW-mo., as shown below.
  - The supply of UCAP in G-J is exactly equal to the requirement.
- Then resources in the LHV would receive only $1/kW-mo. + $5/kW-mo. = $6/kW-mo. in capacity revenue.
  - This is much less than the $15/kW-mo. in capacity revenue that's needed to support development of capacity in the LHV.



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Blended Pricing

- Blended pricing combines elements of comparative and additive pricing, while avoiding their pitfalls.
- It addresses the inefficiency problem:
  - The price difference between capacity provided at different locations will be the same for each type of resource.
  - The price difference between capacity provided by different types of resources will be the same for each location.
- It addresses the missing money problem:
  - When the amount of capacity supplied to meet a requirement is equal to that requirement, the price of capacity will be equal to the net cost of developing resources to meet that requirement.

How Blended Pricing Works

- Under blended pricing:
  - Demand curves for the NYCA and each Locality reflect the net cost of developing resources there using the technology whose net cost is expected to be the lowest in equilibrium (as they do today).
  - Demand curves for each policy resource requirement reflect the net cost of developing capacity to meet that requirement at the location where the **additional** net cost of developing capacity to meet that requirement is expected to be the lowest in equilibrium.
- Prices for capacity that does not meet policy resource requirements are set using comparative pricing (as they are set today).

How Blended Pricing Works (cont.)

- An adder for each policy resource requirement is determined.
  - It is equal to the amount by which (1) the price at the point where the supply and demand curves for that policy resource requirement intersect exceeds (2) the price of capacity that does not count toward policy resource requirements.
    - This is calculated for the location where the additional net cost of meeting that policy resource requirement is expected to be the lowest, in equilibrium.
  - Adders cannot be negative.
  - Adders for nested policy resource requirements must be at least as large as the adder for the requirement in which it is nested.
- The price for capacity provided by a resource in a given location that meets a given policy resource requirement is equal to:
  - The price for capacity at that location provided by resources that don't count toward policy resource requirements, plus
  - The adder for that policy resource requirement.

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Illustrative Example

UCAP Requirements for Example

- To show how blended pricing works, consider a simple example with three UCAP requirements:
  - Requirements for the NYCA and the NYC Locality.
    - Requirements for the G-J Locality and LI have been removed to simplify the example.
  - A requirement for UCAP provided by storage resources located anywhere in the NYCA.
- The values for these requirements appear below.
  - Values for the NYCA and NYC requirements are similar to current values.
  - The value for the storage requirement was assumed for this example.
    - In practice, it is likely that such requirements would reflect a phase-in of the amounts needed to meet CLCPA mandates.

	NYCA	NYC	Storage
Minimum UCAP Reqt. (MW)	35,000	9,000	2,500

Zero-Crossing Points for Example

- For this example, assume the current zero-crossing points (ZCPs) for the NYCA and Locality requirements remain in effect:
  - 112 percent of the NYCA requirement.
  - 118 percent of the NYC requirement.
- The example assumes a slightly higher ZCP for the storage demand curve, equal to 125 percent of the storage requirement.
  - A relatively large ZCP will reduce the impact on price if the amount of capacity supplied is significantly larger or smaller than the annual requirement.
  - This is appropriate because policy requirements will grow quickly, while the other requirements change much more slowly.
  - As the amount of capacity supplied to meet policy resource requirements approaches the CLCPA mandates, it would be reasonable to reduce the ZCPs.

MRPs for Example

- The monthly reference prices (MRPs) (i.e., the prices on the demand curves that correspond to minimum UCAP requirements) used in this example appear below.
  - The MRPs for the NYCA and NYC demand curves are similar to their current values.
  - The MRP for the storage demand curve reflects the net cost of developing a storage resource in ROS.
    - This example assumes that in equilibrium:
      - The additional net cost for developing storage in ROS is $14/kW-mo. – $10/kW-mo. = $4/kW-mo.
      - The additional net cost for developing storage is lower in ROS than in NYC.
    - The value of the storage MRP was assumed for the purpose of this example, and doesn't reflect an estimate of actual costs.

	NYCA	NYC	Storage
Monthly Reference Price ($/kW-mo.)	$ 10.00	$ 22.00	$ 14.00

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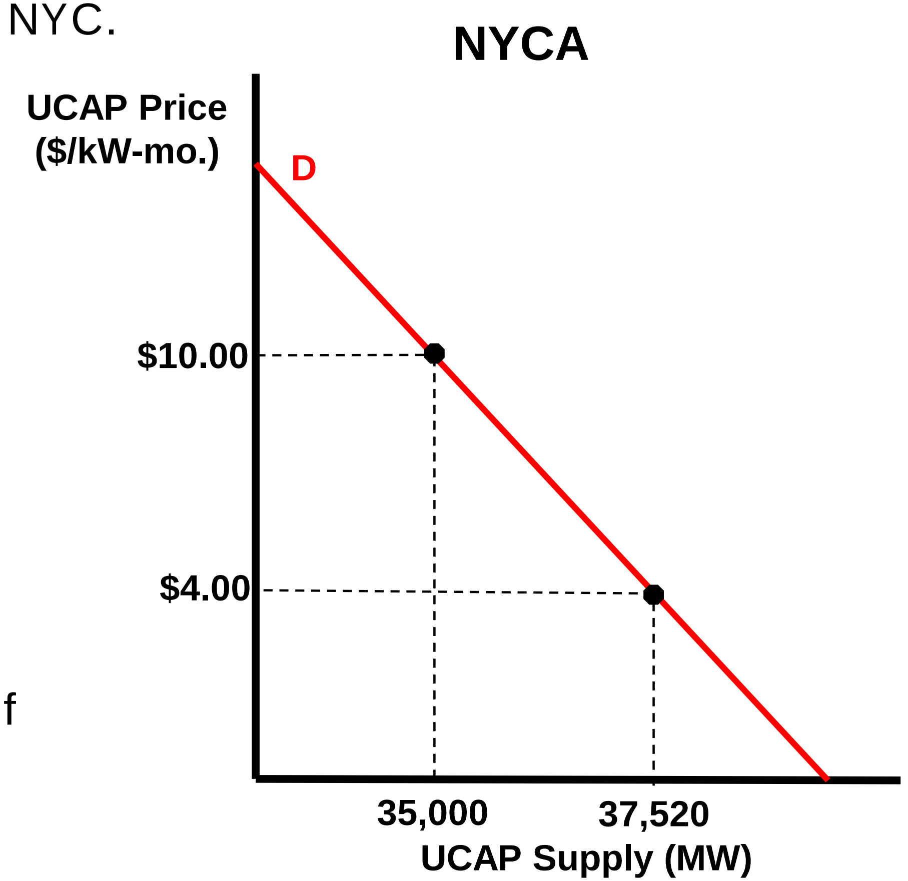
Offers for Example

- Finally, offers to supply UCAP, and the amount of each offer that is accepted, are shown below. Offers on the margin are highlighted.

Offer Quantity (MW)	Offer Price ($/kW-mo.)	Location	Storage?	Accepted Offers (MW)
26,000	4.00	ROS	N	25,825
8,000	8.00	ROS	N	-
2,400	11.00	ROS	Y	2,400
10,000	18.00	NYC	N	9,095
3,000	22.00	NYC	N	-
200	24.00	NYC	Y	200
Total				**37,520**

Price of ROS Non-Storage UCAP in Example

- Since there are two locations and two resource types in this example, there are four UCAP prices to calculate:
  - Non-storage UCAP in ROS and in NYC.
  - Storage UCAP in ROS and in NYC.
- The offer of 26,000 MW of ROS non-storage UCAP at $4/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for ROS non-storage UCAP.
  - A total of 37,520 MW of UCAP offers are accepted.
  - The price on the NYCA demand curve that corresponds to that amount of UCAP is $4/kW-mo.
  - Accepting any more of this offer would drive the price of ROS non-storage UCAP below $4/kW-mo.



