



February 26, 2021

**VIA ELECTRONIC FILING**

The Honorable Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426

**Re: ISO New England Inc., Docket No. ER21-\_\_\_\_-000**  
**Forward Capacity Auction Results Filing**  
**April 12, 2021 COMMENT DATE REQUIRED BY REGULATION**

Dear Secretary Bose:

Pursuant to Section 205 of the Federal Power Act (“FPA”)<sup>1</sup> and Section III.13.8.2 of the ISO New England Transmission, Markets and Services Tariff (the “Tariff”),<sup>2</sup> ISO New England Inc. (the “ISO”) submits this Forward Capacity Auction Results Filing (“FCA Results Filing”) for the fifteenth Forward Capacity Auction (“FCA”).<sup>3</sup> Section III.13.8.2 (a) of the Tariff requires the ISO to file the results of the FCA with the Federal Energy Regulatory Commission (“Commission” or “FERC”) as soon as practicable after the FCA is complete. The fifteenth FCA was held on February 8, 2021 for the June 1, 2024 through May 31, 2025 Capacity Commitment Period. The ISO submits this filing in accordance with the Tariff.

Pursuant to Section III.13.8.2 (c) of the Tariff, any objection to the FCA results must be filed with the Commission within 45 days from the date of the FCA Results Filing. **Accordingly, any objections must be filed on or before April 12, 2021, and the ISO requests that the Commission issue a notice setting an April 12, 2021 comment date.** As discussed below, the ISO requests an effective date of June 26, 2021, which is 120 days from the date of this submission.

In accordance with Section III.13.8.2 of the Tariff, this submission contains the results of the fifteenth FCA, including the Capacity Zones in the auction; the Capacity Clearing Price in each of those Capacity Zones; a list of which resources received Capacity Supply Obligations in each Capacity Zone; and the amount of those Capacity Supply

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<sup>1</sup> 16 U.S.C. § 824d.

<sup>2</sup> The rules governing the Forward Capacity Market (“FCM Rules”) are primarily contained in Section III.13 of the Tariff, but also may include other provisions, including portions of Section III.12.

<sup>3</sup> Capitalized terms used but not defined in this filing are intended to have the meaning given to such terms in the Tariff.

Obligations.<sup>4</sup> Pursuant to Section III.12.4 of the Tariff, the Capacity Zones for the fifteenth FCA were the Southeast New England Capacity Zone (“SENE”), the Northern New England Capacity Zone (“NNE”), the Maine Capacity Zone (“Maine”) and the Rest-of-Pool (“ROP”) Capacity Zone. The SENE Capacity Zone included the Southeastern Massachusetts, Rhode Island and Northeastern Massachusetts/Boston energy load zones. The SENE Capacity Zone was modeled as an import-constrained Capacity Zone. The NNE Capacity Zone included the New Hampshire, Vermont, and Maine Load Zones. NNE was modeled as an export-constrained Capacity Zone. The Maine Load Zone was modeled as a separate nested export-constrained Capacity Zone within NNE. The ROP Capacity Zone included the Connecticut and Western/Central Massachusetts Load Zones.

Section III.13.8.2 (b) of the Tariff requires the ISO to provide documentation regarding the competitiveness of the FCA. The documentation may include certification from the auctioneer and the ISO that: (i) all resources offering and bidding in the FCA were properly qualified in accordance with the provisions of Section III.13.1; and (ii) the FCA was conducted in accordance with the provisions of Section III.13. To meet the requirement of Section III.13.8.2 (b) of the Tariff, the ISO has included the Testimony of Robert G. Ethier, Vice President of System Planning at the ISO (“Ethier Testimony”); the Testimony of Alan McBride, Director of Transmission Services and Resource Qualification at the ISO (“McBride Testimony”); and the Testimony of Lawrence M. Ausubel, the auctioneer (“Ausubel Testimony”).

The ISO tenders the instant filing in compliance with Section III.13.8.2 of its Tariff pursuant to Section 205 of the FPA, and the ISO requests that the Commission find that the ISO conducted the fifteenth FCA in accordance with its FERC-approved Tariff.

## **I. COMMUNICATIONS**

All correspondence and communications in this proceeding should be addressed to the undersigned as follows:

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<sup>4</sup> Section III.13.8.2 of the Tariff requires the ISO to include in the FCA Results Filing the substitution auction clearing prices and the total amount of payments associated with any demand bids cleared at a substitution auction clearing price above their demand bid prices. However, as explained below and in the Ethier Testimony, the substitution auction was not conducted in the fifteenth FCA because there were no active demand bids. For that reason, this FCA Results Filing does not include substitution auction clearing prices or total amount of payments associated with any demand bids cleared at a substitution auction clearing price above their demand bid prices.

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## **II. STANDARD OF REVIEW**

The ISO tenders the instant filing in compliance with Section III.13.8.2 of its Tariff and pursuant to Section 205 of the FPA.<sup>5</sup> The ISO respectfully requests that the Commission find that the fifteenth FCA Results Filing meets the standard of Section 205, in that the results are just and reasonable rates derived from the auction that was conducted in accordance with the ISO's FERC-approved Tariff.

## **III. REQUESTED EFFECTIVE DATE**

The ISO respectfully requests that the Commission accept the fifteenth FCA Results Filing, confirming that the auction was conducted in conformance with the ISO's Commission-approved Tariff, to be effective June 26, 2021, which is 120 days after the date of submission. Under the Tariff, parties have 45 days to file with the Commission an objection to the FCA Results Filing.<sup>6</sup> An effective date of 120 days from the date of submission gives interested parties an opportunity to respond to any objections and provides the Commission time to review the FCA Results Filing and associated pleadings.

## **IV. SPECIFIC FCA RESULTS**

### **A. Capacity Zones Resulting from the Auction**

Section III.13.8.2 (a) of the Tariff requires the ISO to provide the Capacity Zones resulting from the FCA. The Capacity Zones for the fifteenth FCA were SENE, NNE, Maine, and ROP. The Capacity Zones determined under Section III.13.2.3.4 of the Tariff are the same Capacity Zones that were modeled pursuant to Section III.12.4 of the Tariff.

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<sup>5</sup> It should be noted that the Commission has consistently held that the matters that may properly be in dispute in the annual FCA results filing are the results of the FCA and not the underlying market design or rules. *See, e.g., ISO New England Inc.*, 130 FERC ¶ 61,145 at P 33 (2010) (finding that challenges to the Forward Capacity Market ("FCM") market design are outside the scope of the proceeding evaluating the FCA results filing).

<sup>6</sup> Tariff Section III.13.8.2 (c).

## **B. Capacity Clearing Prices**

The Tariff requires the ISO to provide the Capacity Clearing Price in each Capacity Zone (and, pursuant to Section III.13.2.3.3 (d), the Capacity Clearing Price associated with certain imports, if applicable).<sup>7</sup> For the fifteenth FCA, the descending clock auction starting price in each Capacity Zone was \$13.932/kW-month. As explained in the Ethier Testimony, the auction resulted in the Capacity Clearing Price of \$3.980/kW-month for the SENE Capacity Zone, \$2.477/kW-month for NNE and Maine Capacity Zones, and \$2.611/kW-month for the ROP Capacity Zone.<sup>8</sup>

Imports over the New York AC Ties external interface, totaling 684.059 MW, imports over the Hydro-Quebec Highgate external interface, totaling 60.000 MW, imports over the New Brunswick external interface, totaling 226.000 MW, and imports over the Phase I/II HQ Excess external interface, totaling 517.000 MW, will also receive a Capacity Clearing Price. The New York AC Ties and Phase I/II HQ Excess will receive \$2.611/kW-month. Hydro-Quebec Highgate and New Brunswick will receive \$2.477/kw-month.

## **C. Substitution Auction Clearing Prices and Total Amount of Payments Associated with any Demand Bids Cleared at a Substitution Auction Clearing Price Above Their Demand Bid Prices**

Section III.13.8.2 (a) of the Tariff requires the ISO to provide the clearing prices and total amount of payments associated with any demand bids cleared at the substitution auction clearing price above their demand bid prices. In the fifteenth FCA, there were no active demand bids for the substitution auction and, accordingly, the substitution auction was not conducted.

## **D. Capacity Supply Obligations**

The Tariff requires the ISO to specify in the FCA Results Filing the resources that received Capacity Supply Obligations in each Capacity Zone.<sup>9</sup> This information is provided in Attachment A.

The Tariff also requires the ISO to list which resources cleared as Conditional Qualified New Generating Capacity Resources and to provide certain information relating to Long Lead Time Facilities.<sup>10</sup> No resources cleared as Conditional Qualified New Generating Capacity Resources in the fifteenth FCA. In addition, there were no Long Lead Time Facilities that secured a Queue

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<sup>7</sup> Tariff Section III.13.8.2 (a).

<sup>8</sup> Ethier Testimony at 8-13.

<sup>9</sup> Tariff Section III.13.8.2 (a).

<sup>10</sup> *Id.*

Position to participate as a New Generating Capacity Resource in the fifteenth FCA; as such, there were no resources with a lower queue priority that were selected in the FCA subject to a Long Lead Time Facility with a higher queue priority.

#### **E. De-List Bids Reviewed for Reliability Purposes**

Prior to the fifteenth FCA, pursuant to Section III.13.2.5.2.5 of the Tariff, the ISO reviewed each submitted Retirement De-List Bid, Permanent De-List Bid, and Static De-List Bid<sup>11</sup> to determine if the capacity associated with each such bid was needed for reliability reasons. During the FCA, also pursuant to Section III.13.2.5.2.5, the ISO reviewed a sufficient quantity of Dynamic De-List Bids associated with reaching the Capacity Clearing Price to determine if the capacity associated with each such bid was needed for reliability reasons. The capacity is deemed to be needed for reliability reasons if a violation of any North American Electric Reliability Corporation, Northeast Power Coordinating Council, or ISO criteria would occur in the absence of the capacity. The ISO's review of de-list bids considered the availability of all existing supply resources in the FCM, including Demand Capacity Resources. The ISO's process for performing the reliability review of de-list bids pursuant to Section III.13.2.5.2.5 of the Tariff is described in that provision, and in Section 7 of ISO New England Planning Procedure No. 10 — Planning Procedure to Support the Forward Capacity Market.

Section III.13.8.2 (a) of the Tariff requires that, in the FCA Results Filing, the ISO enumerate de-list bids rejected for reliability reasons pursuant to Section III.13.2.5.2.5, and the reasons for those rejections. As explained in the McBride Testimony, in the fifteenth FCA, the ISO did not reject any bids for reliability reasons pursuant to Section III.13.2.5.2.5 of the Tariff.

#### **V. DOCUMENTATION REQUIRED PURSUANT TO SECTION III.13.8.2 (b) OF THE TARIFF**

Section III.13.8.2 (b) of the Tariff requires the ISO to provide documentation regarding the competitiveness of the FCA, and states that the documentation may include certification from the auctioneer and the ISO that: (i) all resources offering and bidding in the FCA were properly qualified in accordance with the provisions of Section III.13.1 of the Tariff; and (ii) the FCA was conducted in accordance with the provisions of Section III.13 of the Tariff. In this regard, the ISO has included the Ethier Testimony, the McBride Testimony, and the Ausubel Testimony.

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<sup>11</sup> No Export De-List Bids or Administrative Export De-List Bids were submitted for the fifteenth FCA.

In his testimony, Dr. Ethier certifies that all resources offering and bidding in the fifteenth FCA were qualified in accordance with Section III.13.1 of the Tariff.<sup>12</sup> Dr. Ethier also explains the prices resulting from the auction and how the prices were determined.<sup>13</sup>

In his testimony, Mr. McBride testifies that he oversaw the reliability review of de-list bids for the fifteenth FCA pursuant to Section III.13.2.5.2.5 of the Tariff.

Dr. Ausubel, the auctioneer, and chairman and founder of Power Auctions LLC, the company that helped implement and administer the FCA, certifies that the auction was conducted in accordance with Section III.13.2 of the Tariff.<sup>14</sup> Dr. Ausubel's certification is based on his vast experience in conducting energy auctions.

## **VI. ADDITIONAL SUPPORTING INFORMATION**

The ISO tenders the instant filing in compliance with Section III.13.8.2 of its Tariff pursuant to Section 205 of the FPA.<sup>15</sup> Section 35.13 of the Commission's regulations generally requires public utilities to file certain cost and other information related to an examination of cost-of-service rates.<sup>16</sup> However, the results of the FCA are not traditional "rates" and the ISO is not a traditional investor-owned utility. Therefore, to the extent necessary, the ISO requests waiver of Section 35.13 of the Commission's regulations. Notwithstanding its request for waiver, the ISO submits the following additional information in compliance with the identified filing regulations of the Commission applicable to Section 205.

35.13(b)(1) - Materials included herewith are as follows:

- This transmittal letter;
- Attachment A: List of Capacity Supply Obligations;
- Attachment B: Testimony of Robert G. Ethier;

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<sup>12</sup> Ethier Testimony at 2.

<sup>13</sup> *Id.* at 8-13.

<sup>14</sup> Ausubel Testimony at 4.

<sup>15</sup> As noted above, the Commission has consistently held that the scope of the proceeding evaluating the annual FCA results filing is limited to the results of the FCA. *See e.g., ISO New England Inc.*, 130 FERC ¶ 61,145 at P 33 (2010) (finding that challenges to the FCM market design are outside the scope of the proceeding evaluating the FCA results filing).

<sup>16</sup> 18 C.F.R. § 35.13 (2020).

- Attachment C: Testimony of Alan McBride;
- Attachment D: Testimony of Lawrence M. Ausubel; and
- Attachment E: List of governors and utility regulatory agencies in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont to which a copy of this filing has been mailed.

35.13(b)(2) - The ISO respectfully requests that the Commission accept this filing to become effective on June 26, 2021, which is 120 days after the submission of this FCA Results Filing.

35.13(b)(3) - Pursuant to Section 17.11 (e) of the Participants Agreement, Governance Participants are being served electronically rather than by paper copy. The names and addresses of the Governance Participants are posted on the ISO's website at <https://www.iso-ne.com/participate/participant-asset-listings/directory?id=1&type=committee>. An electronic copy of this transmittal letter and the accompanying materials have also been emailed to the governors and electric utility regulatory agencies for the six New England states which comprise the New England Control Area, and to the New England Conference of Public Utility Commissioners, Inc. The names and addresses of these governors and regulatory agencies are shown in Attachment E.

