

Proposed Installed Capacity Requirement and Related Values for Sixteenth Forward Capacity Auction (FCA 16)



Reliability Committee

Manasa Kotha

LEAD ENGINEER | RESOURCE STUDIES AND ASSESSMENTS



Objective of This Presentation

- Review the ICR-Related Values development schedule
- Review the proposed ICR-Related Values consisting of:
 - Installed Capacity Requirement (ICR)
 - Local Resource Adequacy Requirement (LRA), Transmission Security Analysis (TSA), and Local Sourcing Requirement (LSR) for the import-constrained Capacity Zone of Southeast New England (SENE)
 - SENE is the combined Load Zones of NEMA/Boston, SEMA, and RI
 - Maximum Capacity Limit (MCL) for the export-constrained Capacity Zones of Northern New England (NNE) and Maine (nested in NNE)
 - NNE is the combined Load Zones of Maine, VT, and NH
 - Marginal Reliability Impact (MRI) Demand Curves

Notes:

- The ICR, LRA, TSA, LSR, MCL, the MRI system and zonal Demand Curves, and the Hydro-Quebec Interconnection Capability Credits (HQICCs) are collectively called the ICR-Related Values
- For details on ICR-Related Values development, see [ICR Reference Guide](#)
- Acronyms not defined are spelled out in Appendix-II

FCA 16 ICR-Related Values Development Schedule

Date	Topic
May 20	Power Supply Planning Committee (PSPC) reviewed Capacity Zone determinations
June 29	PSPC reviewed ICR-Related Values calculation assumptions and assumptions for tie benefits study
July 27	PSPC reviewed tie benefits study results
August 25	PSPC reviewed proposed ICR-Related Values
September 1	Reliability Committee (RC) initial review of proposed ICR-Related Values
September 21	RC review/vote of proposed ICR-Related Values
October 7	PC review/vote of proposed ICR-Related Values
By November 9	File ICR-Related Values with FERC

PROPOSED ICR-RELATED VALUES FOR FCA 16



ISO Proposed FCA 16 ICR-Related Values for CCP 2025-2026 (MW)

2025-2026 FCA 16	New England	Southeast New England	Maine	Northern New England
Peak Load (50/50) net of BTM PV	28,025	11,991	2,129	5,462
Peak Load (90/10) net of BTM PV	29,988	12,960	2,240	5,739
Existing Capacity Resources	33,523	9,922	3,674	8,421
ICR	32,568			
HQICCs	923			
Net ICR (ICR minus HQICCs)	31,645			
LSR		9,450		
MCL			4,095	8,555

Notes:

- The Existing Capacity Resources value reflects the existing resources with Qualified Capacity for FCA 16 at the time of the ICR calculation and reflects applicable retirements and terminations
- 50/50 and 90/10 peak loads, net of behind-the-meter photovoltaic (BTM PV) (includes both transportation and heating electrification forecasts) are shown for informational purposes



Comparison of ICR-Related Values (MW)

CCP 2025-2026 (FCA 16) vs CCP 2024-2025 (FCA 15)

	New England		Southeast New England		Maine		Northern New England	
	2025-2026 FCA 16	2024-2025 FCA 15	2025-2026 FCA 16	2024-2025 FCA 15	2025-2026 FCA 16	2024-2025 FCA 15	2025-2026 FCA 16	2024-2025 FCA 15
Peak Load Net of BTM PV (50/50)	28,025	29,303	11,991	12,679	2,129	2,230	5,462	5,645
Existing Capacity Resources	33,523	33,332	9,922	9,665	3,674	3,483	8,421	8,324
Installed Capacity Requirement	32,568	34,153						
HQICCs	923	883						
NET ICR (ICR minus HQICCs)	31,645	33,270						
LRA			9,450	10,305				
TSA			8,962	10,005				
LSR			9,450	10,305				
MCL					4,095	4,145	8,555	8,680

Notes:

- The Existing Capacity Resources value reflects the existing resources with Qualified Capacity for FCA 16 at the time of the ICR calculation and reflects applicable retirements and terminations
- For details on the calculation of the ICR and related values for FCA 15 (associated with the Capacity Commitment Period 2024-2025) see: https://www.iso-ne.com/static-assets/documents/2020/09/a8_fca_15_icr_and_tie_benefits_presentation_r1.pptx
- The 50/50 peak load net of BTM PV (includes both transportation and heating electrification forecasts) is shown for informational purposes

ICR Calculation Details

Total MW Breakdown	2025-2026 FCA 16 ICR (MW)
Generating Capacity Resources	29,855
Demand Resources	3,667
Import Capacity Resources	-
Tie Benefits	1,830
OP-4 Actions 6 & 8 (Voltage Reduction)	263
Minimum System Reserve	(700)
Total MW	34,916

Installed Capacity Requirement Calculation Details	2025-2026 FCA 16 ICR (MW)
Annual Peak	28,025
Total Capacity	34,916
Tie Benefits	1,830
HQICCs	923
OP-4 Actions 6 & 8 (Voltage Reduction)	263
Minimum System Reserve	(700)
ALCC	1,663
Installed Capacity Requirement	32,568
Net ICR	31,645
Reserve Margin with HQICCs	16.2%
Reserve Margin without HQICCs	12.9%

$$\text{Installed Capacity Requirement (ICR)} = \frac{\text{Capacity} - \text{Tie Benefits} - \text{OP4 Load Relief}}{1 + \frac{\text{ALCC}}{\text{APk}}} + \text{HQICCs}$$

Notes:

- All values in the table are in MW except the reserve margin which is shown in percent
- ALCC is the “additional load carrying capability” used to bring the system to the target reliability criterion
- APK is the forecast gross 50/50 peak load net of BTM PV (includes both transportation and heating electrification forecasts)

Effect of Updated FCA 16 Assumptions on Net ICR

Assumption	2025-2026 FCA 16		2024-2025 FCA 15		Effect on Net ICR (MW)
Tie Benefits	287 MW New York		258 MW New York		-95
	478 MW Maritimes		454 MW Maritimes		
	923 MW Quebec (HQICCs)		883 MW Quebec (HQICCs)		
	142 MW Quebec via Highgate		140 MW Quebec via Highgate		
Total	1,830 MW		1,735 MW		
	MW	WAEFORd (%)	MW	WAEFORd (%)	
Generation Resources	29,855	6.2	29,383	6.1	155
Demand Resources	3,667	2.3	3,867	1.0	
Imports	0	0.0	82	0.5	
	MW		MW		
50/50 Gross Load Forecast net BTM PV	28,025		29,303		-1705
Passive Demand Resource (PDR) reconstitution methodology changes					-1545
BTM PV forecast change					-200
Load forecast uncertainty due to the annual data refresh and updated model estimation period change					-120
Economic forecast data change					245
	MW		MW		
Net ICR	31,645		33,270		-1,625

Notes:

- Methodology: Using the model associated with the 2024-2025 FCA 15 ICR calculation, change one assumption at a time and note the change in Net ICR
- The impact of each assumption change on Net ICR is not additive since they are evaluated one assumption at a time. The approach would not capture the compound effects of these assumptions changes when modeled together
- Generation forced outage assumption is a weighted average (WA) of individual generators' 5-year average Equivalent Forced Outage Rate on Demand (EFORd) and Intermittent Power Resources assumed 100% available
- For additional details on the PDR reconstitution methodology changes see [May 2021 PSPC meeting material](#)

Comparison of LRA – SENE

	Local Resource Adequacy Requirement - SENE		
Southeast New England Capacity Zone		2025-2026 FCA 16	2024-2025 FCA 15
Resource _z	[1]	9,922	9,665
Proxy Units _z	[2]	0	0
Firm Load Adjustment _z	[3]	443	-604
FOR _z	[4]	0.062	0.057
LRA _z	[5]=[1]+[2]-([3]/(1-[4]))	9,450	10,305
Rest of New England Zone			
Resource	[6]	23,601	23,667
Proxy Units	[7]	0	0
Firm Load Adjustment	[8] = -[3]	-443	604
Total System Resources	[9]=[1]+[2]-[3]+[6]+[7]-[8]	33,523	33,332
Peak Load Net of BTM PV (50/50)		11,991	12,679