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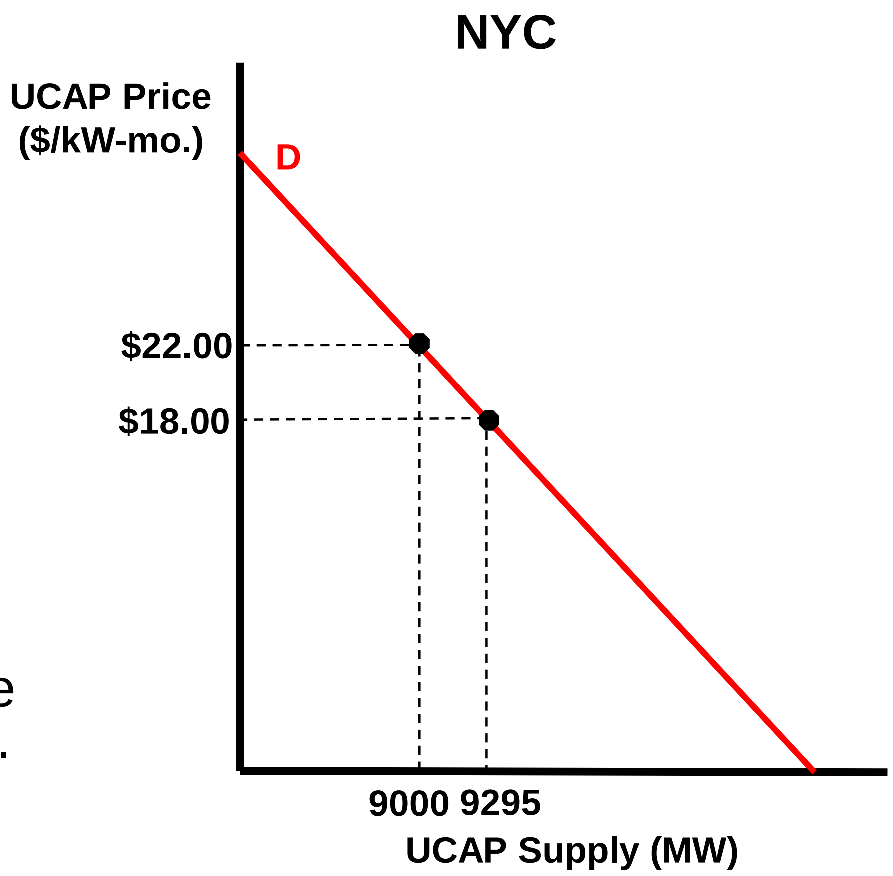
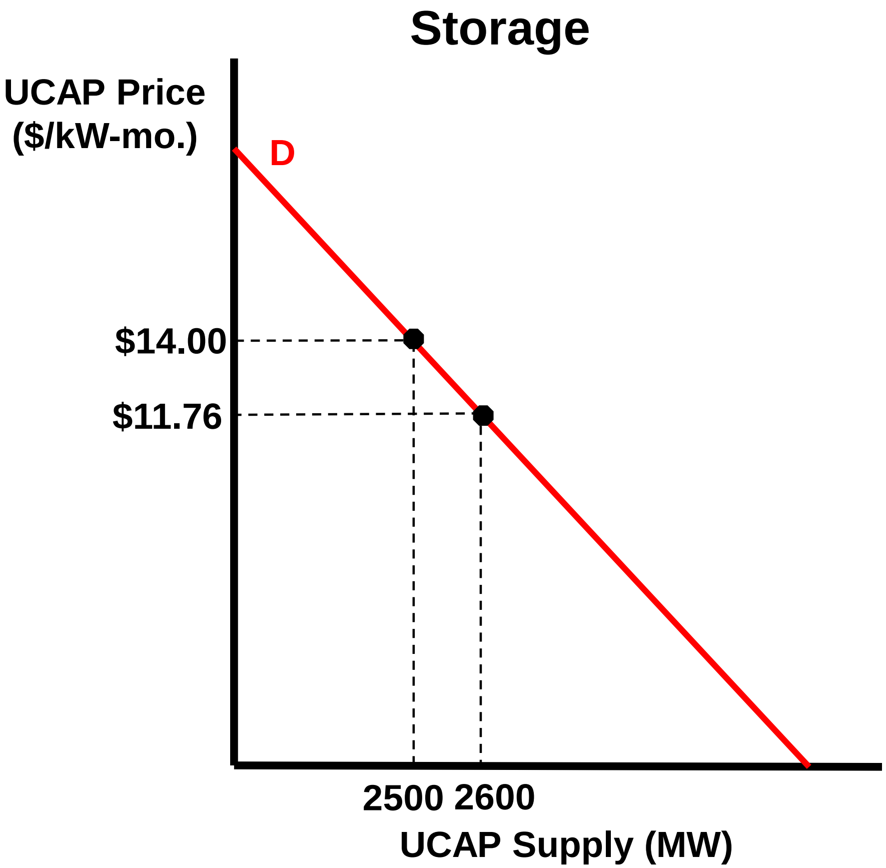
Price of NYC Non-Storage UCAP in Example

- The offer of 10,000 MW of NYC non-storage UCAP at $18/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for NYC non-storage UCAP.
  - A total of 9295 MW of UCAP offers from NYC resources (both storage and non-storage) are accepted.
  - The price on the NYC demand curve that corresponds to that amount of UCAP is $18/kW-mo.
  - Accepting any more of this offer would drive the price of NYC non-storage UCAP below $18/kW-mo.



Price of ROS Storage UCAP in Example

- The storage demand curve sets the price for ROS storage UCAP.
  - A total of 2600 MW of UCAP offers from storage resources (both in ROS and NYC) are accepted.
  - The price on the storage demand curve that corresponds to that amount of UCAP is $11.76/kW-mo.
  - Since the price of ROS non-storage UCAP is $4/kW-mo., the ***adder*** for storage UCAP is $11.76 /kW-mo. – $4/kW-mo. = $7.76/kW-mo.



Price of NYC Storage UCAP in Example

- The price of NYC storage UCAP is also indirectly based on the storage demand curve, because it is based on this adder.
  - The price of NYC non-storage UCAP is $18/kW-mo.
  - Since the adder for storage UCAP is $7.76/kW-mo., the price for NYC storage UCAP is $18/kW-mo. + $7.76/kW-mo. = $25.76/kW-mo.

Blended Pricing is Efficient

- Prices calculated in this manner avoid the inefficiency problems that arise under comparative pricing.
  - The difference between the prices of storage UCAP in ROS and non-storage UCAP in ROS is the same as the difference between the prices of storage UCAP in NYC and non-storage UCAP in NYC.
    - Thus, developers of capacity in each location have the same incremental incentives to develop capacity that meets policy requirements.
  - And the difference between the prices of storage UCAP in ROS and storage UCAP in NYC is the same as the difference between the prices of non-storage UCAP in ROS and non-storage UCAP in NYC.
    - Thus, developers of each type of capacity have the same incremental incentives to develop capacity that meets locational resource adequacy requirements.

Blended Pricing is Efficient (cont.)

- As a result, the owners of portfolios that provide the same contribution towards each capacity requirement will be paid the same amount.
  - Portfolio C consists of a storage resource in NYC that provides 1 MW of UCAP and a non-storage resource in ROS that provides 1 MW of UCAP.
    - Its owner would receive \$25.76/kW-mo. × 1000 kW/MW + \$4/kW-mo. × 1000 kW/MW = \$29,760/mo. for its capacity.
  - Portfolio D consists of a non-storage resource in NYC that provides 1 MW of UCAP and a storage resource in ROS that provides 1 MW of UCAP.
    - Its owner would receive \$18/kW-mo. × 1000 kW/MW + \$11.76/kW-mo. × 1000 kW/MW = \$29,760/mo. for its capacity.

Additional Examples

- The appendix contains additional, more detailed examples illustrating MVP.
  - Each example includes the G-J, NYC and LI Localities.
- In addition:
  - Example 1 includes a renewable requirement with a nested offshore wind (“OSW”) requirement.
  - Example 2 includes both a renewable requirement with a nested OSW requirement and a storage requirement.
  - Example 3 is like Example 2, but it assumes that the NYCA demand curve is based on the net cost of developing a storage resource.
    - Example 3 also includes a cost allocation illustration.