35.13(b)(4) - A description of the materials submitted pursuant to this filing is contained in the transmittal letter;

35.13(b)(5) - The reasons for this filing are discussed in this transmittal letter; and

35.13 (b)(7) - The ISO has no knowledge of any relevant expenses or cost of service that have been alleged or judged in any administrative or judicial proceeding to be illegal, duplicative, or unnecessary costs that are demonstrably the product of discriminatory employment practices.

## VII. CONCLUSION

In this FCA Results Filing, the ISO has presented all of the information required by the Tariff. The ISO has demonstrated that the fifteenth FCA was conducted in accordance with the Tariff, as found just and reasonable by the Commission. The ISO has specified the Capacity Zones that were used in the auction. The ISO has also provided the Capacity Clearing Price for each of the Capacity Zones and external interfaces, and it has provided a list of resources that received Capacity Supply Obligations. Finally, the ISO has provided documentation, in the form of testimony, regarding the outcome of the fifteenth FCA. Accordingly, the ISO requests that the Commission accept the results of the fifteenth FCA within 120 days of this filing.

Respectfully submitted,

By: /s/ Margoth Caley

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cc: Governance Participants (electronically) and entities listed in Attachment E.



## Attachment A

















ID	Name	Type	Capacity Zone ID	Capacity Zone Name	State	Load Zone	Status	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25
12451	NYPA - VT	Import	8500	Rest-of-Pool			Existing	14	14	14	14	14	14	14	14	14	14	14	14
12500	Thomas A.	Generator	8506	Southeast	MA	SEMA	Existing	105.2	105.2	105.2	105.2	105.2	105.2	105.2	105.2	105.2	105.2	105.2	105.2
12504	Devon 15-	Generator	8500	Rest-of-Pool	CT	CT	Existing	187.589	187.589	187.589	187.589	187.589	187.589	187.589	187.589	187.589	187.589	187.589	187.589
12505	Middletow	Generator	8500	Rest-of-Pool	CT	CT	Existing	187.6	187.6	187.6	187.6	187.6	187.6	187.6	187.6	187.6	187.6	187.6	187.6
12509	UNH Powe	Generator	8505	Northern N	NH	NH	Existing	2	2	2	2	2	2	2	2	2	2	2	2
12510	Swanton G	Generator	8505	Northern N	VT	VT	Existing	19.304	19.304	19.304	19.304	19.304	19.304	19.304	19.304	19.304	19.304	19.304	19.304
12511	Swanton G	Generator	8505	Northern N	VT	VT	Existing	19.349	19.349	19.349	19.349	19.349	19.349	19.349	19.349	19.349	19.349	19.349	19.349
12521	Lowell Pow	Generator	8500	Rest-of-Pool	MA	WCMA	Existing	74	74	74	74	74	74	74	74	74	74	74	74
12524	Cos Cob 13	Generator	8500	Rest-of-Pool	CT	CT	Existing	36	36	36	36	36	36	36	36	36	36	36	36
12526	Pierce	Generator	8500	Rest-of-Pool	CT	CT	Existing	74.085	74.085	74.085	74.085	74.085	74.085	76.085	76.085	76.085	76.085	74.085	74.085
12530	Sheffield W	Generator	8505	Northern N	VT	VT	Existing	3.175	3.175	3.175	3.175	10.062	10.062	10.062	10.062	10.062	10.062	10.062	10.062
12551	Kibby Wind	Generator	8503	Maine	ME	ME	Existing	14.5	14.5	14.5	14.5	27.568	27.568	27.568	27.568	27.568	27.568	27.568	27.568
12564	Waterbury	Generator	8500	Rest-of-Pool	CT	CT	Existing	93.079	93.079	93.079	93.079	93.079	93.079	93.079	93.079	93.079	93.079	93.079	93.079
12581	CL&P - Con	Demand	8500	Rest-of-Pool	CT	CT	Existing	467.922	467.922	467.922	467.922	467.922	467.922	471.542	471.542	471.542	471.542	467.922	467.922
12583	CL&P Distr	Demand	8500	Rest-of-Pool	CT	CT	Existing	34.232	34.232	34.232	34.232	34.232	34.232	34.232	34.232	34.232	34.232	34.232	34.232
12590	Ameresco	Demand	8500	Rest-of-Pool	CT	CT	Existing	1.605	1.605	1.605	1.605	1.605	1.605	1.605	1.605	1.605	1.605	1.605	1.605
12597	Cambridge	Demand	8506	Southeast	MA	NEMA	Existing	0.653	0.653	0.653	0.653	0.653	0.653	0.653	0.653	0.653	0.653	0.653	0.653
12598	Cambridge	Demand	8506	Southeast	MA	NEMA	Existing	4.736	4.736	4.736	4.736	4.736	4.736	4.736	4.736	4.736	4.736	4.736	4.736
12600	UI Conserv	Demand	8500	Rest-of-Pool	CT	CT	Existing	89.081	89.081	89.081	89.081	89.081	89.081	89.081	89.081	89.081	89.081	89.081	89.081
12657	Unitil CORE	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	8.452	8.452	8.452	8.452	8.452	8.452	8.452	8.452	8.452	8.452	8.452	8.452
12670	ngrid_nem	Demand	8506	Southeast	MA	NEMA	Existing	178.356	178.356	178.356	178.356	178.356	178.356	178.356	178.356	178.356	178.356	178.356	178.356
12671	ngrid_nh_f	Demand	8505	Northern N	NH	NH	Existing	8.929	8.929	8.929	8.929	8.929	8.929	8.929	8.929	8.929	8.929	8.929	8.929
12672	ngrid_ri_fc	Demand	8506	Southeast	RI	RI	Existing	251.499	251.499	251.499	251.499	251.499	251.499	251.499	251.499	251.499	251.499	251.499	251.499
12673	ngrid_sem	Demand	8506	Southeast	MA	SEMA	Existing	275.625	275.625	275.625	275.625	275.625	275.625	275.625	275.625	275.625	275.625	275.625	275.625
12674	ngrid_wcm	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	327.302	327.302	327.302	327.302	327.302	327.302	327.302	327.302	327.302	327.302	327.302	327.302
12684	NSTAR EE S	Demand	8506	Southeast	MA	NEMA	Existing	452.202	452.202	452.202	452.202	452.202	452.202	452.202	452.202	452.202	452.202	452.202	452.202
12685	NSTAR EE S	Demand	8506	Southeast	MA	SEMA	Existing	91.287	91.287	91.287	91.287	91.287	91.287	91.287	91.287	91.287	91.287	91.287	91.287
12693	PSNH CORE	Demand	8505	Northern N	NH	NH	Existing	100.98	100.98	100.98	100.98	100.98	100.98	100.98	100.98	100.98	100.98	100.98	100.98
12694	Acushnet C	Demand	8506	Southeast	MA	SEMA	Existing	2.111	2.111	2.111	2.111	2.111	2.111	2.111	2.111	2.111	2.111	2.111	2.111
12696	7.9 MW CH	Demand	8505	Northern N	NH	NH	Existing	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
12705	Cape Light	Demand	8506	Southeast	MA	SEMA	Existing	57.05	57.05	57.05	57.05	57.05	57.05	57.05	57.05	57.05	57.05	57.05	57.05
12749	Bridgewater	Demand	8506	Southeast	MA	SEMA	Existing	1.412	1.412	1.412	1.412	1.412	1.412	1.412	1.412	1.412	1.412	1.412	1.412
12753	MA SEMA S	Demand	8506	Southeast	MA	SEMA	Existing	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147
12754	Tewksbury	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	0.517	0.517	0.517	0.517	0.517	0.517	0.517	0.517	0.517	0.517	0.517	0.517
12757	NHEC Ener	Demand	8505	Northern N	NH	NH	Existing	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704
12779	CPLN CT Or	Demand	8500	Rest-of-Pool	CT	CT	Existing	4.989	4.989	4.989	4.989	4.989	4.989	4.989	4.989	4.989	4.989	4.989	4.989
12786	CSG Aggreg	Demand	8506	Southeast	MA	NEMA	Existing	12.318	12.318	12.318	12.318	12.318	12.318	12.318	12.318	12.318	12.318	12.318	12.318
12790	CSG Aggreg	Demand	8506	Southeast	RI	RI	Existing	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217
12791	CSG Aggreg	Demand	8506	Southeast	MA	SEMA	Existing	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.517
12799	CSG Aggreg	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	2.106	2.106	2.106	2.106	2.106	2.106	2.106	2.106	2.106	2.106	2.106	2.106
12801	UES CORE	Demand	8505	Northern N	NH	NH	Existing	7.748	7.748	7.748	7.748	7.748	7.748	7.748	7.748	7.748	7.748	7.748	7.748
12802	University	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	10.26	10.26	10.26	10.26	10.26	10.26	10.26	10.26	10.26	10.26	10.26	10.26
12806	WMECO - C	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	3.616	3.616	3.616	3.616	3.616	3.616	3.616	3.616	3.616	3.616	3.616	3.616
12822	Burlington	Demand	8505	Northern N	VT	VT	Existing	6.837	6.837	6.837	6.837	6.837	6.837	6.363	6.363	6.363	6.363	6.837	6.837
12832	CPLN MA N	Demand	8506	Southeast	MA	NEMA	Existing	9.266	9.266	9.266	9.266	9.266	9.266	8.721	8.721	8.721	8.721	9.266	9.266
12835	CPLN MA S	Demand	8506	Southeast	MA	SEMA	Existing	4.983	4.983	4.983	4.983	4.983	4.983	3.848	3.848	3.848	3.848	4.983	4.983
12838	CPLN MA V	Demand	8500	Rest-of-Pool	MA	WCMA	Existing	10.299	10.299	10.299	10.299	10.299	10.299	10.299	10.299	10.299	10.299	10.299	10.299
12843	CPLN RI OP	Demand	8506	Southeast	RI	RI	Existing	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44
12845	Vermont E	Demand	8505	Northern N	VT	VT	Existing	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96
13669	Mancheste	Generator	8500	Rest-of-Pool	CT	CT	Existing	0.127	0.127	0.127	0.127	0	0	0	0	0	0	0	0
13673	MATEP (DI	Generator	8506	Southeast	MA	NEMA	Existing	11.08	11.08	11.08	11.08	11.08	11.08	11.08	11.08	11.08	11.08	11.08	11.08
13675	MATEP (CC	Generator	8506	Southeast	MA	NEMA	Existing	46.785	46.785	46.785	46.785	46.785	46.785	46.785	46.785	46.785	46.785	46.785	46.785
13703	Verso VCG	Generator	8503	Maine	ME	ME	Existing	47.223	47.223	47.223	47.223	47.223	47.223	55.461	55.461	55.461	55.461	47.223	47.223
13704	Verso VCG	Generator	8503	Maine	ME	ME	Existing	43.475	43.475	43.475	43.475	43.475	43.475	56.321	56.321	56.321	56.321	43.475	43.475































ID	Name	Type	Capacity Zone ID	Capacity Zone Name	State	Load Zone	Status	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25
40930	ENA Old Pi	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40934	ENA Cranb	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40936	ENA Grove	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40938	ENA Lake S	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40939	ENA Old Fa	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40940	ENA Old Pi	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40943	Cahoon Gr	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
40947	BigelowRd	Generator	8500	Rest-of-Po	MA	WCMA	New	0.085	0.085	0.085	0.085	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
40948	Plainfield	Generator	8500	Rest-of-Po	MA	WCMA	New	0.078	0.078	0.078	0.078	0	0	0	0	0	0	0	0
40949	Wales_Sola	Generator	8500	Rest-of-Po	MA	WCMA	New	0.165	0.165	0.165	0.165	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128
40950	Hadley_No	Generator	8500	Rest-of-Po	MA	WCMA	New	0.197	0.197	0.197	0.197	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084
40951	Hadley_So	Generator	8500	Rest-of-Po	MA	WCMA	New	0.166	0.166	0.166	0.166	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084
40952	Montague	Generator	8500	Rest-of-Po	MA	WCMA	New	0.245	0.245	0.245	0.245	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
40953	Webster Re	Generator	8500	Rest-of-Po	MA	WCMA	New	0.078	0.078	0.078	0.078	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
40957	Winchend	Generator	8500	Rest-of-Po	MA	WCMA	New	0.083	0.083	0.083	0.083	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
40960	Fitchburg S	Generator	8500	Rest-of-Po	MA	WCMA	New	0.368	0.368	0.368	0.368	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
40964	Palmer Sola	Generator	8500	Rest-of-Po	MA	WCMA	New	0.355	0.355	0.355	0.355	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213
40999	Charlton PV	Generator	8500	Rest-of-Po	MA	WCMA	New	0.114	0.114	0.114	0.114	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
41001	Spring Stre	Generator	8506	Southeast	MA	SEMA	New	0.436	0.436	0.436	0.436	0.282	0.282	0.282	0.282	0.282	0.282	0.282	0.282
41006	Syncarpha	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41007	Syncarpha	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41008	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0.014	0.014	0.014	0.014	0	0	0	0	0	0	0	0
41009	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41013	Borr - Broo	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41015	Borr - Pleas	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41020	Bemis Road	Generator	8500	Rest-of-Po	MA	WCMA	New	0.434	0.434	0.434	0.434	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128
41021	Oakhurst R	Generator	8506	Southeast	MA	SEMA	New	0.086	0.086	0.086	0.086	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043
41025	Douglas PV	Generator	8506	Southeast	MA	SEMA	New	0.516	0.516	0.516	0.516	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
41029	Ludlow PV	Generator	8500	Rest-of-Po	MA	WCMA	New	0.248	0.248	0.248	0.248	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128
41030	Rehoboth	Generator	8506	Southeast	MA	SEMA	New	0.46	0.46	0.46	0.46	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
41046	Granby Ran	Generator	8500	Rest-of-Po	MA	WCMA	New	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211
41051	Dalton PV	Generator	8500	Rest-of-Po	MA	WCMA	New	0.391	0.391	0.391	0.391	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
41067	Borr - Blod	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41097	Syncarpha	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41098	Syncarpha	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41100	WCMA Sto	Demand	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41119	NEMA C&I	Demand	8506	Southeast	MA	NEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41155	Plainfield	Generator	8500	Rest-of-Po	MA	WCMA	New	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084
41177	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41179	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41183	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41185	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41187	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41189	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41191	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41193	Syncarpha	Generator	8506	Southeast	MA	SEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41194	DWW Sola	Generator	8500	Rest-of-Po	CT	CT	New	1.077	1.077	1.077	1.077	0	0	0	0	0	0	0	0
41196	Syncarpha	Generator	8506	Southeast	MA	NEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41200	Syncarpha	Generator	8506	Southeast	MA	NEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41285	Syncarpha	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41314	Kear - S Ma	Generator	8506	Southeast	MA	NEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41315	Kear - S Ma	Generator	8506	Southeast	MA	NEMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41327	Ldstr - Pulc	Generator	8500	Rest-of-Po	MA	WCMA	New	0	0	0	0	0	0	0	0	0	0	0	0
41396	WCMA Res	Demand	8500	Rest-of-Po	MA	WCMA	New	12.904	12.904	12.904	12.904	12.904	12.904	0	0	0	0	12.904	12.904







## Attachment B

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

ISO New England Inc.