Notes:

- All values in the table are in MW except the Forced Outage Rate_z (FOR_z)
- SENE interface transfer limits have been increased by 100 MW (i.e., from 5,150 MW for FCA 15 to 5,250 MW) for FCA 16. See March 17, 2021 presentation available at: https://www.iso-ne.com/static-assets/documents/2021/03/a8_fca_16_transmission_transfer_capability_and_capacity_zonal_development.pdf
- The 50/50 peak load net of BTM PV (includes both transportation and heating electrification forecast) is shown for informational purposes

Comparison of TSA Requirement – SENE (MW)

SENE Capacity Zone	2025-2026 FCA 16	2024-2025 FCA 15
Peak Load net of BTM PV (90/10)	12,960	13,739
Reserves (Largest unit or loss of import capability)	700	850
Sub-area Transmission Security Need	13,660	14,589
Existing Resources	9,922	9,665
Assumed Unavailable Capacity	-611	-546
Sub-area N-1 Import Limit	5,250	5,150
Sub-area Available Resources	14,561	14,269
TSA Requirement	8,962	10,005

$$\text{TSA Requirement} = \frac{(\text{Need} - \text{Import Limit})}{1 - (\text{Assumed Unavailable Capacity} / \text{Existing Resources})}$$

Notes:

- The 90/10 peak load net of BTM PV (includes both transportation and heating electrification forecast) is shown for informational purposes
- Line-Line TSA produced a higher TSA requirement for FCA 16 and FCA 15
- All values have been rounded off to the nearest whole number
- Information on the CCP 2024-2025 CCP (FCA 15) TSA calculation available at: https://www.iso-ne.com/static-assets/documents/2020/09/a8_fca_15_icr_and_tie_benefits_presentation_r1.pptx

Comparison of MCL – NNE

LRA - Rest of New England (for NNE MCL calculation)			
Rest of New England Zone		2025-2026 FCA 16	2024-2025 FCA 15
Resource _z	[1]	25,101	25,008
Proxy Units _z	[2]	0	0
Surplus Capacity Adjustment _z	[3]	1,865	65
Firm Load Adjustment _z	[4]	26	328
FOR _z	[5]	0.0598	0.0592
LRA _z	[6]=[1]+[2]-([3]/(1-[5]))-([4]/(1-[5]))]	23,090	24,590
NNE Zone			
Resource	[7]	8,421	8,324
Proxy Units	[8]	0	0
Firm Load Adjustment	[9] = -[4]	-26	-328
Total System Resources	[10]=[1]+[2]-[4]+[7]+[8]-[9]	33,523	33,332
Maximum Capacity Limit - NNE			
Commitment Period		2025-2026 FCA 16	2024-2025 FCA 15
NICR for New England	[1]	31,645	33,270
LRA _{RestofNewEngland}	[2]	23,090	24,590
Maximum Capacity Limit _y	[3]=[1]-[2]	8,555	8,680
Peak Load Net of BTM PV (50/50)		5,462	5,645

Notes:

- All values in the table are in MW except the FOR_z
- The 50/50 peak load Net of BTM PV (includes both transportation and heating electrification forecasts) is shown for informational purposes

Comparison of MCL – ME

LRA - Rest of New England (for ME MCL calculation)			
Rest of New England Zone		2025-2026 FCA 16	2024-2025 FCA 15
Resource _z	[1]	29,849	29,849
Proxy Units _z	[2]	0	0
Surplus Capacity Adjustment _z	[3]	1,865	65
Firm Load Adjustment _z	[4]	296	618
FOR _z	[5]	0.060	0.0567
LRA _z	[6]=[1]+[2]-([3]/(1-[5]))-([4]/(1-[5]))]	27,550	29,125
NNE Zone			
Resource	[7]	3,674	3,483
Proxy Units	[8]	0	0
Firm Load Adjustment	[9] = -[4]	-296	-618
Total System Resources	[10]=[1]+[2]-[4]+[7]+[8]-[9]	33,523	33,332
Maximum Capacity Limit - ME			
Commitment Period		2025-2026 FCA 16	2024-2025 FCA 15
NICR for New England	[1]	31,645	33,270
LRA _{RestofNewEngland}	[2]	27,550	29,125
Maximum Capacity Limit _y	[3]=[1]-[2]	4,095	4,145
Peak Load Net of BTM PV (50/50)		2,129	2,230