Appendix

Example 1

Renewable Requirement with Nested OSW Requirement

UCAP Requirements for Example 1

- Consider an example with six UCAP requirements:
  - A NYCA requirement and requirements for the three current Localities.
  - A requirement for UCAP provided by renewable resources located anywhere in the NYCA.
  - A requirement for UCAP provided by OSW resources located anywhere in the NYCA.
    - OSW resources also count towards the renewables requirement, so the OSW requirement is "nested" within the renewable requirement.
- The values for these requirements appear below.
  - The NYCA and Locality requirements are similar to current requirements.
  - The renewables and OSW UCAP requirements were assumed for this example.

	NYCA	G-J	NYC	LI	Ren.	OSW
Minimum UCAP Reqt. (MW)	35,000	14,000	9,000	5,000	8,000	2,000

Zero-Crossing Points for Example 1

- For this example, assume the current zero-crossing points (ZCPs) for the NYCA and Locality requirements remain in effect:
  - 112 percent of the NYCA requirement.
  - 115 percent of the G-J requirement.
  - 118 percent of the NYC and LI requirements.
- The example assumes a considerably higher ZCP for the renewables and OSW demand curves, equal to 150 percent of each requirement.

MRPs for Example 1

- The MRPs used in this example appear below.
  - The MRPs for the NYCA, G-J, NYC and LI demand curves are similar to their current values.
  - The MRP for the renewables demand curve reflects the net cost of developing a renewable resource in ROS.
    - This example assumes that in equilibrium:
      - The additional net cost for developing renewables in ROS is $20/kW-mo. – $10/kW-mo. = $10/kW-mo.
      - The additional net cost for developing renewables is lower in ROS than anywhere else in the NYCA.
  - Similarly, the MRP for the OSW demand curve reflects the net cost of developing an OSW resource that interconnects on LI.
    - This example assumes that in equilibrium:
      - The additional net cost for developing OSW interconnecting on LI is $26/kW-mo. – $18/kW-mo. = $8/kW-mo.
      - The additional net cost for developing OSW is lower for OSW interconnecting on LI than anywhere else in the NYCA.
  - The values for the renewables and OSW MRPs were assumed for the purpose of this example, and don't reflect estimates of actual costs.

	NYCA	G-J	NYC	LI	Ren.	OSW
Monthly Reference Price ($/kW-mo.)	$ 10.00	$ 15.00	$ 22.00	$ 18.00	$ 20.00	$ 26.00

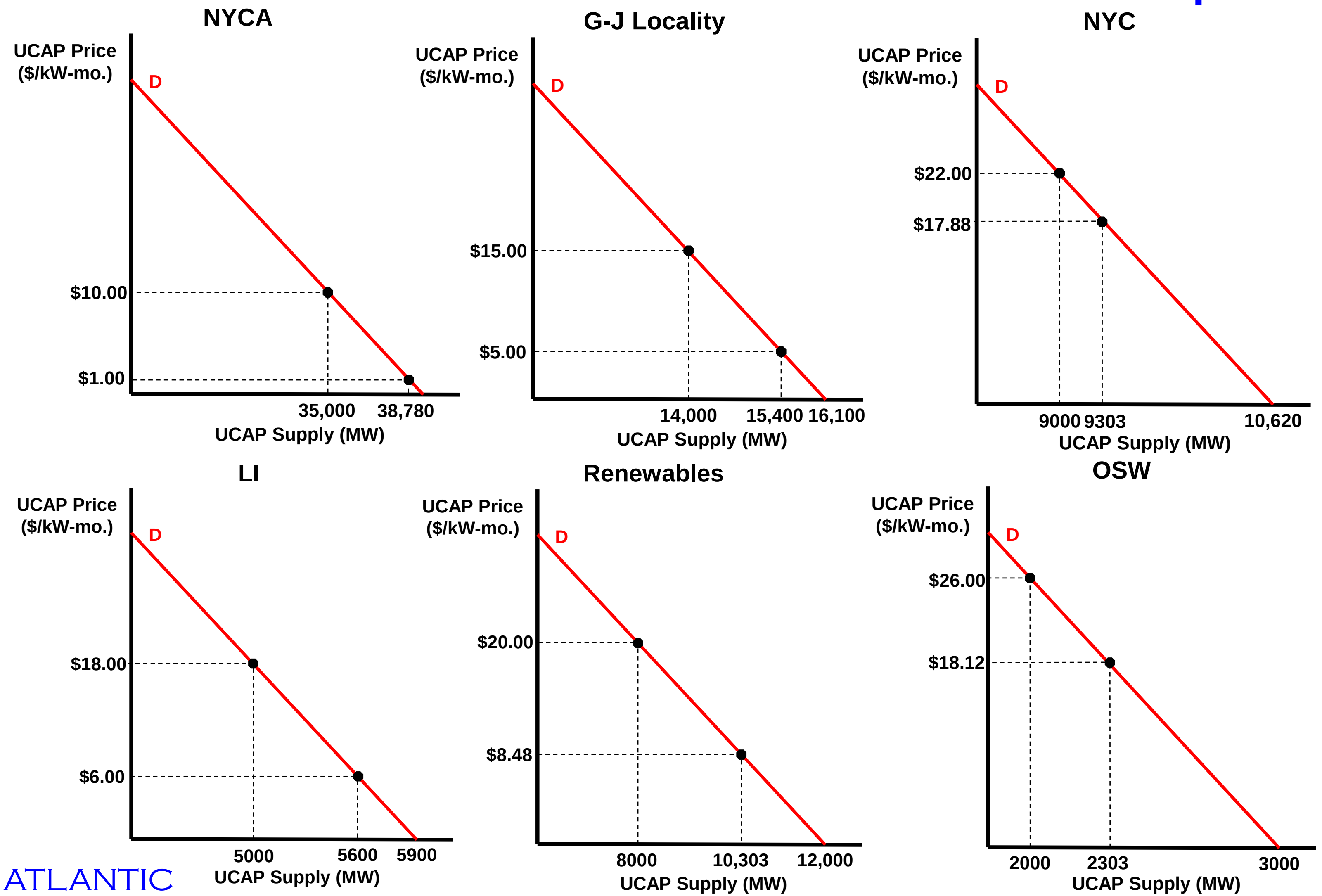
Offers for Example 1

- Finally, offers to supply UCAP, and the amount of each offer that is accepted, are shown below. Offers on the margin are highlighted.

Offer Quantity (MW)	Offer Price ($/kW-mo.)	Location	Renewable?	OSW?	Acccepted Offers (MW)
10,000	1.00	ROS	N	N	9,780
8,000	8.00	ROS	Y	N	8,000
7,000	5.00	LHV	N	N	6,097
1,500	16.00	LHV	Y	N	-
7,000	12.00	NYC	N	N	7,000
3,000	30.00	NYC	Y	Y	2,303
5,600	4.00	LI	N	N	5,600
2,000	25.00	LI	Y	Y	-

- The offers accepted provide:
  - 38,780 MW of UCAP to meet the NYCA requirement.
  - 15,400 MW of UCAP to meet the G-J requirement.
  - 9303 MW of UCAP to meet the NYC requirement.
  - 5600 MW of UCAP to meet the LI requirement.
  - 10,303 MW of UCAP to meet the renewables requirement.
  - 2303 MW of UCAP to meet the OSW requirement.
- The next slide shows the price on each demand curve that corresponds to the total amount of accepted UCAP offers counting towards each requirement.

Prices on Demand Curves for Example 1



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Price of ROS Non-Renewable UCAP in Example 1

- Since there are four locations and three resource types, there are 12 different prices to calculate in this example:
  - Non-renewable UCAP in ROS, LHV, NYC and LI.
  - Renewable non-OSW UCAP in ROS, LHV, NYC and LI.
  - OSW UCAP in ROS, LHV, NYC and LI.
    - Prices can be calculated for every combination, even those that are impractical, such as OSW interconnecting in the LHV.
- The offer of 10,000 MW of ROS non-renewable UCAP at $1/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for ROS non-renewable UCAP.
  - Together with the other accepted offers, a total of 38,780 MW of UCAP offers are accepted.
  - The price on the NYCA demand curve that corresponds to that amount of UCAP is $1/kW-mo.
  - Accepting any more of this offer would drive the price of ROS non-renewable UCAP below $1/kW-mo.