)

Docket No. ER21-\_\_-000

**TESTIMONY OF ROBERT G. ETHIER  
ON BEHALF OF ISO NEW ENGLAND INC.**

1 **Q: PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.**

2 A: My name is Robert G. Ethier. I am employed by ISO New England Inc. (the  
3 “ISO”) as Vice President of System Planning. My business address is One  
4 Sullivan Road, Holyoke, Massachusetts 01040.

5

6 **Q: PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND**  
7 **WORK EXPERIENCE.**

8 A: I have a Bachelor of Arts degree in Economics from Yale University, a Masters in  
9 Resource Economics from Cornell University, and a Ph.D. in Resource  
10 Economics from Cornell University. Since 2000, I have worked at the ISO in  
11 various roles. I was responsible for Market Monitoring for nearly four years and  
12 Resource Adequacy for more than two years before becoming Vice President of  
13 Market Development in July 2008. In July 2014, I became Vice President of  
14 Market Operations and in November of 2019, I became Vice President of System  
15 Planning. Before 2000, I was a Senior Associate at Stratus Consulting with  
16 responsibility for energy market modeling.

17

1 **Q: WHAT ARE THE PURPOSES OF YOUR TESTIMONY?**

2 A: My testimony has two purposes. The first purpose of my testimony is to certify  
3 that resources participating in the fifteenth Forward Capacity Auction (“FCA”),  
4 which was held on February 8, 2021, were properly qualified in accordance with  
5 Section III.13.1 of the ISO New England Transmission, Markets, and Services  
6 Tariff (the “Tariff”). Section III.13.8.2 (b) of the Tariff requires that  
7 documentation regarding the competitiveness of the FCA be filed with the  
8 Commission. Section III.13.8.2 (b) states that such documentation may include a  
9 certification from the ISO that all entities offering and bidding in the FCA were  
10 properly qualified in accordance with Section III.13.1 of the Tariff. My testimony  
11 provides such certification. The second purpose of my testimony is to explain the  
12 auction prices resulting from the fifteenth FCA.

13  
14 **Q: WERE ALL RESOURCES OFFERING AND BIDDING IN THE**  
15 **FIFTEENTH FCA HELD ON FEBRUARY 8, 2021 PROPERLY**  
16 **QUALIFIED IN ACCORDANCE WITH TARIFF SECTION III.13.1?**

17 A: Yes. Section III.13.1 of the Tariff sets forth the process for qualification in the  
18 FCA. I was responsible for overseeing the qualification of all resources in the  
19 fifteenth FCA held on February 8, 2021. I certify that, to the best of my  
20 knowledge, all resources offering and bidding in the fifteenth FCA were properly  
21 qualified in accordance with Section III.13.1 of the Tariff. In a November 10,

1 2020 informational filing with the Commission, the ISO provided resources  
2 qualified to participate in the fifteenth FCA.<sup>1</sup>

3

4 **Q: WHAT WAS YOUR ROLE IN THE DEVELOPMENT OF THE LIST OF**  
5 **RESOURCES THAT RECEIVED CAPACITY SUPPLY OBLIGATIONS**  
6 **IN THE FIFTEENTH FCA?**

7 A: Section III.13.8.2 (a) of the Tariff requires the ISO to provide a list of resources  
8 that received Capacity Supply Obligations in each Capacity Zone and the size of  
9 the Capacity Supply Obligations. The ISO has provided this information in  
10 Attachment A to this filing. As the Vice President of System Planning,  
11 Attachment A was developed under my supervision and direction.

12

13 **Q: WHAT CAPACITY ZONES WERE MODELED IN THE FIFTEENTH**  
14 **FCA?**

15 A: Four Capacity Zones were modeled in the fifteenth FCA: the Southeastern New  
16 England (“SENE”) Capacity Zone, the Northern New England (“NNE”) Capacity  
17 Zone, the Maine Capacity Zone (“Maine”) and the Rest-of-Pool (“ROP”)  
18 Capacity Zone. The SENE Capacity Zone included Northeastern  
19 Massachusetts/Boston, Southeastern Massachusetts, and Rhode Island. The NNE  
20 Capacity Zone included Maine, New Hampshire, and Vermont. The Maine  
21 Capacity Zone included Maine and was nested within the NNE Capacity Zone.

---

<sup>1</sup> *ISO New England Inc.*, Informational Filing for Qualification in the Forward Capacity Market, Docket No. ER21-372-000 (filed November 10, 2020) (“Informational Filing”).

1 The ROP Capacity Zone included Connecticut and Western/Central  
2 Massachusetts. As detailed in the ISO's Informational Filing for the fifteenth  
3 FCA, the Local Sourcing Requirement for the import-constrained SENE Capacity  
4 Zone was 10,305 MW.<sup>2</sup> For the export-constrained NNE Capacity Zone, the  
5 Maximum Capacity Limit was 8,680 MW.<sup>3</sup> For the export-constrained Maine  
6 Capacity Zone, the Maximum Capacity Limit was 4,145 MW.<sup>4</sup> Under Section  
7 III.13.2.2 of the Tariff, the total amount of capacity cleared in the FCA is  
8 determined using the System-Wide Capacity Demand Curve and Capacity Zone  
9 Demand Curves.

10

11 **Q: PLEASE PROVIDE GRAPHS OF THE DEMAND CURVES THAT THE**  
12 **ISO CALCULATED FOR THE FIFTEENTH FCA.**

13 A: As required under Section III.12 of the Tariff, the ISO calculated the following  
14 Demand Curves for the fifteenth FCA:

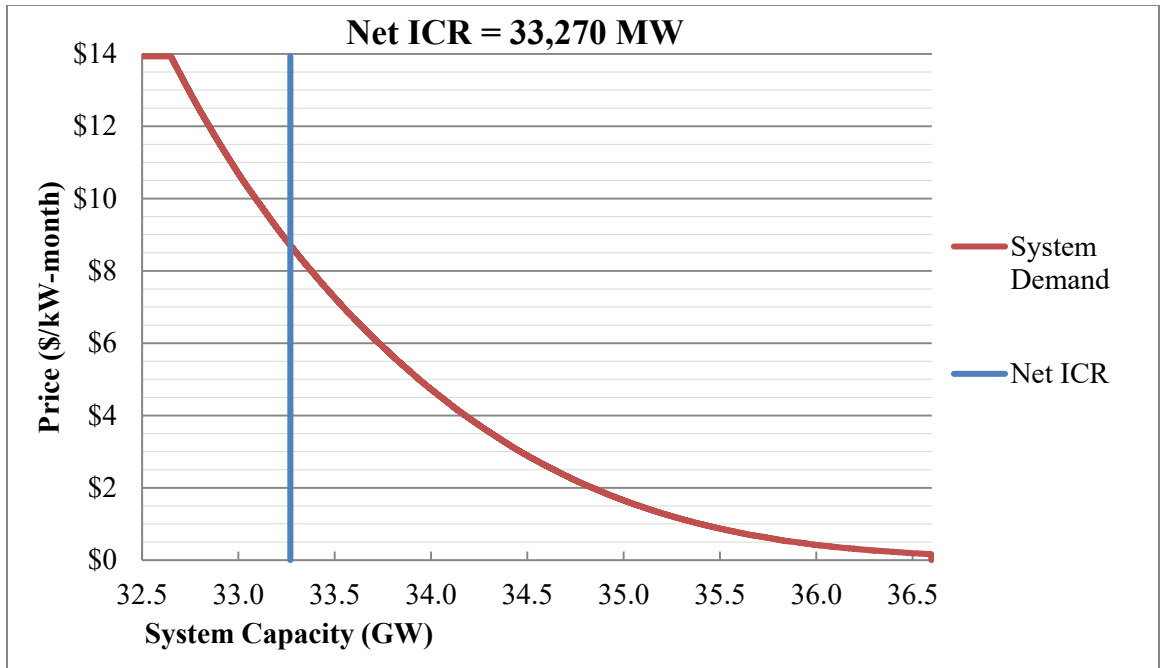
15 1. System-Wide Capacity Demand Curve

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<sup>2</sup> Informational Filing at 9.