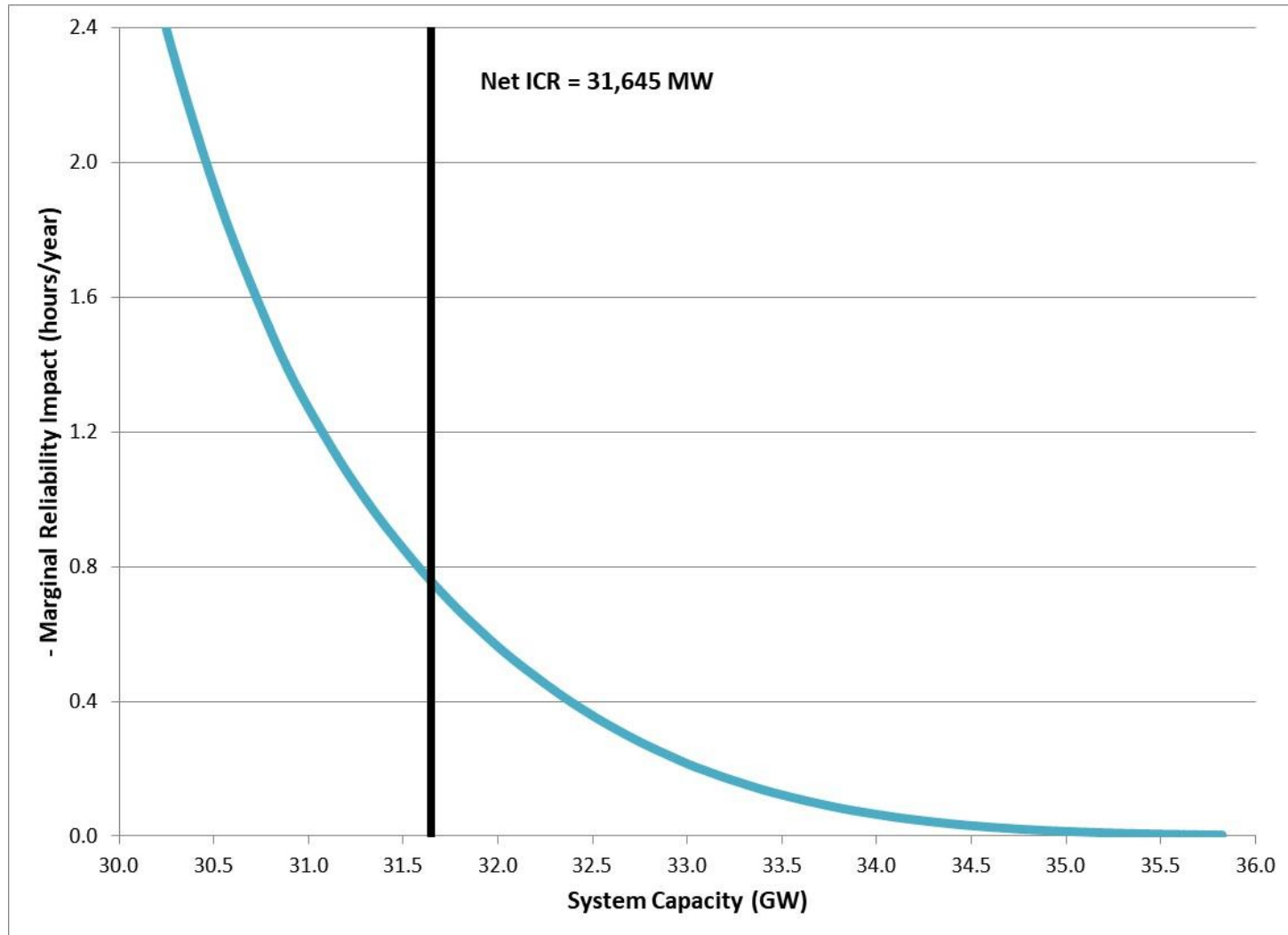
Notes:

- All values in the table are in MW except the FOR_z
- The 50/50 peak load Net of BTM PV (includes both transportation and heating electrification forecasts) is shown for informational purposes

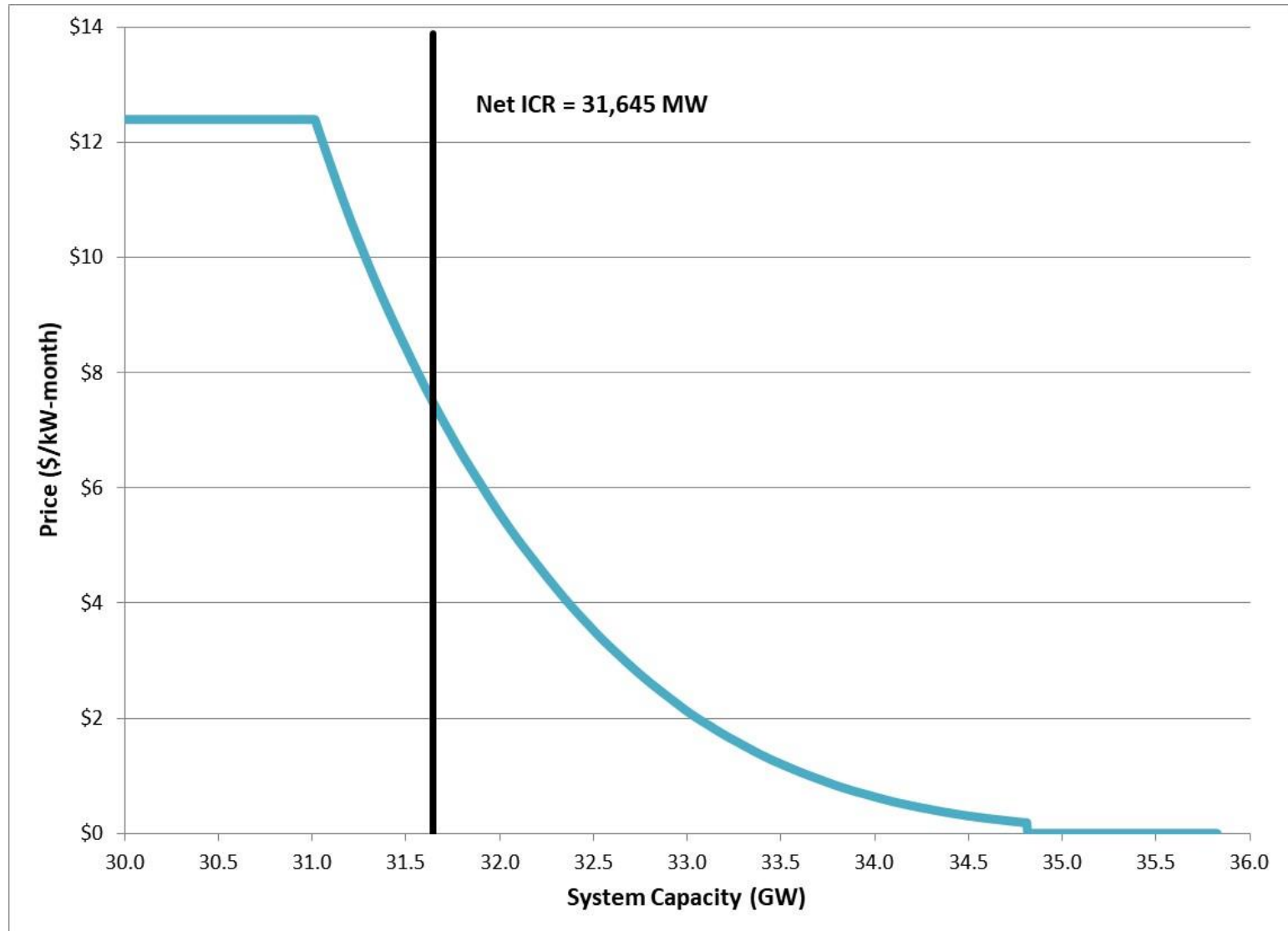
FCA 16 DEMAND CURVES