Price of LHV Non-Renewable UCAP in Example 1

- Similarly, the offer of 7000 MW of LHV non-renewable UCAP at $5/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for LHV non-renewable UCAP.
  - Together with the other accepted offers, a total of 15,400 MW of UCAP offers in G-J are accepted.
  - The price on the G-J demand curve that corresponds to that amount of UCAP is $5/kW-mo.
  - Accepting any more of this offer would drive the price of LHV non-renewable UCAP below $5/kW-mo.

Prices of NYC and LI Non-Ren. UCAP in Example 1

- The NYC demand curve sets the price of NYC non-renewable UCAP.
  - A total of 9303 MW of NYC UCAP offers are accepted.
  - The price on the NYC demand curve that corresponds to that amount of UCAP is $17.88/kW-mo.
- The LI demand curve sets the price of LI non-renewable UCAP.
  - A total of 5600 MW of LI UCAP offers are accepted.
  - The price on the LI demand curve that corresponds to that amount of UCAP is $6/kW-mo.
- Thus, the difference between the prices of NYC and LI non-renewable UCAP is $17.88 – $6 = $11.88/kW-mo.
  - To be efficient, the difference between the price of any other type of capacity provided in NYC and the price of that type of capacity on LI must also be $11.88/kW-mo.
  - Similarly, the difference between the prices of non-renewable UCAP at any other pair of locations should be equal to the difference between the prices of any other type of capacity at those locations.

Price of Renewable Non-OSW UCAP in Example 1

- The renewables demand curve sets the price of ROS renewable non-OSW UCAP.
  - Also, together with locational price differences for non-renewable UCAP, the renewables demand curve sets the prices of renewable non-OSW UCAP in the Localities.
- A total of 10,303 MW of renewable UCAP offers are accepted.
  - The price on the renewables demand curve corresponding to the total amount of renewable UCAP supplied is $8.48/kW-mo., so the price of ROS renewable non-OSW UCAP is $8.48/kW-mo.
  - Since the price of ROS non-renewable UCAP is $1/kW-mo., the ***adder*** for renewable non-OSW UCAP is $8.48 – $1 = $7.48/kW-mo.
- The price of renewable non-OSW UCAP in the LHV, NYC and LI is then determined by adding $7.48/kW-mo., the adder for renewable non-OSW UCAP, to the price of non-renewable UCAP at each of those locations. This yields the following prices:

	ROS	LHV	NYC	LI
Renewable Non-OSW	$ 8.48	$ 12.48	$ 25.37	$ 13.48

Price of OSW UCAP in Example 1

- The OSW demand curve sets the price of LI OSW UCAP.
  - Also, together with locational price differences for non-renewable UCAP, the renewables demand curve also sets the prices of OSW UCAP elsewhere in the NYCA.
- A total of 2303 MW of OSW UCAP offers are accepted.
  - The price on the OSW demand curve corresponding to the total amount of OSW UCAP supplied is $18.12/kW-mo., so the price of LI OSW UCAP is $18.12/kW-mo.
  - Since the price of LI non-renewable UCAP is $6/kW-mo., the ***adder*** for OSW UCAP is $18.12 – $6 = $12.12/kW-mo.
- The price of OSW UCAP in ROS, the LHV and NYC is then determined by adding $12.12/kW-mo., the adder for OSW UCAP, to the price of non-renewable UCAP at each of those locations. This yields the following prices:

	ROS	LHV	NYC	LI
OSW	$ 13.12	$ 17.12	$ 30.00	$ 18.12

Price of OSW UCAP in Example 1 (cont.)

- Thus, the offer for 3000 MW of NYC OSW UCAP at $30/kW-mo., which is on the margin, sets the price of NYC OSW UCAP, as well as OSW UCAP elsewhere in the state.
  - Accepting any more of this offer would drive the price of LI OSW UCAP below $18.12/kW-mo., thereby driving the adder for OSW UCAP below $12.12/kW-mo.
  - This would drive the price of NYC OSW UCAP below $17.88/kW-mo. + $12.12/kW-mo. = $30/kW-mo.
- Even though LI OSW UCAP was offered at a lower price than NYC OSW UCAP, the LI offer was not accepted.
  - The $5/kW-mo. difference between the offer prices is less than the $11.88/kW-mo. difference between the marginal cost of meeting the NYC and LI UCAP requirements.
  - So rejecting the LI OSW offer and accepting the NYC OSW offer is efficient, given the assumptions for this example.

Example 2

Storage Requirement and Renewable Requirement with Nested OSW Requirement

UCAP Requirements for Example 2

- To show how blended pricing works in an example that includes both a storage requirement and requirements for renewables, consider an example with seven UCAP requirements:
  - Six requirements (for the NYCA, the G-J Locality, NYC, LI, and for renewable and OSW resources located anywhere in the NYCA) are the same as in Example 1.
  - The seventh requirement is for 2500 MW of UCAP from storage resources located anywhere in the NYCA.
- The values for these requirements appear below.
  - Values for policy resource requirements were assumed for this example.

	NYCA	G-J	NYC	LI	Ren.	OSW	Storage
Minimum UCAP Reqt. (MW)	35,000	14,000	9,000	5,000	8,000	2,000	2,500

Zero-Crossing Points for Example 2

- For this example, assume a ZCP for the storage demand curve equal to 125 percent of the storage UCAP requirement.
- Also assume that, as in Example 1:
  - The current ZCPs for the NYCA and Locality requirements remain in effect.
  - The ZCPs for the renewables and OSW requirements remain equal to 150 percent of those requirements.

MRPs for Example 2

- The MRPs used in this example appear below.
  - The MRP for the storage demand curve reflects the net cost of developing a storage resource in ROS.
    - This example assumes that in equilibrium:
      - The additional net cost for developing storage in ROS is $14/kW-mo. – $10/kW-mo. = $4/kW-mo.
      - The additional net cost for developing storage in ROS is lower than anywhere else in the NYCA.
  - The other MRPs are the same as in Example 1:
    - The NYCA, G-J, NYC and LI MRPs continue to reflect the net cost of developing non-renewable/non-storage (“NR/NS”) resources in ROS, the LHV, NYC and LI, respectively.
    - The renewables and OSW MRPs continue to reflect the net cost of developing a renewable resource in ROS and an OSW resource that interconnects on LI, respectively.
  - Values for the renewables, OSW and storage MRPs were assumed for the purpose of this example, and don’t reflect estimates of actual costs.

	NYCA	G-J	NYC	LI	Ren.	OSW	Storage
Monthly Reference Price ($/kW-mo.)	$ 10.00	$ 15.00	$ 22.00	$ 18.00	$ 20.00	$ 26.00	$ 14.00

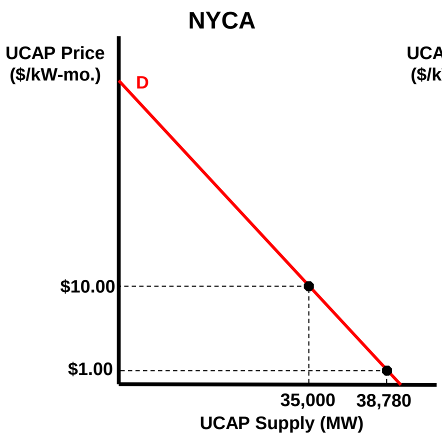
Offers for Example 2

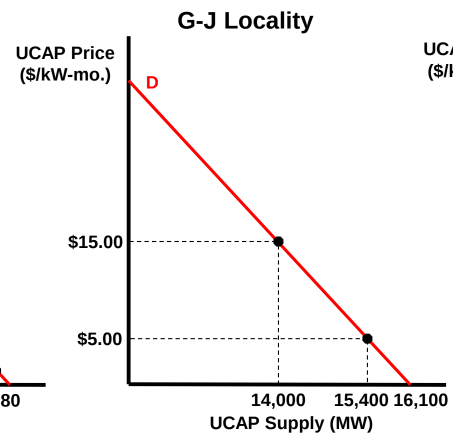
- In addition to the offers submitted in Example 1, two storage resources offer to supply UCAP in this example. The amount of each offer that is accepted is shown below. Offers on the margin are highlighted.