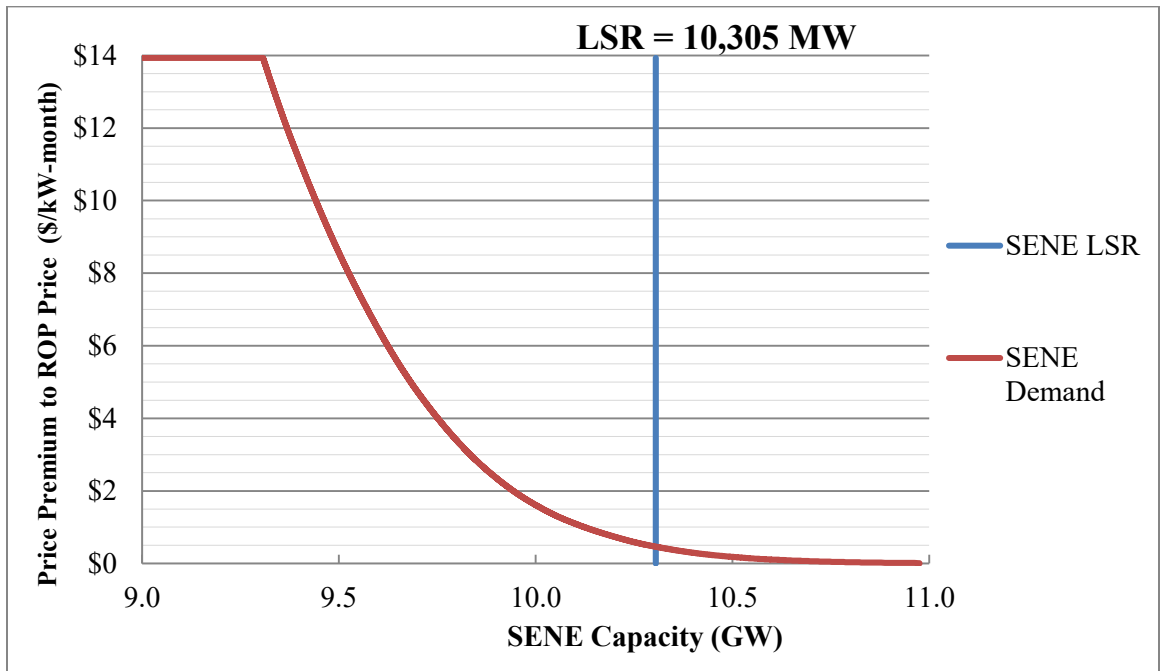
<sup>3</sup> *Id.*

<sup>4</sup> *Id.*



1

2. Import-constrained Capacity Zone Demand Curve for the SENE Capacity Zone

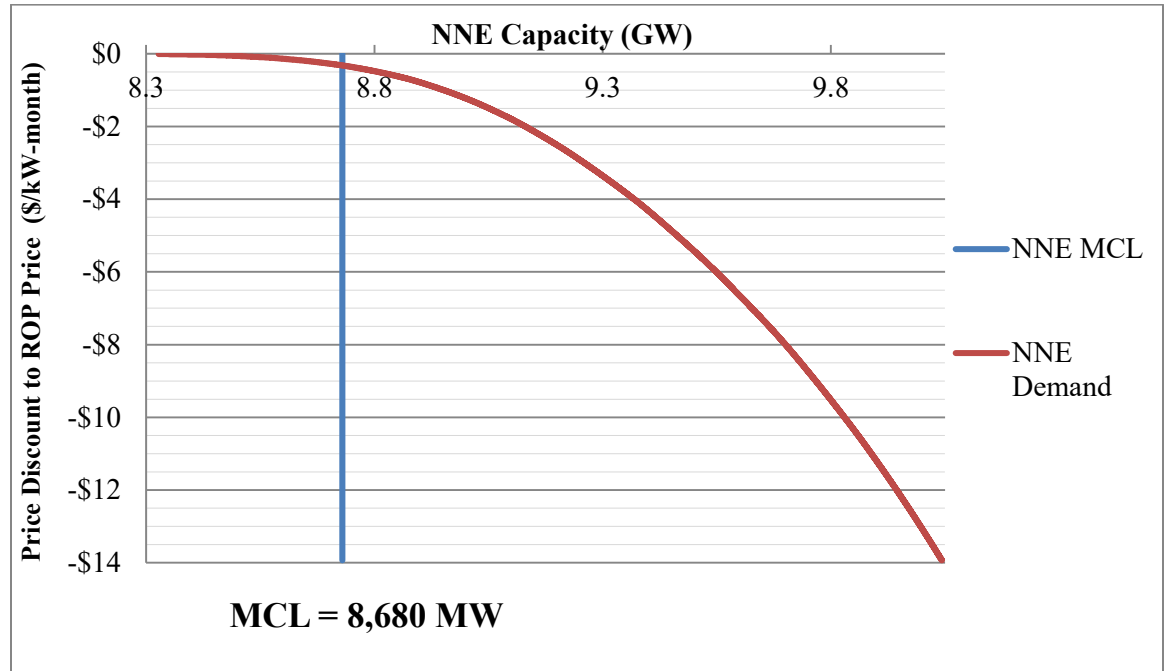


3



1

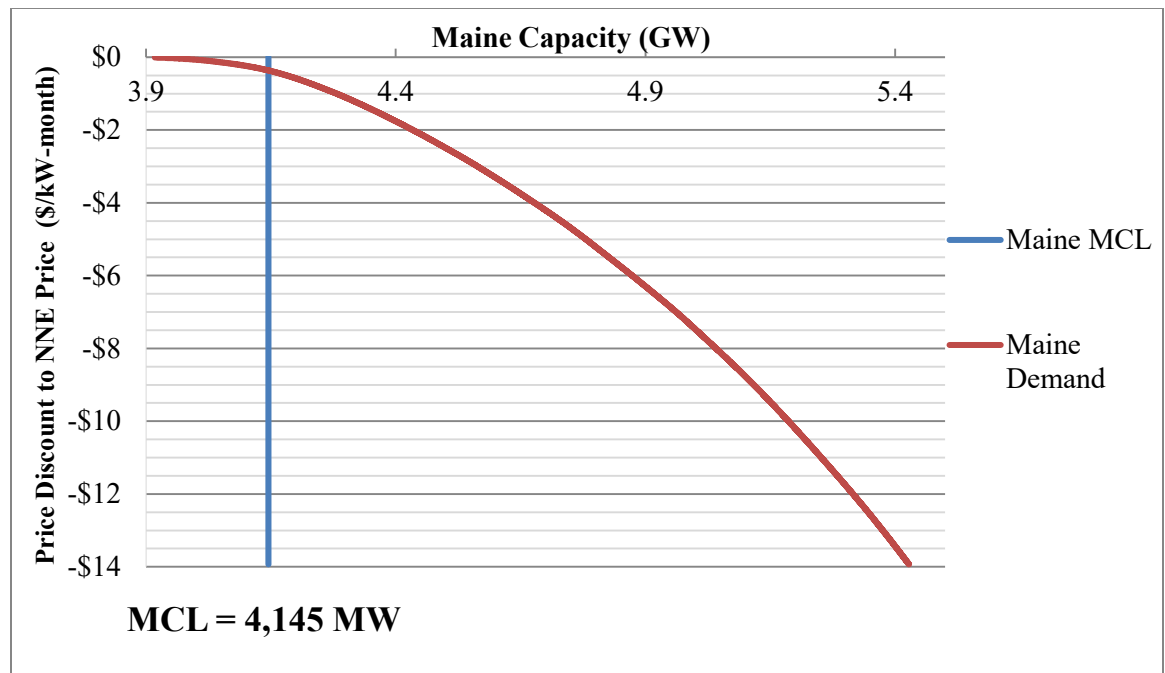
### 3. Export-constrained Capacity Zone Demand Curve for the NNE Capacity Zone



2

3

### 4. Export-constrained Capacity Zone Demand Curve for the Maine Capacity Zone

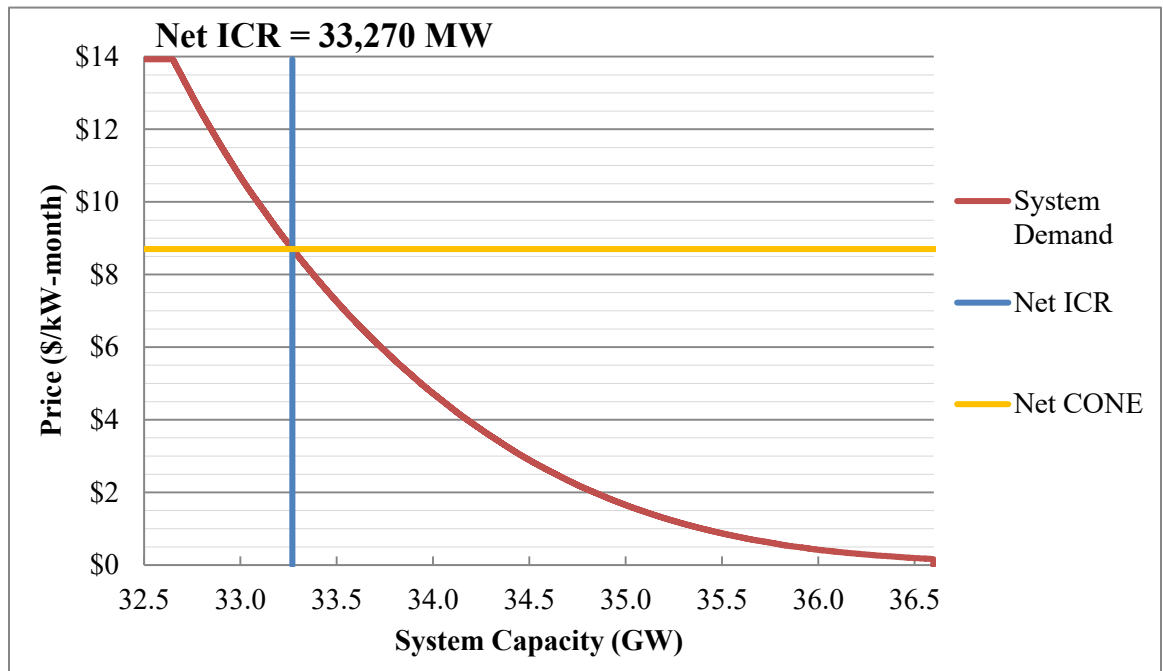


4

5

1 **Q: CAN YOU PROVIDE A GRAPH OF THE SYSTEM-WIDE CAPACITY**  
2 **DEMAND CURVE ALONG WITH THE NET INSTALLED CAPACITY**  
3 **REQUIREMENT (“NET ICR”) AND NET COST OF NEW ENTRY (“NET**  
4 **CONE”) FOR THE FIFTEENTH FCA?**

5 A: Yes. Below is a graph of the System-Wide Capacity Demand Curve, Net CONE,  
6 and Net ICR:



7

8

9 **Q: WHAT CAUSED THE DESCENDING CLOCK AUCTION TO CLOSE?**

10 A: The descending clock auction commenced with a starting price of \$13.932/kW-  
11 month. The descending clock auction closed for the SENE Capacity Zone after  
12 the fourth round of bidding when an offer withdrawal resulted in zonal supply  
13 falling short of zonal demand in the SENE Capacity Zone.

1 The descending clock auction closed for the ROP Capacity Zone after the fifth  
2 round of bidding when a Dynamic De-List Bid resulted in system-wide supply  
3 falling short of system-wide demand.

4  
5 The descending clock auction closed for both the NNE Capacity Zone and the  
6 Maine Capacity Zone after the fifth round of bidding when a Dynamic De-List  
7 Bid in the NNE Capacity Zone resulted in its zonal supply falling short of its  
8 zonal demand. At the same price, the Maine Capacity Zone's supply was less  
9 than its zonal demand. Therefore, the Maine Capacity Zone closed  
10 contemporaneously with the NNE Capacity Zone.

11  
12 For each of the four Capacity Zones, the descending clock auction closed below  
13 the Dynamic De-List Bid Threshold.

14

15 **Q: WHAT WERE THE FORWARD CAPACITY AUCTION CLEARING**  
16 **PRICES FOR THE CAPACITY ZONES?**

17 A: Resources in the SENE Capacity Zone will be paid at the Capacity Clearing Price  
18 set pursuant to the SENE Capacity Demand Curve, which is \$3.980/kW-month.<sup>5</sup>  
19 Resources in the ROP Capacity Zone will be paid at the Capacity Clearing Price  
20 set pursuant to the System-Wide Capacity Demand Curve, which is \$2.611/kW-  
21 month.<sup>6</sup> Resources in the NNE Capacity Zone and resources in the Maine

---

<sup>5</sup> Existing Capacity Resources with multi-year obligations from previous auctions will be paid based on the Capacity Clearing Price in the auction in which they originally cleared. Self-supplied resources will not be paid through the FCM.

1 Capacity Zone will be paid at the Capacity Clearing Price set pursuant to the NNE  
2 Capacity Demand Curve, which is \$2.477/kW-month.<sup>6</sup>

3

4 **Q: WHY WAS THE CAPACITY CLEARING PRICE \$3.980/KW-MONTH IN**  
5 **THE SENE CAPACITY ZONE?**

6 A: In the SENE Capacity Zone, at prices at and above \$3.980/kW-month, zonal  
7 supply was greater than zonal demand. At prices below \$3.980/kW-month, zonal  
8 supply was less than zonal demand. The withdrawal of a non-rationable offer at  
9 \$3.979/kW-month caused zonal supply to fall short of zonal demand. Pursuant to  
10 the FCM rules, many offers from new capacity and many de-list bids from  
11 existing capacity are non-rationable (sometimes called indivisible). That is, the  
12 entire offer segment must clear or not clear. Under Section III.13.2.7.4 of the  
13 Tariff, where non-rationable offers prohibit the descending clock auction from  
14 clearing the precise amount of capacity required, the auctioneer analyzes the  
15 aggregate supply curve “to determine cleared capacity offers and Capacity  
16 Clearing Prices that seek to maximize social surplus for the associated Capacity  
17 Commitment Period. The clearing algorithm may result in offers below the  
18 Capacity Clearing Price not clearing, and in de-list bids below the Capacity  
19 Clearing Price clearing.”

20

21 The ISO utilizes a clearing engine to solve a mixed-integer quadratic  
22 programming problem to identify the optimal combination of offers to clear,  
23 which is the combination of offers that maximizes social surplus. Social surplus

1 (sometimes called social welfare) is, in this case, the sum of consumer surplus  
2 (the difference between the amount that consumers would be willing to pay as  
3 defined by the Demand Curve and the amount they actually pay) and producer  
4 surplus (the difference between the amount that suppliers are actually paid and the  
5 amount that they would have been willing to accept) minus deadweight loss.

6  
7 With exclusively rationable (sometimes called divisible) offers and bids, the  
8 marginal offer can be partially cleared in order for supply to precisely meet  
9 demand, preventing any deadweight loss. Therefore, where all offers are  
10 rationable, social surplus is maximized when all supply to the left of the  
11 intersection with demand is cleared. However, non-rationable offers can prevent  
12 a clearing solution at the precise intersection of supply and demand. When this  
13 occurs, a decision must be made to either clear less supply than demanded at the  
14 clearing price (which generates less consumer surplus and producer surplus but no  
15 deadweight loss), or to clear more supply than demanded at the clearing price  
16 (which generates more consumer surplus and producer surplus, but also  
17 deadweight loss). The optimal solution identifies the combination of cleared  
18 supply offers that maximizes social surplus.

19  
20 With the \$3.980/kW-month offer selected, zonal cleared supply exceeded zonal  
21 demand at the Capacity Clearing Price of \$3.980/kW-month by 43.141 MW.  
22 Although the non-rationable offer in SENE at \$3.980/kW-month resulted in  
23 deadweight loss due to clearing more supply than was demanded at that price,

1 clearing the offer contributed to social surplus. To better match zonal supply to  
2 zonal demand, the clearing engine simultaneously searched in the SENE Capacity  
3 Zone at prices below \$3.980/kW-month for offers to exclude from clearing and  
4 de-list bids to include in clearing which would result in greater social surplus.  
5 However, the clearing engine did not find any such offers or de-list bids because  
6 each offer priced below \$3.980/kW-month increased social surplus when cleared.  
7 And, each de-list bid priced below \$3.980/kW-month decreased social surplus  
8 when cleared.

9  
10 The Capacity Clearing Price was \$3.980/kW-month because this was the lowest  
11 price at which the marginal resource satisfying SENE demand was willing to  
12 accept a Capacity Supply Obligation.<sup>6</sup>

13

14 **Q: WHY WAS THE CAPACITY CLEARING PRICE \$2.611/KW-MONTH IN**  
15 **THE ROP CAPACITY ZONE WHILE THE CAPACITY CLEARING**  
16 **PRICE WAS \$2.477/KW-MONTH IN BOTH THE NNE AND MAINE**  
17 **CAPACITY ZONES?**

18 A: Across the New England Control Area, at prices at and above \$2.611/kW-month,  
19 system-wide supply was greater than system-wide demand. At prices below

---

<sup>6</sup> For more information on the mechanics and implications of clearing non-rationable offers, please see my testimony for the ninth and tenth Forward Capacity Auctions. Forward Capacity Auctions Results, *ISO New England Inc.*, Docket No. ER15-1137-000 (Feb. 27, 2015), available at [https://www.iso-ne.com/static-assets/documents/2015/02/er15-\\_\\_\\_-000\\_2-27-15\\_fca\\_9\\_results\\_filing.pdf](https://www.iso-ne.com/static-assets/documents/2015/02/er15-___-000_2-27-15_fca_9_results_filing.pdf); Forward Capacity Auctions Results, *ISO New England Inc.*, Docket No. ER16-1041-000 (Feb. 29, 2016), available at [https://www.iso-ne.com/static-assets/documents/2016/02/er16-\\_\\_\\_-000\\_2-29-16\\_fca\\_10\\_results\\_filing.pdf](https://www.iso-ne.com/static-assets/documents/2016/02/er16-___-000_2-29-16_fca_10_results_filing.pdf)

1           \$2.611/kW-month, system-wide supply was less than system-wide demand. A  
2           Dynamic De-List Bid at \$2.610/kW-month set the Capacity Clearing Price at  
3           \$2.611/kW-month in the ROP Capacity Zone. Dynamic De-List Bids can be  
4           rationed, which means that they can be taken in part or in full, subject to the  
5           resource's Rationing Minimum Limit. The price-setting de-list bid was rationed  
6           to the greatest extent possible, while honoring the resource's Rationing Minimum  
7           Limit, resulting in the resource receiving a Capacity Supply Obligation quantity  
8           equal to its Rationing Minimum Limit, and in system-wide supply exceeding  
9           system-wide demand at the ROP Capacity Clearing Price. Although system-wide  
10          supply still exceeded system-wide demand at the ROP Capacity Clearing Price  
11          after rationing this Dynamic De-List Bid, selecting it to clear contributed to social  
12          surplus. The Capacity Clearing Price in the ROP Capacity Zone was \$2.611/kW-  
13          month because this was the lowest price at which the marginal resource satisfying  
14          system-wide demand was willing to accept a Capacity Supply Obligation.