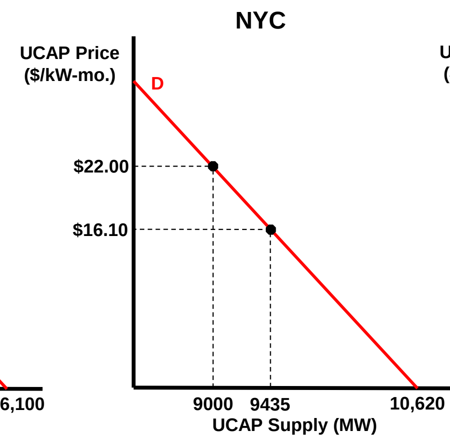
Offer Quantity (MW)	Offer Price ($/kW-mo.)	Location	Renewable?	OSW?	Storage?	Accepted Offers (MW)
10,000	1.00	ROS	N	N	N	7,380
8,000	8.00	ROS	Y	N	N	8,000
2,400	11.00	ROS	N	N	Y	2,400
7,000	5.00	LHV	N	N	N	5,965
1,500	16.00	LHV	Y	N	N	-
7,000	12.00	NYC	N	N	N	7,000
3,000	30.00	NYC	Y	Y	N	2,235
200	24.00	NYC	N	N	Y	200
5,600	4.00	LI	N	N	N	5,600
2,000	25.00	LI	Y	Y	N	-

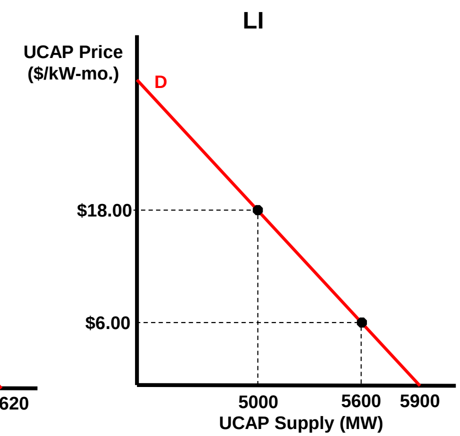
- The offers accepted provide:
  - 38,780 MW of UCAP to meet the NYCA requirement (as in Example 1).
  - 15,400 MW of UCAP to meet the G-J requirement (as in Example 1).
  - 9435 MW of UCAP to meet the NYC requirement.
  - 5600 MW of UCAP to meet the LI requirement (as in Example 1).
  - 10,235 MW of UCAP to meet the renewables requirement.
  - 2235 MW of UCAP to meet the OSW requirement.
  - 2600 MW of UCAP to meet the storage requirement.
- The next slide shows the price on each demand curve that corresponds to the total amount of accepted UCAP offers counting towards each requirement.

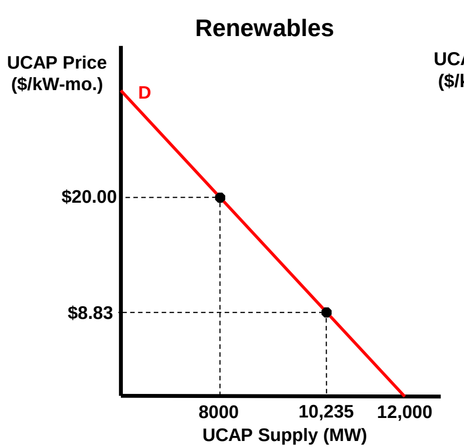
Prices on Demand Curves for Example 2

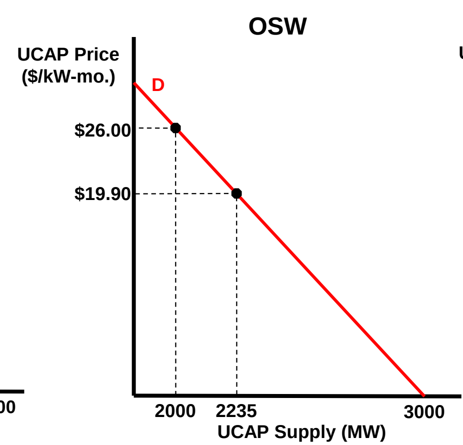


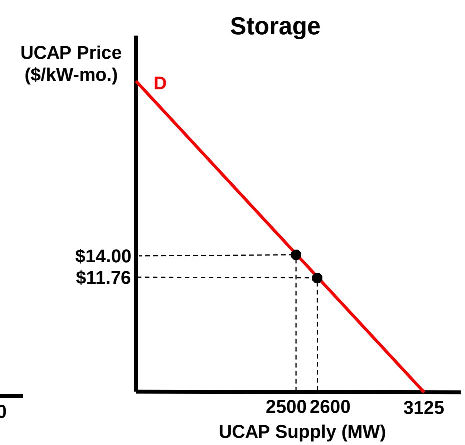












Price of ROS NR/NS UCAP in Example 2

- Since there are four locations and four resource types, there are 16 different prices to calculate in this example:
  - NR/NS UCAP in ROS, LHV, NYC and LI.
  - Renewable non-OSW UCAP in ROS, LHV, NYC and LI.
  - OSW UCAP in ROS, LHV, NYC and LI.
  - Storage UCAP in ROS, LHV, NYC and LI.
- The offer of 10,000 MW of ROS NR/NS UCAP at $1/kW-mo. remains on the margin, as in Example 1 (as it's only partly accepted), so it still sets the price for ROS NR/NS UCAP.
  - All 2600 MW of storage UCAP (including 200 MW in NYC) that was offered in this example, but not in Example 1, was accepted.
  - Those accepted offers were offset by a total of 2600 MW of reductions in the amount of UCAP accepted from other offers, including:
    - 2400 MW reduction in ROS NR/NS UCAP offers accepted.
    - 132 MW reduction in LHV NR/NS UCAP offers accepted.
    - 68 MW reduction in NYC OSW UCAP offers accepted.
  - Therefore, a total of 38,780 MW of UCAP offers are accepted, just as in Example 1.
    - The price on the NYCA demand curve that corresponds to that amount of UCAP also remains $1/kW-mo.

Price of LHV NR/NS UCAP in Example 2

- Similarly, the offer of 7000 MW of LHV NR/NS UCAP at $5/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for LHV NR/NS UCAP.
  - Together with the other accepted offers, a total of 15,400 MW of UCAP offers in G-J are accepted, as in Example 1.
  - The price on the G-J demand curve that corresponds to that amount of UCAP also remains $5/kW-mo.

Prices of NYC and LI NR/NS UCAP in Example 2

- The NYC demand curve sets the price of NYC NR/NS UCAP.
  - A total of 9435 MW of NYC UCAP offers are accepted.
    - This is more than in Example 1, as the 200 MW of new NYC storage offers accepted exceeded the 68 MW decrease in NYC OSW offers accepted.
  - The price on the NYC demand curve that corresponds to that amount of UCAP is $16.10/kW-mo., which is lower than in Example 1.
- The LI demand curve sets the price of LI NR/NS UCAP.
  - A total of 5600 MW of LI UCAP offers are accepted, as in Example 1.
  - The price on the LI demand curve that corresponds to that amount of UCAP remains $6/kW-mo.
- Thus, the difference between the prices of NYC and LI NR/NS UCAP is now $16.10/kW-mo. – $6/kW-mo. = $10.10/kW-mo.
- To be efficient, the difference between the prices of other types of capacity provided in NYC and on LI must also be $10.10/kW-mo.

Price of Renewable Non-OSW UCAP in Example 2

- The renewables demand curve sets the price of ROS renewable non-OSW UCAP.
- A total of 10,235 MW of renewable UCAP offers are accepted.
  - This is less than in Example 1 due to the 68 MW reduction in NYC OSW UCAP offers accepted.
  - The price on the renewables demand curve corresponding to the total amount of renewable UCAP supplied is $8.83/kW-mo., so the price of ROS renewable non-OSW UCAP is $8.83/kW-mo.
  - Since the price of ROS NR/NS UCAP is $1/kW-mo., the ***adder*** for renewable non-OSW UCAP is now $8.83/kW-mo. – $1/kW-mo. = $7.83/kW-mo.
- The price of renewable non-OSW UCAP in the LHV, NYC and LI is then determined by adding $7.83/kW-mo., the adder for renewable non-OSW UCAP, to the price of NR/NS UCAP at each of those locations. This yields the following prices:

	ROS	LHV	NYC	LI
Renewable Non-OSW	$ 8.83	$ 12.83	$ 23.93	$ 13.83

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Price of OSW UCAP in Example 2

- The OSW demand curve sets the price of LI OSW UCAP.
- A total of 2235 MW of OSW UCAP offers are accepted.
  - Again, this is less than in Example 1 due to the 68 MW reduction in NYC OSW UCAP offers accepted.
  - The price on the OSW demand curve corresponding to the total amount of OSW UCAP supplied is $19.90/kW-mo., so the price of LI OSW UCAP is $19.90/kW-mo.
  - Since the price of LI NR/NS UCAP is $6/kW-mo., the ***adder*** for OSW UCAP is now $19.90/kW-mo. – $6/kW-mo. = $13.90/kW-mo.
- The price of OSW UCAP in ROS, the LHV and NYC is then determined by adding $13.90/kW-mo., the adder for OSW UCAP, to the price of NR/NS UCAP at each of those locations. This yields the following prices:

	ROS	LHV	NYC	LI
OSW	$ 14.90	$ 18.90	$ 30.00	$ 19.90

Price of Storage UCAP in Example 2

- The storage demand curve sets the price of ROS storage UCAP.
- A total of 2600 MW of storage UCAP offers are accepted.
  - The price on the storage demand curve corresponding to the total amount of storage UCAP supplied is $11.76/kW-mo., so the price of ROS storage UCAP is $11.76/kW-mo.
  - Since the price of ROS non-renewable UCAP is $1/kW-mo., the ***adder*** for storage UCAP is $11.76/kW-mo. – $1/kW-mo. = $10.76/kW-mo.
- The price of storage UCAP in the LHV, NYC and LI is then determined by adding $10.76/kW-mo., the adder for storage UCAP, to the price of NR/NS UCAP at each of those locations. This yields the following prices:

	ROS	LHV	NYC	LI
Storage	$ 11.76	$ 15.76	$ 26.86	$ 16.76

Other Requirements

- Demand curves like the storage demand curve could be added to reflect other requirements that may be necessary to meet climate public policy objectives.
  - For example, while the CLCPA does not impose an explicit requirement for flexible resources, it will be necessary to add significant amounts of flexible resources to balance volatility in output by other CLCPA-mandated resources.
  - While modifications to ancillary services markets should provide additional incentives for the development of flexible resources, that may not be sufficient.

Other Requirements (cont.)

- The Reliability Gap Analysis (Appendix B of the Grid in Transition report) suggests that resources with greater ramp capability would contribute more to meeting reliability requirements.
- If so, resources that can ramp quickly should receive additional capacity revenue that would reflect their impact on reliability.
- This could be done in two ways:
  - Permitting those resources to provide more UCAP, reflecting their marginal contribution to reliability more accurately.
  - Defining a specific market requirement, and adding an associated demand curve, for such resources.

Example 3

Demand Curve is Based on the Net Cost of Developing a Storage Resource

MRPs for Example 3

- In the future, ICAP demand curves may be based upon the net cost of developing policy resources.
- This example will assume that the UCAP demand curve for the NYCA is based on the net cost of developing a storage resource in ROS.
  - Consequently, the MRPs for both the storage demand curve and the NYCA demand curve, each of which reflects the net cost of developing a storage resource in ROS, are $10/kW-mo.
  - The other MRPs remain the same as in Examples 1 and 2:
    - The G-J, NYC and LI MRPs continue to reflect the net cost of developing NR/NS resources in the LHV, NYC and LI, respectively.
    - The renewables and OSW MRPs continue to reflect the net cost of developing a renewable resource in ROS and an OSW resource that interconnects on Long Island, respectively.
  - Again, these values were assumed for the purpose of this example, and don't reflect estimates of actual costs.

	NYCA	G-J	NYC	LI	Ren.	OSW	Storage
Monthly Reference Price ($/kW-mo.)	$ 10.00	$ 15.00	$ 22.00	$ 18.00	$ 20.00	$ 26.00	$ 10.00

Other Assumptions for Example 3

- The UCAP requirements and the ZCPs in Example 3 are identical to those assumed for Example 2.

	NYCA	G-J	NYC	LI	Ren.	OSW	Storage
Minimum UCAP Reqt. (MW)	35,000	14,000	9,000	5,000	8,000	2,000	2,500
Zero-Crossing Point (% of Min. Reqt.)	112%	115%	118%	118%	150%	150%	125%

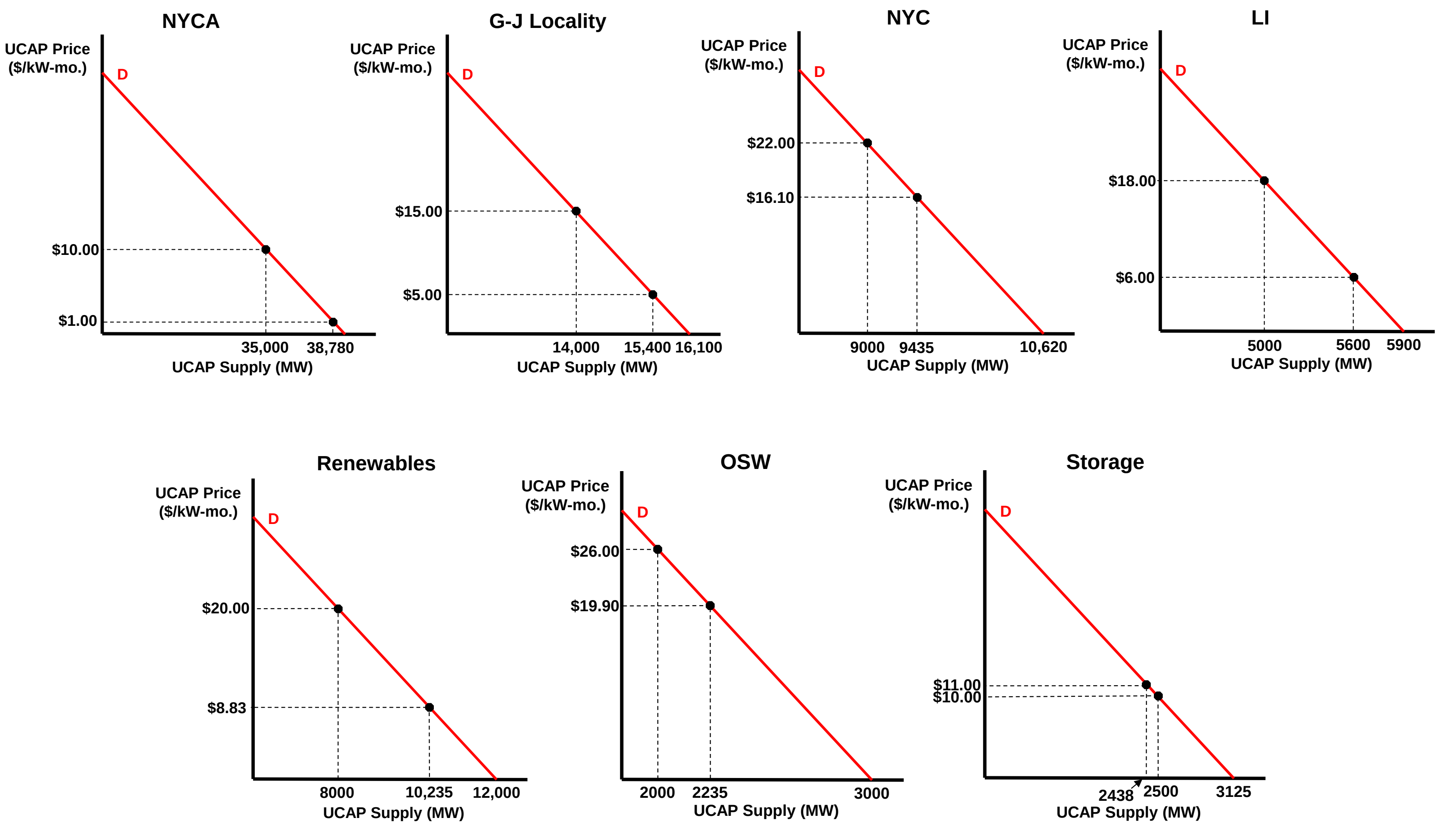
Offers for Example 3

- The offers submitted in this example are also identical to those submitted in Example 2. The amount of each offer that is accepted are shown below. Offers on the margin are highlighted.