15  
16          In the NNE Capacity Zone, which includes the Maine Capacity Zone, at prices at  
17          and above \$2.468/kW-month, offered zonal supply was greater than zonal  
18          demand. At prices below \$2.468/kW-month, offered zonal supply was less than  
19          zonal demand.

20  
21          To better match system supply to system demand, the clearing engine  
22          simultaneously searched for inframarginal offers to exclude from clearing or  
23          inframarginal de-list bids to include in clearing which would result in greater

1 social surplus. The clearing engine found two Dynamic De-List Bids in the NNE  
2 Capacity Zone, both priced below \$2.468/kW-month, that contributed to social  
3 surplus by clearing (that is, by not receiving a Capacity Supply Obligation).  
4 While these Dynamic De-List Bids intuitively would not have cleared, social  
5 surplus was maximized by clearing them. As a result, cleared system-wide supply  
6 exceeded cleared system-wide demand at the ROP Capacity Clearing Price by  
7 23.208 MW, and the NNE Capacity Zone Demand Curve set the Capacity  
8 Clearing Prices in the NNE Capacity Zone and the Maine Capacity Zone at  
9 \$2.477/kW-month.<sup>7</sup>

10

11 **Q: WHY DO THE CLEARING PRICES FOR THE ROP CAPACITY ZONE**  
12 **AND THE SENE CAPACITY ZONE NOT PRECISELY MATCH THOSE**  
13 **CALCULATED USING THE PUBLISHED DEMAND CURVES AND**  
14 **CLEARED QUANTITIES?**

15 A: If the marginal de-list bid satisfying system-wide demand had been fully  
16 rationable, then the total cleared system-wide supply quantity would have  
17 precisely matched the quantity demanded pursuant to the System-Wide Capacity  
18 Demand Curve at the ROP Capacity Clearing Price. However, because the  
19 marginal de-list bid was not fully rationable, the total cleared system-wide supply  
20 quantity was 34,621.065 MW, including 23.208 MW of supply exceeding demand  
21 at the ROP Capacity Clearing Price. Subtracting 23.208 MW from this total

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<sup>7</sup> For more information on the mechanics and implications of clearing non-rationable offers, please see my testimony for the ninth and tenth Forward Capacity Auctions. *See id.*



1 cleared system-wide supply quantity results in 34,597.857 MW, which  
2 corresponds to \$2.611/kW-month on the System-Wide Capacity Demand Curve.

3  
4 Likewise, if the marginal offer in the SENE Capacity Zone had been fully  
5 rationable, then the total cleared supply quantity in the SENE Capacity Zone  
6 would have precisely matched the quantity demanded pursuant to the SENE  
7 Capacity Demand Curve at the SENE Capacity Clearing Price. However, because  
8 the marginal offer in the SENE Capacity Zone was not fully rationable, the total  
9 cleared supply quantity in the SENE Capacity Zone was 10,084.808 MW,  
10 including 43.141 MW of supply exceeding demand at the SENE Capacity  
11 Clearing Price. Subtracting 43.141 MW from this total cleared supply quantity  
12 results in 10,041.667 MW, which corresponds to \$1.369/kW-month on the SENE  
13 Capacity Demand Curve, and when added to the ROP Capacity Clearing Price of  
14 \$2.611/kW-month, results in a total price of \$3.980/kW-month.

15

16 **Q: WHAT WERE THE CAPACITY CLEARING PRICES ON THE**  
17 **EXTERNAL INTERFACES?**

18 A: Imports over the New York AC Ties external interface, totaling 684.059 MW, and  
19 imports over the Phase I/II HQ Excess external interface, totaling 517.000 MW,  
20 will receive \$2.611/kW-month. Imports over the Hydro-Quebec Highgate  
21 external interface, totaling 60.000 MW, and imports over the New Brunswick  
22 external interface, totaling 226.000 MW, will receive \$2.477/kW-month.

23

1 **Q: FOLLOWING COMPLETION OF THE PRIMARY AUCTION-**  
2 **CLEARING PROCESS, WAS A SUBSTITUTION AUCTION**  
3 **ADMINISTERED? IF NOT, WHY?**

4 A: A substitution auction was not administered because no demand bid met the  
5 requirements of a substitution auction demand bid, and at least one substitution  
6 auction demand bid is necessary in order to conduct the substitution auction.  
7 Specifically, in order for a demand bid to be submitted in the substitution auction,  
8 the demand bid must meet the following requirements: (1) the demand bid must  
9 have met all of the conditions to participate in the substitution auction as specified  
10 in Section III.13.2.8.3 of the Tariff; (2) the associated Existing Capacity Resource  
11 must have received a Capacity Supply Obligation in the primary auction-clearing  
12 process as described in Section III.13.2.8.3.1. of the Tariff; and (3) ninety percent  
13 of the associated Existing Capacity Resource's substitution auction test price must  
14 be at or below the Capacity Clearing Price as described in Section III.13.2.8.3.3 of  
15 the Tariff. However, no demand bids satisfied these criteria, and, for that reason,  
16 a substitution auction was not conducted. Accordingly, while Section III.13.8.2  
17 of the Tariff requires the instant filing to include the substitution auction clearing  
18 prices and the total amount of payments associated with any demand bids cleared  
19 at a substitution auction clearing price above their demand bid prices, because a  
20 substitution auction was not conducted, that information is not included in this  
21 filing.

1 Q: DOES THIS CONCLUDE YOUR TESTIMONY?

2 A: Yes.

3

4 I declare that the foregoing is true and correct.

5

6

7



8

Robert G. Ethier

9

10 February 26, 2021

## Attachment C

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

**ISO New England Inc.**

)

**Docket No. ER21-\_\_-000**

**TESTIMONY OF ALAN MCBRIDE**

1 **Q: PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.**

2 A: My name is Alan McBride. I am Director of Transmission Services and Resource  
3 Qualification with ISO New England Inc. (the “ISO”). My business address is  
4 One Sullivan Road, Holyoke, Massachusetts 01040.

5

6 **Q: PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND**  
7 **WORK EXPERIENCE.**

8 A: I joined the ISO in June 2006 and for the following four years my primary  
9 responsibility was as Project Manager of New Generation Qualification for the  
10 Forward Capacity Market.<sup>1</sup> In 2010, I became the Manager, Area Transmission  
11 Planning for northern New England, and continued in that position until 2015,  
12 when I became Director of Transmission Services. In that position, I have been  
13 responsible for the oversight of the ISO’s interconnection process for new  
14 Generating Facilities and Elective Transmission Upgrades. In November 2019,  
15 my responsibilities were expanded to include the qualification of resources in the  
16 Forward Capacity Market (“FCM”). Accordingly, my current title is Director of  
17 Transmission Services and Resource Qualification.

---

<sup>1</sup> Capitalized terms used but not defined in this testimony are intended to have the meaning given to such terms in the ISO New England Inc. Transmission, Markets and Services Tariff.

1 Before joining the ISO, I worked at Dynegy Inc. and then at Calpine Corporation.  
2 At both companies, I supported various transmission-related activities associated  
3 with the development, interconnection, and commercial operation of merchant  
4 generation facilities. Prior to joining Dynegy, I worked at Power Technologies  
5 Incorporated (now a division of Siemens Industries), where I conducted various  
6 transmission analysis studies, including the system impact studies of several  
7 proposed generating facilities.

8  
9 I have 23 years of experience in various aspects of power transmission system  
10 analysis and transmission services. I hold a B.S. degree in Electrical Engineering  
11 from University College Dublin, in Ireland, a Master's degree in Electric Power  
12 Engineering from Rensselaer Polytechnic Institute, and an M.B.A. degree from  
13 Purdue University.

14

15 **Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

16 A: The purpose of my testimony is to explain the ISO's reliability review of de-list  
17 bids submitted in the fifteenth Forward Capacity Auction ("FCA").

18

19 **Q: WHAT WAS YOUR ROLE IN THE RELIABILITY REVIEW OF THE**  
20 **VARIOUS DE-LIST BIDS?**

21 A: As the ISO's Director of Transmission Services and Resource Qualification, I  
22 oversaw the reliability review of all submitted de-list bids.

23

1 **Q: WHAT TYPES OF DE-LIST BIDS DOES THE ISO REVIEW?**

2 A: There are five different types of de-list bids that are reviewed for reliability:  
3 Permanent De-List Bids, Retirement De-List Bids, Static De-List Bids, Export  
4 De-List Bids, and Dynamic De-List Bids. With the exception of Dynamic De-  
5 List Bids,<sup>2</sup> all de-list bids are submitted and reviewed for reliability in advance of  
6 the FCA.

7  
8 **Q: HOW MANY TYPES OF REVIEW DOES THE ISO PERFORM ON DE-**  
9 **LIST BIDS?**

10 A: The ISO performs two types of review on de-list bids. I explain each of those  
11 below.

12  
13 **Q: PLEASE EXPLAIN THE FIRST TYPE OF REVIEW THAT THE ISO**  
14 **PERFORMS ON DE-LIST BIDS.**

15 A: Pursuant to Section III.13.1.2.3.2 of the Tariff, prior to the auction, the ISO's  
16 Internal Market Monitor ("IMM") reviews Export De-List Bids and Static De-List  
17 Bids submitted above the Dynamic De-List Bid threshold, which was set at  
18 \$4.30/kW-month for the fifteenth FCA, to determine whether the bids are  
19 consistent with the resource's net risk-adjusted going forward and opportunity  
20 costs. This review is not performed for Dynamic De-List Bids, which are

---

<sup>2</sup> Dynamic De-List Bids are reviewed for reliability as a part of the real-time auction process. See Sections III.13.2.3.2 (d) and 13.2.5.2.5 of the Tariff.

1 submitted during the auction itself, if the price drops below the Dynamic De-List  
2 Bid threshold (\$4.30/kW-month for the fifteenth FCA).

3  
4 In addition, prior to the auction, the IMM reviews all submitted Permanent and  
5 Retirement De-List Bids regardless of price, and a filing was made on July 2,  
6 2020 (Docket No. ER20-2317-000) indicating, on a confidential basis: (i) the  
7 IMM's determination with respect to each Permanent De-List Bid and Retirement  
8 De-List Bid, (ii) supporting documentation for each determination, (iii) the  
9 capacity that will permanently de-list or retire prior to the FCA, and (iv) whether  
10 capacity suppliers that submitted the bids have elected to conditionally or  
11 unconditionally retire the capacity pursuant to Section III.13.1.2.4.1.<sup>3</sup>

12  
13 **Q: PLEASE EXPLAIN THE SECOND TYPE OF REVIEW THAT THE ISO**  
14 **PERFORMS ON DE-LIST BIDS.**

15 A: Pursuant to Section III.13.2.5.2.5 of the Tariff and ISO New England Planning  
16 Procedure No. 10 – Planning Procedure to Support the Forward Capacity Market,  
17 the ISO reviews each Retirement De-List Bid, Permanent De-List Bid, Export De-  
18 List Bid, Administrative Export De-List Bid, and Static De-List Bid to determine  
19 if the capacity associated with the bid is needed for local reliability during the  
20 Capacity Commitment Period associated with the FCA. The Tariff provides that  
21 capacity will be needed for local reliability if the absence of that capacity would

---

<sup>3</sup> The Commission accepted the filing on August 19, 2020. *See ISO New England Inc.*, Docket No. ER20-2317-000, (Delegated letter order Aug. 19, 2020).



1 result in violation of any NERC, NPCC, or ISO criteria.<sup>4</sup> If the capacity  
2 associated with the de-list bid is determined not to be needed for local reliability,  
3 and the auction price falls to or below the de-list bid price, then the capacity  
4 associated with the bid is removed from the auction.

5  
6 **Q: FOR THE FIFTEENTH FCA, HOW MANY DE-LIST BIDS DID THE ISO**  
7 **REVIEW FOR RELIABILITY?**

8 A: The ISO reviewed one Permanent De-List Bid totaling approximately 42.590 MW  
9 and 11 Retirement De-List Bids totaling approximately 52.975 MW.<sup>5</sup> A total of  
10 813.019 MW of pre-auction Static De-List Bids were submitted. However,  
11 pursuant to Tariff Section III.13.1.2.3.1.1, prior to the auction, participants elected  
12 to withdraw approximately 674 MW of their submitted Static De-List Bids. As a  
13 result, the ISO reviewed 139.019 MW of Static De-List Bids. Finally, no Export  
14 De-List Bids or Administrative Export De-List Bids were submitted for the  
15 fifteenth FCA.

16  
17 During the fourth round of the auction where the price fell below \$4.30/kW-  
18 month (*i.e.*, the threshold for submission of Dynamic De-List Bids prescribed for  
19 the fifteenth FCA), 36 Dynamic De-List Bids were submitted, seeking to delist

---

<sup>4</sup> Section III.13.2.5.2.5 of the Tariff.

<sup>5</sup> The totals noted above do not include two Retirement De-List Bid for resources that elected to not be reviewed for reliability.

1 approximately 677.522 MW.<sup>6</sup> All Dynamic De-List Bids submitted were  
2 reviewed for reliability.

3  
4 During the fifth round of the auction, 126 Dynamic De-List Bids were submitted,  
5 seeking to delist approximately 2,811.526 MW. De-list bids are reviewed for  
6 reliability in descending price order. The ISO reviewed a sufficient quantity of  
7 Dynamic De-List Bids associated with reaching the closing price of the auction.  
8 In this case, during the auction, the ISO reviewed 27 of the Dynamic De-List Bids  
9 submitted in the fifth round, totaling 737.894 MW.

10

11 **Q: DID THE ISO REVIEW SHOW THE NEED TO RETAIN FOR**  
12 **RELIABILITY ANY RESOURCES THAT SUBMITTED DE-LIST BIDS**  
13 **FOR THE FIFTEENTH FCA?**

14 **A:** No. The ISO's review of de-list bids did not show the need to retain for reliability  
15 any resources that submitted de-list bids for the fifteenth FCA. Accordingly, the  
16 ISO did not reject any de-list bids that it studied for the fifteenth FCA.

17

18 **Q: DOES THIS CONCLUDE YOUR TESTIMONY?**

19 **A:** Yes.