Offer Quantity (MW)	Offer Price ($/kW-mo.)	Location	Renewable?	OSW?	Storage?	Accepted Offers (MW)
10,000	1.00	ROS	N	N	N	7,543
8,000	8.00	ROS	Y	N	N	8,000
2,400	11.00	ROS	N	N	Y	2,238
7,000	5.00	LHV	N	N	N	5,965
1,500	16.00	LHV	Y	N	N	-
7,000	12.00	NYC	N	N	N	7,000
3,000	30.00	NYC	Y	Y	N	2,235
200	24.00	NYC	N	N	Y	200
5,600	4.00	LI	N	N	N	5,600
2,000	25.00	LI	Y	Y	N	-

- The offers accepted provide:
  - 38,780 MW of UCAP to meet the NYCA requirement (as in Example 2).
  - 15,400 MW of UCAP to meet the G-J requirement (as in Example 2).
  - 9435 MW of UCAP to meet the NYC requirement (as in Example 2).
  - 5600 MW of UCAP to meet the LI requirement (as in Example 2).
  - 10,235 MW of UCAP to meet the renewables requirement (as in Example 2).
  - 2235 MW of UCAP to meet the OSW requirement (as in Example 2).
  - 2438 MW of UCAP to meet the storage requirement.
- The next slide shows the price on each demand curve that corresponds to the total amount of accepted UCAP offers counting towards each requirement.

Prices on Demand Curves for Example 3



ATLANTIC ECONOMICS

Price of ROS NR/NS UCAP in Example 3

- There are once more 16 different prices to calculate in this example:
  - NR/NS UCAP in ROS, LHV, NYC and LI.
  - Renewable non-OSW UCAP in ROS, LHV, NYC and LI.
  - OSW UCAP in ROS, LHV, NYC and LI.
  - Storage UCAP in ROS, LHV, NYC and LI.
- The offer of 10,000 MW of ROS NR/NS UCAP at $1/kW-mo. remains on the margin, so it still sets the price for ROS NR/NS UCAP, as in Examples 1 and 2.
  - Offers for only 2438 MW of storage UCAP (including 200 MW in NYC) were accepted, 162 MW less than in Example 2.
  - This reduction in offers accepted was offset by the acceptance of an additional 162 MW of ROS NR/NS UCAP offers.
  - Therefore, a total of 38,780 MW of UCAP offers are accepted, just as in Examples 1 and 2.
    - The price on the NYCA demand curve that corresponds to that amount of UCAP also remains $1/kW-mo.

Price of LHV NR/NS UCAP in Example 3

- Similarly, the offer of 7000 MW of LHV NR/NS UCAP at $5/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for LHV NR/NS UCAP.
  - Together with the other accepted offers, a total of 15,400 MW of UCAP offers in G-J are accepted, as in Examples 1 and 2.
  - The price on the G-J demand curve that corresponds to that amount of UCAP also remains $5/kW-mo., as in Examples 1 and 2.

Prices of NYC and LI NR/NS UCAP in Example 3

- The NYC demand curve sets the price of NYC NR/NS UCAP.
  - A total of 9435 MW of NYC UCAP offers are accepted.
    - This is the same amount as in Example 2.
  - The price on the NYC demand curve that corresponds to that amount of UCAP remains $16.10/kW-mo., as in Example 2.
- The LI demand curve sets the price of LI NR/NS UCAP.
  - A total of 5600 MW of LI UCAP offers are accepted, as in Examples 1 and 2.
  - The price on the LI demand curve that corresponds to that amount of UCAP remains $6/kW-mo., as in Example 2.
- Thus, the difference between the prices of NYC and LI NR/NS UCAP remains $16.10/kW-mo. – $6/kW-mo. = $10.10/kW-mo.
  - To be efficient, the difference between the prices of other types of capacity provided in NYC and on LI must be $10.10/kW-mo., as in Example 2.

Price of Renewable Non-OSW UCAP in Example 3

- The renewables demand curve sets the price of ROS renewable non-OSW UCAP.
- A total of 10,235 MW of renewable UCAP offers are accepted, as in Example 2.
  - The price on the renewables demand curve corresponding to the total amount of renewable UCAP supplied remains $8.83/kW-mo., so the price of ROS renewable non-OSW UCAP also remains $8.83/kW-mo.
  - Since the price of ROS NR/NS UCAP is $1/kW-mo., the ***adder*** for renewable non-OSW UCAP remains $8.83/kW-mo. – $1/kW-mo. = $7.83/kW-mo.
- The price of renewable non-OSW UCAP in the LHV, NYC and LI is then determined by adding $7.83/kW-mo. to the price of NR/NS UCAP at each of those locations, yielding the following prices (which are the same as in Example 2):

	ROS	LHV	NYC	LI
Renewable Non-OSW	$ 8.83	$ 12.83	$ 23.93	$ 13.83

Price of OSW UCAP in Example 3

- The OSW demand curve sets the price of LI OSW UCAP.
- A total of 2235 MW of OSW UCAP offers are accepted, as in Example 2.
  - The price on the OSW demand curve corresponding to the total amount of OSW UCAP supplied remains $19.90/kW-mo., so the price of LI OSW UCAP also remains $19.90/kW-mo.
  - Since the price of LI NR/NS UCAP is $6/kW-mo., the ***adder*** for OSW UCAP remains $19.90/kW-mo. – $6/kW-mo. = $13.90/kW-mo.
- The price of OSW UCAP in ROS, the LHV and NYC is then determined by adding $13.90/kW-mo. to the price of NR/NS UCAP at each of those locations. This yields the following prices (which are the same as in Example 2):

	ROS	LHV	NYC	LI
OSW	$ 14.90	$ 18.90	$ 30.00	$ 19.90

Price of Storage UCAP in Example 3

- The offer of 2400 MW of ROS storage UCAP at $11/kW-mo. is on the margin (as it's only partly accepted), so it sets the price for ROS storage UCAP.
- The offer for ROS storage UCAP was fully accepted in Example 2, but the reduction in the net cost of developing a storage resource in ROS has lowered the storage demand curve.
  - As a result, accepting all 2400 MW of ROS storage UCAP that was offered, plus another 200 MW of NYC storage UCAP, would drive the price on the storage demand curve down to $8.40/kW-mo.
  - That is less than the $11/kW-mo. offer price for the ROS storage UCAP, so only some of that UCAP can be purchased.
  - It can be purchased up to the point where the total amount of storage UCAP purchased is 2438 MW, since the price that corresponds to that quantity on the storage demand curve is $11/kW-mo.
- Since the price of ROS non-renewable UCAP is $1/kW-mo., the ***adder*** for storage UCAP is now $11/kW-mo. – $1/kW-mo. = $10/kW-mo.
  - The price of storage UCAP in the LHV, NYC and LI is then determined by adding $10/kW-mo. to the price of NR/NS UCAP at each of those locations, yielding the following prices:

	ROS	LHV	NYC	LI
Storage	$ 11.00	$ 15.00	$ 26.10	$ 16.00

Price of Storage UCAP in Example 3 (cont.)

- Even though the ICAP demand curve for the NYCA is based on the net cost of entry for a storage resource, the price for storage UCAP exceeds the price of NR/NS UCAP.
  - While there is an excess of NR/NS UCAP, the amount of storage UCAP that is supplied is close to the storage UCAP requirement.
  - As a result, the price of storage UCAP must be higher, to support entry of storage.