---

<sup>6</sup> The fourth round was the first round of the auction in which Dynamic De-List Bids could be submitted.

1 I declare that the foregoing is true and correct.

2

3

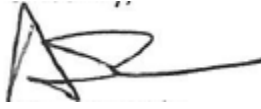
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7

February 26, 2021



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Alan McBride

## Attachment D

1 UNITED STATES OF AMERICA  
2 BEFORE THE  
3 FEDERAL ENERGY REGULATORY COMMISSION  
4

5  
6 )  
7 ISO New England Inc. ) Docket No. ER21-\_\_-000  
8 )  
9 )

10 TESTIMONY OF LAWRENCE M. AUSUBEL  
11

12 Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

13 A. My name is Lawrence M. Ausubel. I am the Founder and Chairman of Power  
14 Auctions LLC, the company that has helped to design, implement, and administer  
15 the Forward Capacity Auction (“FCA”) for ISO New England Inc. (the “ISO”).  
16 I am also a Professor of Economics at the University of Maryland. My business  
17 address is 3333 K St. NW Suite 425, Washington, DC 20007.

18  
19 Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND  
20 WORK EXPERIENCE.

21 A. I have an A.B. in Mathematics from Princeton University, an M.S. in  
22 Mathematics from Stanford University, an M.L.S. in Legal Studies from Stanford  
23 University, and a Ph.D. in Economics from Stanford University.  
24 I am the Chairman of Power Auctions LLC, a provider of auction implementation  
25 services and software worldwide. I was also the President of Market Design Inc.,  
26 an economics consultancy that (until its dissolution in 2016) offered services in  
27 the design of auction markets. I have played a lead role in the design and  
28 implementation of: electricity auctions in France, Germany, Spain, Belgium and

1 the US; gas auctions in Germany, France, Hungary and Denmark; the world's first  
2 auction for greenhouse gas emission reductions in the UK; and a prototype airport  
3 slot auction in the US. I have advised the US Federal Communications  
4 Commission, Innovation Science and Economic Development Canada, and the  
5 Australian Communications and Media Authority on spectrum auctions. I have  
6 also advised BOEM (the US Bureau of Ocean Energy Management) and ICANN  
7 (the Internet Corporation for Assigned Names and Numbers) on auction design. I  
8 hold 23 U.S. patents related to auction technology and I have published numerous  
9 articles on auction design, bargaining, industrial organization and financial  
10 markets. My curriculum vitae, which includes a list of publications and other  
11 experience, is attached.

12  
13 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

14 A. The purpose of this testimony is to certify that the fifteenth FCA, which was held  
15 on February 8, 2021, was conducted in accordance with the relevant provisions of  
16 the ISO New England Transmission, Markets, and Services Tariff ("Tariff")  
17 currently in effect. Section III.13.8.2 (b) of the Tariff requires that, after each  
18 FCA, documentation regarding the competitiveness of the FCA be filed with the  
19 Federal Energy Regulatory Commission ("Commission"). Section III.13.8.2 (b)  
20 states that such documentation may include certification from the auctioneer that  
21 the FCA was conducted in accordance with the provisions of Section III.13 of the  
22 Tariff. Section III.13.2 of the Tariff provides the rules relating to the mechanics  
23 of the FCA. My testimony certifies that the FCA was conducted in accordance

1 with Section III.13.2 of the Tariff.

2  
3 **Q. PLEASE DESCRIBE POWER AUCTIONS LLC.**

4 A. Power Auctions LLC designs, implements and conducts high-stakes electronic  
5 auctions utilizing proprietary software, processes, and other intellectual property.  
6 The PowerAuctions software platform designed by Power Auctions LLC has been  
7 used to implement over 300 auctions worldwide in the electricity, gas and  
8 resource sectors. In the electricity sector, the software platform was used to  
9 operate 42 quarterly EDF Generation Capacity Auctions in France. It was also  
10 used for the Endesa-Iberdola Virtual Power Plant Auctions in Spain, the  
11 Electrabel Virtual Power Plant Auctions in Belgium and the E.ON Virtual Power  
12 Plant Auction in Germany. Currently, our software platform is also used for  
13 implementing the UK's Capacity Market auctions and for implementing the  
14 US Department of Interior's auctions of offshore wind energy tracts. Further,  
15 Power Auctions LLC was part of the team that the US Federal Communications  
16 Commission assembled to design and implement the FCC Incentive Auction  
17 (2016–17), and it is prime contractor to the Governments of Australia, Canada  
18 and the US for the ongoing design and implementation of spectrum auctions.

19  
20 Power Auctions LLC worked with the ISO to design and implement (on the  
21 PowerAuctions platform) the previous FCAs held on February 4-6, 2008;  
22 December 8-10, 2008; October 5-6, 2009; August 2-3, 2010; June 6-7, 2011;  
23 April 2-3, 2012; February 4-5, 2013; February 3, 2014; February 2, 2015;

1 February 8, 2016; February 6, 2017; February 5-6, 2018; February 4, 2019; and  
2 February 3, 2020.

3  
4 **Q. WHAT WAS POWER AUCTIONS LLC'S ROLE IN THE FIFTEENTH**  
5 **FCA HELD ON FEBRUARY 8, 2021?**

6 A. The ISO retained Power Auctions LLC as the independent auction manager  
7 ("Auction Manager") for the fifteenth FCA. As the Auction Manager, Power  
8 Auctions LLC worked with the ISO to design and implement the FCA in  
9 conformance with the Tariff. By design, the Auction Manager conducted the  
10 auction independently, with limited involvement by the ISO. The auction was  
11 implemented using the PowerAuctions software platform.

12  
13 **Q. WAS THE FIFTEENTH FCA HELD ON FEBRUARY 8, 2021**  
14 **CONDUCTED IN ACCORDANCE WITH SECTION III.13.2 OF THE**  
15 **TARIFF?**

16 A. Yes. In accordance with Section III.13.8.2 (b) of the Tariff, I certify that, to the  
17 best of my knowledge, the fifteenth FCA held on February 8, 2021 was conducted  
18 in conformance with the provisions of Section III.13.2 of the Tariff.

19  
20 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

21 A. Yes.



1 I declare that the foregoing is true and correct.

2

3 Executed on February 12, 2021

4

A handwritten signature in cursive script that reads "Lawrence Ausubel".

5

Lawrence M. Ausubel

6

## Curriculum Vitae

LAWRENCE M. AUSUBEL

### Address

Department of Economics  
University of Maryland  
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2744 32<sup>nd</sup> Street, NW  
Washington, DC 20008

### Education

Ph.D. (1984) Stanford University, Economics  
M.L.S. (1984) Stanford Law School, Legal Studies  
M.S. (1982) Stanford University, Mathematics  
A.B. (1980) Princeton University, Mathematics

Honors: Fellow of the Econometric Society  
Phi Beta Kappa  
Sigma Xi  
Magna cum laude in mathematics  
Stanford University Economics Department, graduate fellowship, 1982  
Stanford Law School, fellowship in law and economics, 1983

### Fields of Concentration

Market Design  
Auction Theory  
Bargaining Theory  
Microeconomic Theory and Game Theory  
Credit Cards, Bankruptcy and Banking  
Industrial Organization  
Law and Economics

## **Professional Experience**

Professor of Economics, University of Maryland (August 1992 – present).

Chairman and Founder, Power Auctions LLC (2003 – present).

Power Auctions LLC has been a technology provider of auction design, auction software, implementation services and intellectual property since 2003. The PowerAuctions™ software platform has been used for more than 300 high-stakes auctions on six continents, with total transaction values well in excess of \$100 billion.

President, Market Design Inc. (2003 – 2016).

Until its dissolution in 2016, Market Design Inc. was a consultancy of leading economists and game theorists (Al Roth, Peter Cramton, R. Preston McAfee, Paul Milgrom, Robert Wilson, et al) that worked with governments and companies worldwide to design and implement state-of-the-art auctions and markets.

Assistant Professor of Managerial Economics and Decision Sciences, Kellogg School, Northwestern University (September 1984 – August 1992).

Visiting Assistant Professor, New York University (January 1990 – May 1990).

## **Recent Consulting Experience**

Provided expert bidding advice to bidders in more than a dozen large spectrum auctions, including Bharti Airtel in India's 900/1800 MHz auction, Orange in Slovakia's Multi-Band spectrum auction, Three (Hutchison) in the UK 4G and PSSR auctions, Eircom in Ireland's 800/900/1800 MHz auction, Aircel in India's 3G/BWA auctions, Spain's Telefónica in the UK, German, Italian and Austrian UMTS/3G spectrum auctions, Ericsson in the US PCS spectrum auctions, MTN in the Nigerian spectrum auctions, MCI in the US Direct Broadcast Satellite auction, US Airwaves in the US C-Block Auction, Mobile Media in the US Narrowband Auction, and other confidential clients.

Advised the Secretaría de Energía (SENER) by preparing an expert report on Mexico's first two capacity auctions and by providing advice for future auctions, 2016.

Provided expert bidding advice to a confidential client in India's 500 MW solar auction, 2015.

Advisor to the US government (Federal Communications Commission) on the design and implementation of the FCC Incentive Auction and all ongoing spectrum auctions and universal service fund auctions, 2011 – present.

Advisor to the Canadian government (Innovation, Science and Economic Development Canada) on the design and implementation of the 600 MHz, 700 MHz, 2.5 GHz, 3.5 GHz and mmWave spectrum auctions, 2010 – present.

Advisor to the Australian government (ACMA) on the design and implementation of the Australian Digital Dividend auction and all subsequent spectrum auctions, 2011 –

present.

Provided auction design advice to the IDA Singapore on their Auction of Public Cellular Mobile Telecommunication Services Spectrum Rights, 2007 – 2008.

Design and implementation of the Trinidad and Tobago GSM auction, 2005.

Design and implementation of the UK Capacity Market auction (electricity, 2014 – present).

Design and implementation of auctions for offshore wind energy tracts for the Bureau of Ocean Energy Management (BOEM), US Department of Interior (2010 – present).

Design and implementation of the Forward Capacity Auction for ISO New England (electricity, 2007 – present).

Design and implementation of the quarterly Electricité de France generation capacity auctions (2001 – 2011) and Long-Term Contract auctions (2008 – 2009).

Design and implementation of the quarterly Spanish Virtual Power Plant (VPP) auctions (electricity, 2007 – 2009).

Design and implementation of the E.ON VPP auction in Germany (2007).

Design and implementation of the quarterly Electrabel Virtual Power Plant (VPP) auctions in Belgium (2003 – 2005).

Design and implementation of auctions for new gTLDs for ICANN (Internet Corporation for Assigned Names and Numbers (2008 – present).

Design and implementation of rough diamond auctions for Okavango Diamond Company, Botswana (2013 – present).

Design and implementation of rough diamond auctions for BHP Billiton/Dominion Diamonds (2007 – 2014).

Design and implementation of the annual E.ON Földgáz Trading gas release programme auction in Hungary (2006 – 2013).

Design and implementation of the annual Danish Oil and Natural Gas (DONG Energy) gas release programme auction (2006 – 2011).

Design and implementation of the annual E.ON Ruhrgas gas release programme auction in Germany (2003 – 2008, 2010).

Design and implementation of the Gaz de France gas storage auction (2006).

Design and implementation of the Gaz de France gas release programme auction (2004).

Design and implementation of the Total gas release programme auction (2004).

Design and implementation of the UK Emissions Trading Scheme auction to procure greenhouse gas emission reductions for the UK Government (2002).

Design and implementation of a demonstration auction of landing and takeoff slots for LaGuardia Airport, for the US Federal Aviation Administration (2005, 2008).

### **Teaching**

Econ 456	Law and Economics (Undergraduate; Maryland)
Econ 603	Microeconomic Analysis (Ph.D.; Maryland)
Econ 661	Industrial Organization (Ph.D.; Maryland)
Econ 704	Advanced Microeconomics: Market Design (Ph.D.; Maryland)
Mngl Econ D30	Intermediate Microeconomics (M.B.A.; Northwestern)
Mngl Econ D45	Regulation and Deregulation (M.B.A.; Northwestern)

### **Publications**

“Revealed Preference and Activity Rules in Dynamic Auctions” (with Oleg Baranov), *International Economic Review*, Vol. 61, No. 2, pp. 471–502, May 2020 [lead article].

“Core-Selecting Auctions with Incomplete Information” (with Oleg Baranov), *International Journal of Game Theory*, Vol. 49, No. 1, pp. 251–273, March 2020.

“An Experiment on Auctions with Endogenous Budget Constraints” (with Justin E. Burkett and Emel Filiz-Ozbay), *Experimental Economics*, Vol. 20, No. 4, pp. 973–1006, December 2017.

“A Practical Guide to the Combinatorial Clock Auction” (with Oleg Baranov), *Economic Journal*, Vol. 127, No. 605 (Feature Issue), pp. F334–F350, October 2017.

“Efficient Procurement Auctions with Increasing Returns” (with Oleg Baranov, Christina Aperjis and Thayer Morrill), *American Economic Journal: Microeconomics*, Vol. 9, No. 3, pp. 1–27, August 2017 [lead article].

“Demand Reduction and Inefficiency in Multi-Unit Auctions” (with Peter Cramton, Marek Pycia, Marzena J. Rostek and Marek Weretka), *Review of Economic Studies*, Vol. 81, No. 4, pp. 1366–1400, October 2014.

“Sequential Kidney Exchange” (with Thayer Morrill), *American Economic Journal: Microeconomics*, Vol. 6, No. 3, pp. 265–285, August 2014.

“Market Design and the Evolution of the Combinatorial Clock Auction” (with Oleg Baranov), *American Economic Review: Papers & Proceedings*, Vol. 104, No. 5, pp. 456–451, May 2014.

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- “Non-Judicial Debt Collection and the Consumer’s Choice among Repayment, Bankruptcy and Informal Bankruptcy” (with Amanda E. Dawsey and Richard M. Hynes), *American Bankruptcy Law Journal*, Vol. 87, pp. 1–26, March 2013 [lead article].
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- “Using Forward Markets to Improve Electricity Market Design” (with Peter Cramton), *Utilities Policy*, Vol. 18, No. 4, pp. 195–200, December 2010.
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- “An Efficient Ascending-Bid Auction for Multiple Objects,” *American Economic Review*, Vol. 94, No. 5, pp. 1452–1475, December 2004.
- “Dynamic Auctions in Procurement” (with Peter Cramton), Chapter 9 of *Handbook of Procurement* (N. Dimitri, G. Piga, and G. Spagnolo, eds.), pp. 220–245, Cambridge: Cambridge University Press, 2006.
- “The Lovely but Lonely Vickrey Auction” (with Paul Milgrom), Chapter 1 of *Combinatorial Auctions* (P. Cramton, Y. Shoham, and R. Steinberg, eds.), pp. 17–40, Cambridge: MIT Press, 2006.
- “Ascending Proxy Auctions” (with Paul Milgrom), Chapter 3 of *Combinatorial Auctions* (P. Cramton, Y. Shoham, and R. Steinberg, eds.), pp. 79–98, Cambridge: MIT Press, 2006.
- “The Clock-Proxy Auction: A Practical Combinatorial Auction Design” (with Peter Cramton and Paul Milgrom), Chapter 5 of *Combinatorial Auctions* (P. Cramton, Y. Shoham, and R. Steinberg, eds.), pp. 115–138, Cambridge: MIT Press, 2006.
- “Auctioning Many Divisible Goods” (with Peter C. Cramton), *Journal of the European Economics Association*, Vol. 2, Nos. 2-3, pp. 480–493, April-May 2004.
- “Vickrey Auctions with Reserve Pricing” (with Peter C. Cramton), *Economic Theory*, 23, pp. 493–505, April 2004. Reprinted in Charalambos Aliprantis, et al. (eds.), *Assets, Beliefs, and Equilibria in Economic Dynamics*, Berlin: Springer-Verlag, 355–368, 2003.
- “Auction Theory for the New Economy,” Chapter 6 of *New Economy Handbook* (D. Jones, ed.), San Diego: Academic Press, 2003.
- “Ascending Auctions with Package Bidding” (with Paul Milgrom), *Frontiers of Theoretical Economics*, Vol. 1, No. 1, Article 1, August 2002.  
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- “Bargaining with Incomplete Information” (with Peter Cramton and Raymond Deneckere), Chapter 50 of *Handbook of Game Theory* (R. Aumann and S. Hart, eds.), Vol. 3, Amsterdam: Elsevier Science B.V., 2002.
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- “Credit Card Defaults, Credit Card Profits, and Bankruptcy,” *American Bankruptcy Law Journal*, Vol. 71, pp. 249–270, Spring 1997; recipient of the Editor's Prize for the best paper in the American Bankruptcy Law Journal, 1997.
- “Efficient Sequential Bargaining” (with R. Deneckere), *Review of Economic Studies*, Vol. 60, No. 2, pp. 435–461, April 1993.
- “A Generalized Theorem of the Maximum” (with R. Deneckere), *Economic Theory*, Vol. 3, No. 1, pp. 99–107, January 1993.
- “Durable Goods Monopoly with Incomplete Information” (with R. Deneckere), supercedes “Stationary Sequential Equilibria in Bargaining with Two-Sided Incomplete Information,” *Review of Economic Studies*, Vol. 59, No. 4, pp. 795–812, October 1992.
- “Bargaining and the Right to Remain Silent” (with R. Deneckere), *Econometrica*, Vol. 60, No. 3, pp. 597–625, May 1992.
- “The Failure of Competition in the Credit Card Market,” *American Economic Review*, Vol. 81, No. 1, pp. 50–81, March 1991; reprinted as Chapter 21 in *Advances in Behavioral Finance* (D. Thaler, ed.), Russell Sage Foundation, 1993.
- “Insider Trading in a Rational Expectations Economy,” *American Economic Review*, Vol. 80, No. 5, pp. 1022–1041, December 1990.
- “Partially-Revealing Rational Expectations Equilibrium in a Competitive Economy,” *Journal of Economic Theory*, Vol. 50, No. 1, pp. 93–126, February 1990.
- “A Direct Mechanism Characterization of Sequential Bargaining with One-Sided Incomplete Information” (with R. Deneckere), *Journal of Economic Theory*, Vol. 48, No. 1, pp. 18–46, June 1989; reprinted as Chapter 15 in *Bargaining with Incomplete Information* (P. Linhart, R. Radner, and M. Satterthwaite, eds.), Academic Press, 1992.

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“One is Almost Enough for Monopoly” (with R. Deneckere), *Rand Journal of Economics*, Vol. 18, No. 2, pp. 255–274, Summer 1987.

## **Patents**

“System and Method for Cryptographic Choice Mechanisms” (with Andrew Komo), U.S. Patent Number 10,872,487, issued December 22, 2020.

“System and Method for an Auction of Multiple Types of Items” (with Peter Cramton and Wynne P. Jones), U.S. Patent Number 8,762,222, issued June 24, 2014.

“System and Method for the Efficient Clearing of Spectrum Encumbrances” (with Peter Cramton and Paul Milgrom), U.S. Patent Number 8,744,924, issued June 3, 2014.

“System and Method for a Dynamic Auction with Package Bidding” (with Paul Milgrom), U.S. Patent Number 8,566,211, issued October 22, 2013.

“System and Method for an Efficient Dynamic Multi-Unit Auction,” U.S. Patent Number 8,447,662, issued May 21, 2013.

“System and Method for a Hybrid Clock and Proxy Auction” (with Peter Cramton and Paul Milgrom), U.S. Patent Number 8,335,738, issued December 18, 2012.

“System and Method for a Hybrid Clock and Proxy Auction” (with Peter Cramton and Paul Milgrom), U.S. Patent Number 8,224,743, issued July 17, 2012.

“System and Method for the Efficient Clearing of Spectrum Encumbrances” (with Peter Cramton and Paul Milgrom), U.S. Patent Number 8,145,555, issued March 27, 2012.

“Computer Implemented Methods and Apparatus for Auctions,” U.S. Patent Number 8,065,224, issued November 22, 2011.

“Ascending Bid Auction for Multiple Objects,” U.S. Patent Number 7,966,247, issued June 21, 2011.

“System and Method for an Auction of Multiple Types of Items” (with Peter Cramton and Wynne P. Jones), U.S. Patent Number 7,899,734, issued March 1, 2011.

“System and Method for an Efficient Dynamic Multi-Unit Auction,” U.S. Patent Number 7,870,050, issued January 11, 2011.

“Computer Implemented Methods and Apparatus for Auctions,” U.S. Patent Number 7,774,264, issued August 10, 2010.



- “System and Method for a Hybrid Clock and Proxy Auction” (with Peter Cramton and Paul Milgrom), U.S. Patent Number 7,729,975, issued June 1, 2010.
- “System and Method for an Efficient Dynamic Multi-Unit Auction,” U.S. Patent Number 7,467,111, issued December 16, 2008.
- “System and Method for an Efficient Dynamic Multi-Unit Auction,” U.S. Patent Number 7,343,342, issued March 11, 2008.
- “Ascending Bid Auction for Multiple Objects,” U.S. Patent Number 7,337,139, issued February 26, 2008.
- “Computer Implemented Methods and Apparatus for Auctions,” U.S. Patent Number 7,249,027, issued July 24, 2007.
- “System and Method for an Efficient Dynamic Multi-Unit Auction,” U.S. Patent Number 7,165,046, issued January 16, 2007.
- “System and Method for an Efficient Dynamic Multi-Unit Auction,” U.S. Patent Number 7,062,461, issued June 13, 2006.
- “System and Method for an Efficient Dynamic Auction for Multiple Objects,” U.S. Patent Number 6,026,383, issued February 15, 2000.
- “Computer Implemented Methods and Apparatus for Auctions,” U.S. Patent Number 6,021,398, issued February 1, 2000.
- “Computer Implemented Methods and Apparatus for Auctions,” U.S. Patent Number 5,905,975, issued May 18, 1999.

### **Book Reviews and Encyclopedia Entries**

- “Auction Theory,” *New Palgrave Dictionary of Economics*, Second Edition, Steven N. Durlauf and Lawrence E. Blume, eds., London: Macmillan, 2008.
- “Credit Cards,” *McGraw-Hill Encyclopedia of Economics*, McGraw-Hill, 1994.
- “Book Review: The Credit Card Industry, by Lewis Mandell,” *Journal of Economic Literature*, Vol. 30, No. 3, September 1992, pp. 1517-18.
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### **Working Papers**

- “Market Design and the FCC Incentive Auction” (with Christina Aperjis and Oleg V. Baranov), October 2017.

- “The Combinatorial Clock Auction, Revealed Preference and Iterative Pricing” (with Oleg V. Baranov), February 2014.
- “Penalty Interest Rates, Universal Default, and the Common Pool Problem of Credit Card Debt” (with Oleg V. Baranov and Amanda E. Dawsey), mimeo, University of Maryland, June 2010.
- “A Troubled Asset Reverse Auction” (with Peter Cramton), working paper, University of Maryland, October 2008.
- “Time Inconsistency in the Credit Card Market” (with Haiyan Shui), mimeo, University of Maryland, January 2005.
- “Informal Bankruptcy” (with Amanda E. Dawsey), mimeo, University of Maryland, April 2004.
- “Adverse Selection in the Credit Card Market,” mimeo, University of Maryland, June 1999.
- “The Credit Card Market, Revisited,” mimeo, University of Maryland, July 1995.
- “Walrasian Tâtonnement for Discrete Goods,” mimeo, University of Maryland, July 2005.
- “Bidder Participation and Information in Currency Auctions” (with Rafael Romeu), Working Paper WP/05/157, International Monetary Fund, 2005.
- “A Mechanism Generalizing the Vickrey Auction,” mimeo, University of Maryland, September 1999.
- “The Ascending Auction Paradox” (with Jesse Schwartz), mimeo, University of Maryland, July 1999.
- “The Optimality of Being Efficient” (with Peter Cramton), mimeo, University of Maryland, June 1999.
- “Sequential Recontracting Under Incomplete Information” (with Arijit Sen), mimeo, University of Maryland, June 1995.
- “Separation and Delay in Bargaining” (with Raymond Deneckere), mimeo, University of Maryland, April 1994.
- “A Model of Managerial Discretion and Corporate Takeovers,” mimeo, University of Maryland, March 1993.
- “Rigidity and Asymmetric Adjustment of Bank Interest Rates,” mimeo, University of Maryland, August 1992.
- “Oligopoly When Market Share Matters,” mimeo, Stanford University, May 1984.

“Partially-Revealing Equilibria,” Stanford University, Department of Economics, August 1984. Dissertation committee: Mordecai Kurz (principal advisor); Peter J. Hammond; Kenneth J. Arrow.

### **Works in Progress**

“The Hungarian Auction” (with T. Morrill)

“Bargaining and Forward Induction” (with R. Deneckere)

### **Op-Eds**

“Making Sense of the Aggregator Bank” (with Peter Cramton), *Economists’ Voice*, Vol. 6, Issue 3, Article 2, February 2009.

“No Substitute for the ‘P’-Word in Financial Rescue” (with Peter Cramton), *Economists’ Voice*, Vol. 6, Issue 2, Article 2, February 2009.

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### **Research Grants**

Principal Investigator, “Common-Value Auctions with Liquidity Needs” (with P. Cramton, E. Filiz-Ozbay and E. Ozbay), National Science Foundation Grant SES-09-24773, September 1, 2009 – August 31, 2013.

Principal Investigator, “Dynamic Matching Mechanisms” (with P. Cramton), National Science Foundation Grant SES-05-31254, August 15, 2005 – July 31, 2008.

Co-Principal Investigator, “Slot Auctions for U.S. Airports” (with M. Ball, P. Cramton and D. Lovell), Federal Aviation Administration, September 1, 2004 – August 31, 2005.

Co-Principal Investigator, “Rapid Response Electronic Markets for Time-Sensitive Goods” (with G. Anandalingam, P. Cramton, H. Lucas, M. Ball and V. Subrahmanian), National Science Foundation Grant IIS-02-05489, Aug 1, 2002 – July 31, 2005.

Principal Investigator, “Multiple Item Auctions” (with P. Cramton), National Science Foundation Grant SES-01-12906, July 15, 2001 – June 30, 2004.

Principal Investigator, “Auctions for Multiple Items” (with P. Cramton), National Science Foundation Grant SBR-97-31025, April 1, 1998 – March 31, 2001.

Co-Principal Investigator, “Auctions and Infrastructure Conference” (with P. Cramton), National Science Foundation, April 1, 1998 – March 31, 1999.

Principal Investigator, “Bargaining Power, Sequential Recontracting, and the Principal-Agent Problem” (with A. Sen), National Science Foundation Grant SBR-94-10545, October 15, 1994 – September 30, 1997.

Principal Investigator, “Insider Trading and Economic Efficiency,” The Lynde and Harry Bradley Foundation, May 15, 1989 – May 14, 1992.

Principal Investigator, “Bargaining with One- and Two-Sided Incomplete Information” (with R. Deneckere), National Science Foundation Grant SES-86-19012, June 1, 1987 – May 31, 1989.

Principal Investigator, “Information Transmission in Bargaining and Markets” (with R. Deneckere), National Science Foundation Grant IST-86-09129, July 1, 1986 – June 30, 1987.

### **Conference Presentations**

“On Generalizing the English Auction,” Econometric Society Winter Meetings, Chicago, January 1998.

“The Optimality of Being Efficient,” Maryland Auction Conference, Wye River, May 1998.

“Adverse Selection in the Credit Card Market,” Western Finance Association, Monterey, June 1998.

“The Optimality of Being Efficient,” Econometric Society Summer Meetings, Montreal, June 1998.

“Bargaining and Forward Induction,” Northwestern Summer Microeconomics Conference, Evanston, IL, July 1998.

“Predicting Personal Bankruptcies,” National Conference of Bankruptcy Judges, Dallas, October 1998.

“Adverse Selection in the Credit Card Market,” NBER Behavioral Macroeconomics Conference, Boston, December 1998.

“The Ascending Auction Paradox,” Econometric Society Summer Meetings, Madison, June 1999.

“Adverse Selection in the Credit Card Market,” Econometric Society Summer Meetings, Madison, June 1999.

“Predicting Personal Bankruptcies,” Meeting of the National Association of Chapter Thirteen Trustees, New York, July 1999.