	ROS	LHV	NYC	LI
Non-Renewable, Non-Storage	$ 1.00	$ 5.00	$ 16.10	$ 6.00
Storage	$ 11.00	$ 15.00	$ 26.10	$ 16.00

Cost Allocation and Price Decomposition

- Blended pricing makes it easy:
  - To separate the share of capacity costs associated with meeting locational requirements from the share of costs associated with meeting policy resource requirements, and
  - To use different procedures to allocate different portions of these costs to LSEs.
- The price paid to UCAP providers can be decomposed into:
  - The price of ROS NR/NS UCAP,
  - The price of meeting each locational requirement, and
  - The price of meeting each policy resource requirement.
- There are no interactions between locational and policy components.
  - For example, the impact of meeting the renewables requirement on the price of UCAP is not affected by the impact of meeting the LI requirement on the price of UCAP.

Bucket 1: No Locational or Policy Costs

- This table shows that suppliers would receive $351.1 million per month in ICAP payments in this example, if all capacity is sold in the spot market. These payments can be divided into seven different buckets.
  - The first bucket contains the portion of the amount paid to each ICAP supplier that consists of the ROS NR/NS price, $1/kW-mo.
  - Since a total of 38,780 MW of UCAP were purchased, 38,780 MW × $1/kW-mo. = $38.8 million goes into this bucket.

Payments to Generators	ROS	LHV	NYC	LI	Total
Non-Renewable, Non-Storage					
UCAP Supply (MW)	7,543	5,965	7,000	5,600	26,108
UCAP Price ($/kW-mo.)	$ 1.00	$ 5.00	$ 16.10	$ 6.00	
UCAP Payment ($000)	**$ 7,543**	**$ 29,827**	**$ 112,690**	**$ 33,600**	**$ 183,660**
Renewable Non-OSW					
UCAP Supply (MW)	8,000	-	-	-	8,000
UCAP Price ($/kW-mo.)	$ 8.83	$ 12.83	$ 23.93	$ 13.83	
UCAP Payment ($000)	**$ 70,618**	**$ -**	**$ -**	**$ -**	**$ 70,618**
OSW					
UCAP Supply (MW)	-	-	2,235	-	2,235
UCAP Price ($/kW-mo.)	$ 14.90	$ 18.90	$ 30.00	$ 19.90	
UCAP Payment ($000)	**$ -**	**$ -**	**$ 67,037**	**$ -**	**$ 67,037**
Storage					
UCAP Supply (MW)	2,238	-	200	-	2,438
UCAP Price ($/kW-mo.)	$ 11.00	$ 15.00	$ 26.10	$ 16.00	
UCAP Payment ($000)	**$ 24,613**	**$ -**	**$ 5,220**	**$ -**	**$ 29,832**
Totals					
UCAP Supply (MW)	**17,780**	**5,965**	**9,435**	**5,600**	**38,780**
UCAP Payment ($000)	**$ 102,773**	**$ 29,827**	**$ 184,946**	**$ 33,600**	**$ 351,146**

Buckets 2-4: Cost to Meet Locational Requirements

- The next three buckets contain the premiums that were paid to obtain capacity counting towards locational requirements.
  - Bucket 2 (additional cost to meet the G-J requirement):
    - A total of 15,400 MW of UCAP is purchased from resources in the G-J Locality (some in the LHV, some in NYC).
    - The price of LHV UCAP is $4/kW-mo. above the price of ROS UCAP (for each type of capacity).
    - Therefore, 15,400 MW × $4/kW-mo. = $61.6 million goes into this bucket.
  - Bucket 3 (additional cost to meet the NYC requirement):
    - A total of 9435 MW of UCAP is purchased from resources in NYC.
    - The price of NYC UCAP is $11.10/kW-mo. above the price of LHV UCAP (for each type of capacity).
    - Therefore, 9435 MW × $11.10/kW-mo. = $104.7 million goes into this bucket.
  - Bucket 4 (additional cost to meet the LI requirement):
    - A total of 5600 MW of UCAP is purchased from resources in NYC.
    - The price of LI UCAP is $5/kW-mo. above the price of ROS UCAP (for each type of capacity).
    - Therefore, 5600 MW × $5/kW-mo. = $28 million goes into this bucket.

Buckets 5-7: Cost to Meet Policy Requirements

- The last three buckets contain the premiums that were paid to obtain capacity counting towards policy resource requirements.
  - Bucket 5 (additional cost to meet the renewables requirement):
    - A total of 10,235 MW of UCAP is purchased from renewable resources (including both OSW and non-OSW renewables).
    - The price of renewable non-OSW UCAP is $7.83/kW-mo. above the price of NR/NS UCAP (at each location).
    - Therefore, 10,235 MW × $7.83/kW-mo. = $80.1 million goes into this bucket.
  - Bucket 6 (additional cost to meet the OSW requirement):
    - A total of 2235 MW of UCAP is purchased from OSW resources.
    - The price of OSW UCAP is $6.07/kW-mo. above the price of renewable non-OSW UCAP (at each location).
    - Therefore, 2235 MW × $6.07/kW-mo. = $13.6 million goes into this bucket.
  - Bucket 7 (additional cost to meet the storage requirement):
    - A total of 2438 MW of UCAP is purchased from storage resources.
    - The price of storage UCAP is $10/kW-mo. above the price of NR/NS UCAP (at each location).
    - Therefore, 2438 MW × $10/kW-mo. = $24.4 million goes into this bucket.

Allocation Mechanisms

- Each of these buckets can be allocated to LSEs in whatever manner policymakers deem fit.
- For example, the table on the next page uses the current procedure to allocate costs associated with locational requirements:
  - Costs in Bucket 2, which are incurred to meet the requirement for the G-J Locality, are allocated proportionally to load throughout that Locality.
  - Costs in Bucket 3, which are incurred to meet the NYC requirement, are allocated proportionally to load in NYC.
  - Costs in Bucket 4, which are incurred to meet the LI requirement, are allocated proportionally to load in LI.
- It allocates costs in the other four buckets—including the costs of meeting all policy resource requirements—proportionally to all load statewide.

Illustrative Cost Allocation

Payments by LSEs	ROS	LHV	NYC	LI	Total
Peak Load Forecast (MW)	11,000	5,000	11,000	5,000	32,000
Bucket 1: **All UCAP @ ROS NR/NS Price ($000)**	**$ 13,331**	**$ 6,059**	**$ 13,331**	**$ 6,059**	**$ 38,780**
Additional Costs of Meeting Locational Requirements					
Bucket 2: G-J UCAP × (LHV Price – ROS Price) ($000)	$ -	$ 19,250	$ 42,350	$ -	$ 61,600
Bucket 3: NYC UCAP × (NYC Price – LHV Price) ($000)	$ -	$ -	$ 104,710	$ -	$ 104,710
Bucket 4: LI UCAP × (LI Price – ROS Price) ($000)	$ -	$ -	$ -	$ 28,000	$ 28,000
Allocation of Locational UCAP Costs ($000)	**$ -**	**$ 19,250**	**$ 147,060**	**$ 28,000**	**$ 194,310**
Additional Costs of Meeting Policy Requirements					
Bucket 5: Ren. UCAP × (Ren. Non-OSW Pr. – NR/NS Pr.) ($000)	$ 27,537	$ 12,517	$ 27,537	$ 12,517	$ 80,108
Bucket 6: OSW UCAP × (OSW Pr. – Ren. Non-OSW Pr.) ($000)	$ 4,666	$ 2,121	$ 4,666	$ 2,121	$ 13,573
Bucket 7: Storage UCAP × (Storage Pr. – NR/NS Pr.) ($000)	$ 8,379	$ 3,809	$ 8,379	$ 3,809	$ 24,375
Allocation of Policy UCAP Costs ($000)	**$ 40,582**	**$ 18,446**	**$ 40,582**	**$ 18,446**	**$ 118,056**
Total UCAP Cost Allocation ($000)	**$ 53,912**	**$ 43,756**	**$ 200,973**	**$ 52,506**	**$ 351,146**
Average Cost of UCAP ($/kW-mo.)	$ 4.04	$ 7.22	$ 15.08	$ 8.67	$ 9.05

Costs have been allocated based on shares of peak load forecast. Forecasts are similar to current forecasts for each region.