“The Ascending Auction Paradox,” Southeast Economic Theory Conference, Washington DC, November 1999.

- “Adverse Selection in the Credit Card Market,” Utah Winter Finance Conference, Salt Lake City, February 2000.
- “An Efficient Dynamic Auction for Heterogeneous Commodities,” Conference on Auctions and Market Structure, Heidelberg, Germany, July 2000.
- “An Efficient Dynamic Auction for Heterogeneous Commodities,” Conference on Multiunit Auctions, Stony Brook, NY, July 2000.
- “A Mechanism Generalizing the Vickrey Auction,” Econometric Society World Congress, Seattle, August 2000.
- “Auctions for Financial E-Commerce,” New York Federal Reserve Bank Conference on Financial E-Commerce, New York, February 2001.
- “An Efficient Dynamic Auction for Heterogeneous Commodities,” NSF General Equilibrium Conference, Providence, RI, April 2001.
- “An Efficient Dynamic Auction for Heterogeneous Commodities,” NSF/NBER Decentralization Conference, Evanston, IL, April 2001.
- “Informal Bankruptcy,” Association of American Law Schools Workshop on Bankruptcy, St. Louis, MO, May 2001.
- “An Efficient Dynamic Auction for Heterogeneous Commodities,” Econometric Society Summer Meetings, College Park, MD, June 2001.
- “Ascending Auctions with Package Bidding,” FCC, SIEPR and NSF Conference on Combinatorial Auctions, Wye River, MD, October 2001.
- “The Electricité de France Generation Capacity Auctions,” CORE-ECARES-LEA Workshop on Auctions, Brussels, Belgium, November 2001.
- “Informal Bankruptcy,” Utah Winter Finance Conference, Salt Lake City, February 2002.
- “Defictionalizing the Walrasian Auctioneer,” Conference on Market Design in Honor of Robert Wilson, Stanford, CA, May 2002.
- “Adverse Selection in the Credit Card Market,” Conference on the Economics of Payment Networks, Toulouse, France, June 2002.
- “Ascending Auctions with Package Bidding,” Econometric Society Summer Meetings, Los Angeles, June 2002.
- “An Efficient Dynamic Auction for Heterogeneous Commodities,” Conference in Honor of Mordecai Kurz, Stanford, CA, August 2002.

- “Adverse Selection in the Credit Card Market,” Conference on Credit, Trust and Calculation, San Diego, November 2002.
- “Package Bidding for Spectrum Auctions,” American Economic Association Meetings, Washington, DC, January 2003.
- “Auctioning Many Divisible Goods,” invited session, European Economic Association Annual Congress, Stockholm, August 2003.
- “Spectrum Auctions with Package Bidding,” TPRC Research Conference on Communication, Information and Internet Policy, Arlington, VA, September 2003.
- “Defictionalizing the Walrasian Auctioneer,” invited lecture, Conference on Auctions and Market Design: Theory, Evidence and Applications, Fondazione Eni Enrico Mattei, Milan, September 2003.
- “Clock Auctions, Proxy Auctions, and Possible Hybrids,” Workshop on Auction Theory and Practice, Pittsburgh, PA, November 2003.
- “Clock Auctions, Proxy Auctions, and Possible Hybrids,” FCC Combinatorial Bidding Conference, Wye River, MD, November 2003.
- “Time Inconsistency in the Credit Card Market,” Utah Winter Finance Conference, Salt Lake City, February 2004.
- “The Clock-Proxy Auction: A Practical Combinatorial Auction Design,” Conference on Auctions and Market Design: Theory, Evidence and Applications, Consip, Rome, Italy, September 2004.
- “Bidder Participation and Information in Currency Auctions,” Conference on Auctions and Market Design: Theory, Evidence and Applications, Consip, Rome, Italy, September 2004.
- “The Clock-Proxy Auction: A Practical Combinatorial Auction Design,” Market Design Conference, Stanford University, December 2004.
- “Dynamic Matching Mechanisms,” Econometric Society World Congress, London, August 2005.
- “The Clock-Proxy Auction, with Recent Applications,” SISL Workshop, Caltech, October 2005.
- “Dynamic Matching Mechanisms,” Conference on Matching and Two-Sided Markets, University of Bonn, May 2006.
- “The Hungarian Auction,” DIMACS Workshop on Auctions with Transaction Costs, Rutgers University, March 2007.
- “The Hungarian Auction,” PSE Lecture at the Paris School of Economics, June 2007.

- “Time Inconsistency in the Credit Card Market,” John M. Olin Conference on Law and Economics of Consumer Credit, University of Virginia, February 2008.
- “The Hungarian Auction,” 6th Annual International Industrial Organization Conference, Arlington, VA, May 2008.
- “The Hungarian Auction,” Frontiers of Microeconomic Theory and Policy, Symposium in Honour of Ray Rees, University of Munich, July 2008.
- “Common-Value Auctions with Liquidity Needs: An Experimental Test of a Troubled Assets Reverse Auction,” 2009 CAPCP Conference on Auctions and Procurement, Penn State University, March 2009.
- “Market Design for Troubled Assets,” NBER Workshop on Market Design, Cambridge, MA, May 2009.
- “Market Design for Troubled Assets,” Madrid Summer Workshop on Economic Theory, Universidad Carlos III de Madrid, June 2009.
- “Virtual Power Plant Auctions,” (with Peter Cramton), Workshop: Designing Electricity Auctions, Research Institute of Industrial Economics, Stockholm, Sweden, September 2009.
- “Using Forward Markets to Improve Electricity Market Design,” (with Peter Cramton), Workshop: Designing Electricity Auctions, Research Institute of Industrial Economics, Stockholm, Sweden, September 2009.
- “Virtual Power Plant Auctions,” (with Peter Cramton), Market Design 2009 Conference, Stockholm, Sweden, September 2009.
- “Using Forward Markets to Improve Electricity Market Design,” (with Peter Cramton), Market Design 2009 Conference, Stockholm, Sweden, September 2009.
- “Auctions with Multiple Objects,” 2009 Erwin Plein Nemmers Prize in Economics, Conference in Honor of Paul Milgrom, Northwestern University, November 2009.
- “Penalty Interest Rates, Universal Default, and the Common Pool Problem of Credit Card Debt” (with Oleg V. Baranov and Amanda E. Dawsey), Credit, Default and Bankruptcy Conference, University of California - Santa Barbara, June 2010.
- “Core-Selecting Auctions with Incomplete Information” (with Oleg V. Baranov), World Congress of the Econometric Society, Shanghai, China, August 2010.
- “Core-Selecting Auctions with Incomplete Information” (with Oleg V. Baranov), NBER Workshop on Market Design, Cambridge, MA, October 2010.
- “Core-Selecting Auctions with Incomplete Information” (with Oleg V. Baranov), NSF/CEME Decentralization Conference, Ohio State University, April 2011

- “Penalty Interest Rates, Universal Default, and the Common Pool Problem of Credit Card Debt” (with Oleg V. Baranov and Amanda E. Dawsey), Centre for Financial Analysis & Policy Conference on Consumer Credit and Bankruptcy, University of Cambridge, UK, April 2011.
- “Core-Selecting Auctions with Incomplete Information” (with Oleg V. Baranov), Center for the Study of Auctions, Procurements and Competition Policy Conference, Penn State University, April 2011.
- “Design Issues for Combinatorial Clock Auctions” (with Oleg V. Baranov), Annual Meeting of the Institute for Operations Research and the Management Sciences (INFORMS), Phoenix AZ, October 2012.
- “An Enhanced Combinatorial Clock Auction” (with Oleg V. Baranov), SIEPR Conference on the FCC Incentive Auctions, Stanford University, February 2013.
- “Enhancing the Combinatorial Clock Auction” (with Oleg V. Baranov), Ofcom Conference, Combinatorial Auctions for Spectrum, London School of Economics, September 2013.
- “The Combinatorial Clock Auction, Revealed Preference and Iterative Pricing” (with Oleg V. Baranov), NBER Workshop on Market Design, Stanford University, October 2013.
- “Market Design and the Evolution of the Combinatorial Clock Auction” (with Oleg V. Baranov), invited session in honor of the Nobel Prize in Economics awarded to Market Design, American Economic Association meetings, Philadelphia, January 2014.
- “Revealed Preference in Bidding: Empirical Evidence from Recent Spectrum Auctions” (with Oleg V. Baranov), NBER Market Design Conference, Palo Alto, CA, June 2014.
- “Enhancing the Combinatorial Clock Auction” (with Oleg V. Baranov), Industry Canada Retrospective on the Canadian 700 MHz Spectrum Auction, Ottawa, Canada, November 2014.
- “Efficient Procurement Auctions with Increasing Returns” (with Oleg V. Baranov, Christina Aperjis and Thayer Morrill), Annual Meeting of the Institute for Operations Research and the Management Sciences (INFORMS), Philadelphia PA, November 2015.
- “Efficient Procurement Auctions with Increasing Returns” (with Oleg V. Baranov, Christina Aperjis and Thayer Morrill), Workshop on Auction Design, University of Vienna, August 2016.
- “Vickrey-Based Pricing in Iterative First-Price Auctions” (with Oleg V. Baranov), Workshop on Auction Design, University of Vienna, August 2016.
- “Efficient Procurement Auctions with Increasing Returns” (with Oleg V. Baranov, Christina Aperjis and Thayer Morrill), NBER Market Design Conference, Palo Alto, CA, October 2016.



- “Market Design and the FCC Incentive Auction” (with Christina Aperjis and Oleg V. Baranov), Tenth Bi-Annual Conference on Economic Design,, York, UK, June 2017.
- “Market Design and the FCC Incentive Auction” (with Christina Aperjis and Oleg V. Baranov), NBER Market Design Conference, Cambridge, MA, October 2017.
- “Market Design and the FCC Incentive Auction” (with Christina Aperjis and Oleg V. Baranov), New Perspectives on Spectrum Policy Workshop, U Penn Law School, April 2018.
- “Revealed Preference and Activity Rules in Auctions” (with Oleg V. Baranov), keynote talk, York Annual Symposium on Game Theory 2018, York, UK, June 2018.
- “Market Design and the FCC Incentive Auction” (with Christina Aperjis and Oleg V. Baranov), INFORMS Workshop on Mathematical Optimization in Market Design, Ithaca, NY, June 2018.
- “Market Design and the FCC Incentive Auction” (with Christina Aperjis and Oleg V. Baranov), European Economic Association Annual Congress, Cologne, August 2018.
- “Revealed Preference and Activity Rules in Auctions” (with Oleg Baranov), Society of Economic Design, Budapest, June 2019.
- “VCG, the Core, and Assignment Stages in Auctions” (with Oleg Baranov), Society of Economic Design, Budapest, June 2019.
- “Supply Reduction in the Broadcast Incentive Auction,” (with Christina Aperjis and Oleg Baranov), NBER Market Design Conference, Cambridge, MA, October 2019.
- “Supply Reduction in the Broadcast Incentive Auction,” (with Christina Aperjis and Oleg Baranov), Econometric Society World Congress, Virtual Milan, August 2020.
- “Supply Reduction in the Broadcast Incentive Auction,” (with Christina Aperjis and Oleg Baranov), INFORMS Annual Meeting, Virtual Washington DC, November 2020.

### **Professional Service**

- Mentored the National Winner of the 2017-18 Siemens Competition in Math, Science and Technology (Andrew Komo of Bethesda, MD).
- Member of working group for the design and implementation of the broadcast incentive auction for the US Federal Communications Commission, 2011–2017.
- Bureau of Ocean Energy Management, US Department of Interior, for the design and implementation of offshore wind energy auctions, 2012–present.
- Advisor to Innovation, Science and Economic Development Canada for the design and implementation of 600 MHz, 700 MHz and 2.5 GHz spectrum auctions, 2011 – present.

Advisor to the Australian Communications and Media Authority for the design and implementation of the Australian Digital Dividend Auction and future spectrum auctions, 2011 – present.

Congressional Briefing on “How Fundamental Economic Research Improves People’s Lives,” Rayburn House Office Building, March 2010.

Testified before the Committee on Banking, Housing and Urban Affairs of the US Senate, Hearing on “Modernizing Consumer Protection in the Financial Regulatory System: Strengthening Credit Card Protections,” February 12, 2009.

Testified before the Subcommittee on Financial Institutions and Consumer Credit of the US House of Representatives, Hearing on “The Credit Cardholders’ Bill of Rights: Providing New Protections for Consumers,” March 13, 2008.

Member, National Science Foundation Economics Panel, 2004 – 2005.

Associate Editor, *Berkeley Electronic Journals of Theoretical Economics*, 2004 – present.

Guest Associate Editor, *Management Science*, issue on Electronic Auctions, 2003.

Program Chair of the 2001 North American Summer Meeting of the Econometric Society (with Peter Cramton), University of Maryland, June 21–24, 2001.

Program Committee of the North American Summer Meeting of the Econometric Society, UCLA, June 2002, and University of Pennsylvania, June 1991.

Organized Maryland Auction Conference (with Peter Cramton), Wye River Conference Center, May 1998, sponsored by the National Science Foundation, the World Bank, and the University of Maryland.

Spoke at a Forum on Bankruptcy of the Financial Services Committee of the United States House of Representatives, February 28, 2001.

Testified before the Subcommittee on Commercial and Administrative Law of the United States House of Representatives, Hearing on the Consumer Bankruptcy Issues in the Bankruptcy Reform Act of 1998, March 10, 1998.

Testified before the Subcommittee on Financial Institutions and Regulatory Relief of the United States Senate, Hearing on Bankruptcy Reform, February 11, 1998.

Testified before the National Bankruptcy Review Commission, January 1997.

Referee for: *American Economic Review*, *Econometrica*, *European Economic Review*, *Games and Economic Behavior*, *International Journal of Game Theory*, *International Journal of Industrial Organization*, *Journal of Banking and Finance*, *Journal of Business*, *Journal of Economic Theory*, *Journal of Financial Intermediation*, *Journal of Political Economy*, *Quarterly Journal of Economics*, *Rand Journal of Economics*, *Review of Economic Studies*, and the National Science Foundation.

**Professional Organizations**

American Economic Association  
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INFORMS

## Attachment E

## New England Governors, State Utility Regulators and Related Agencies

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