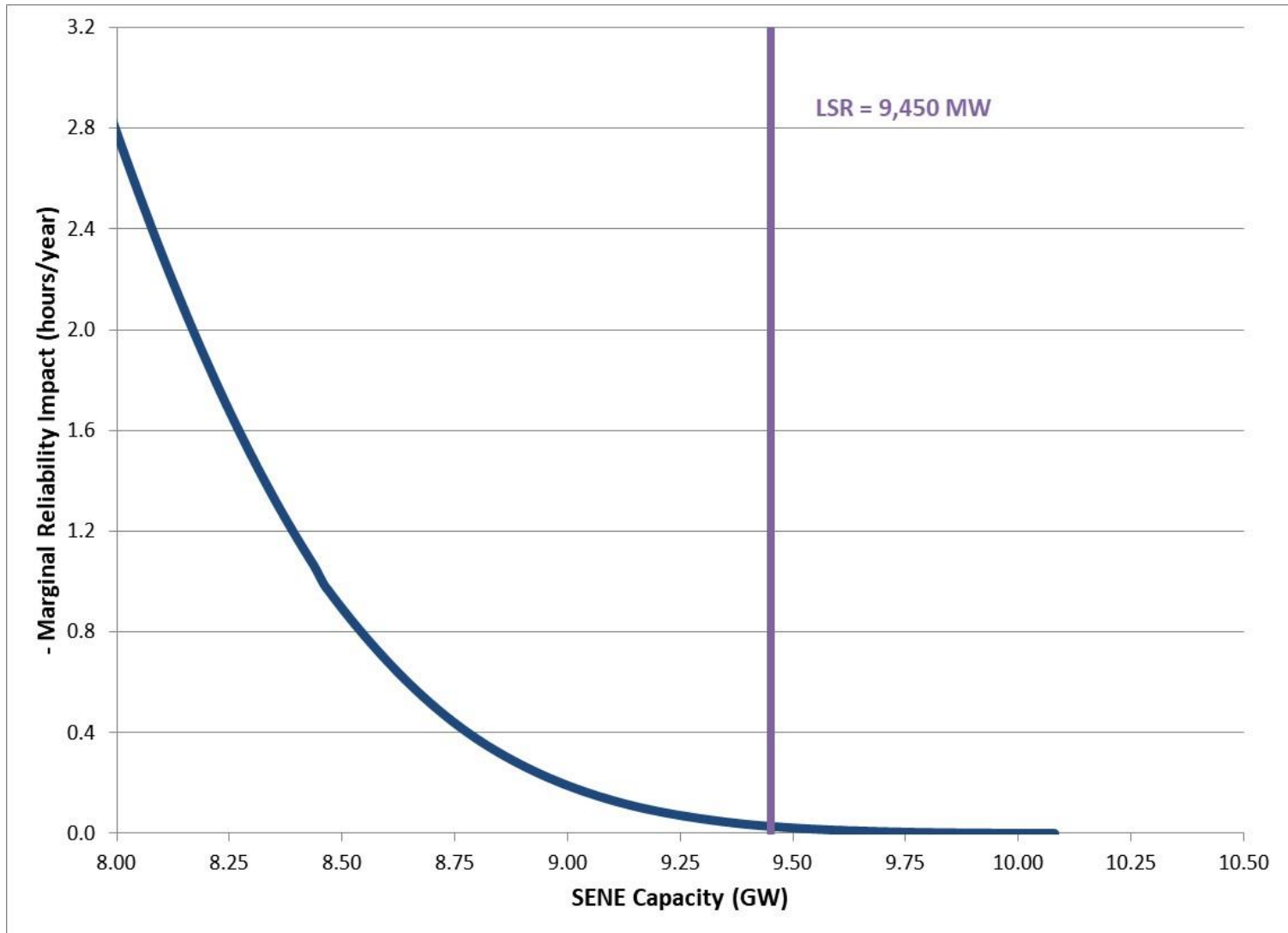
FCA 16 System-wide MRI Curve



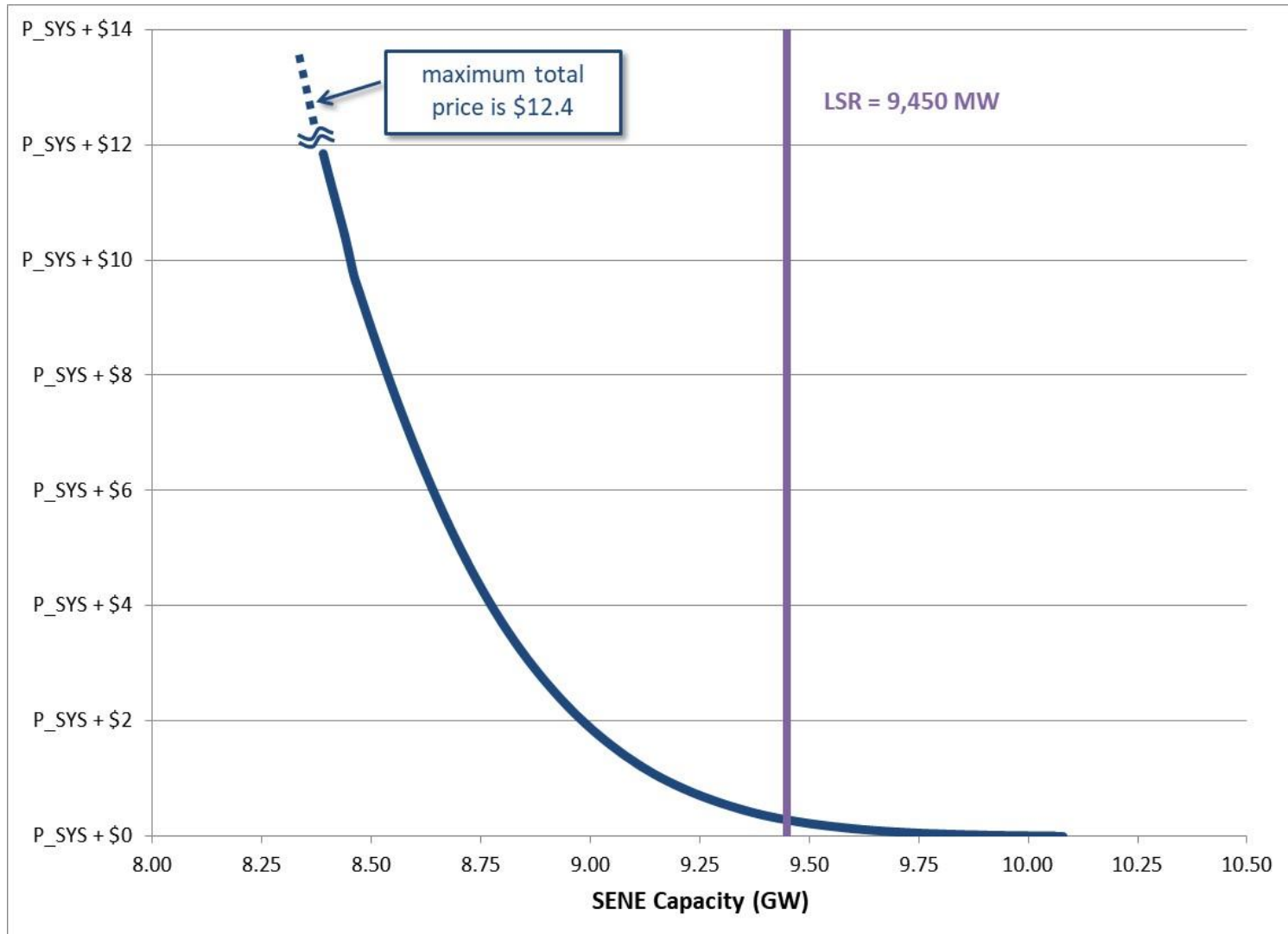
FCA 16 System-wide Demand Curve



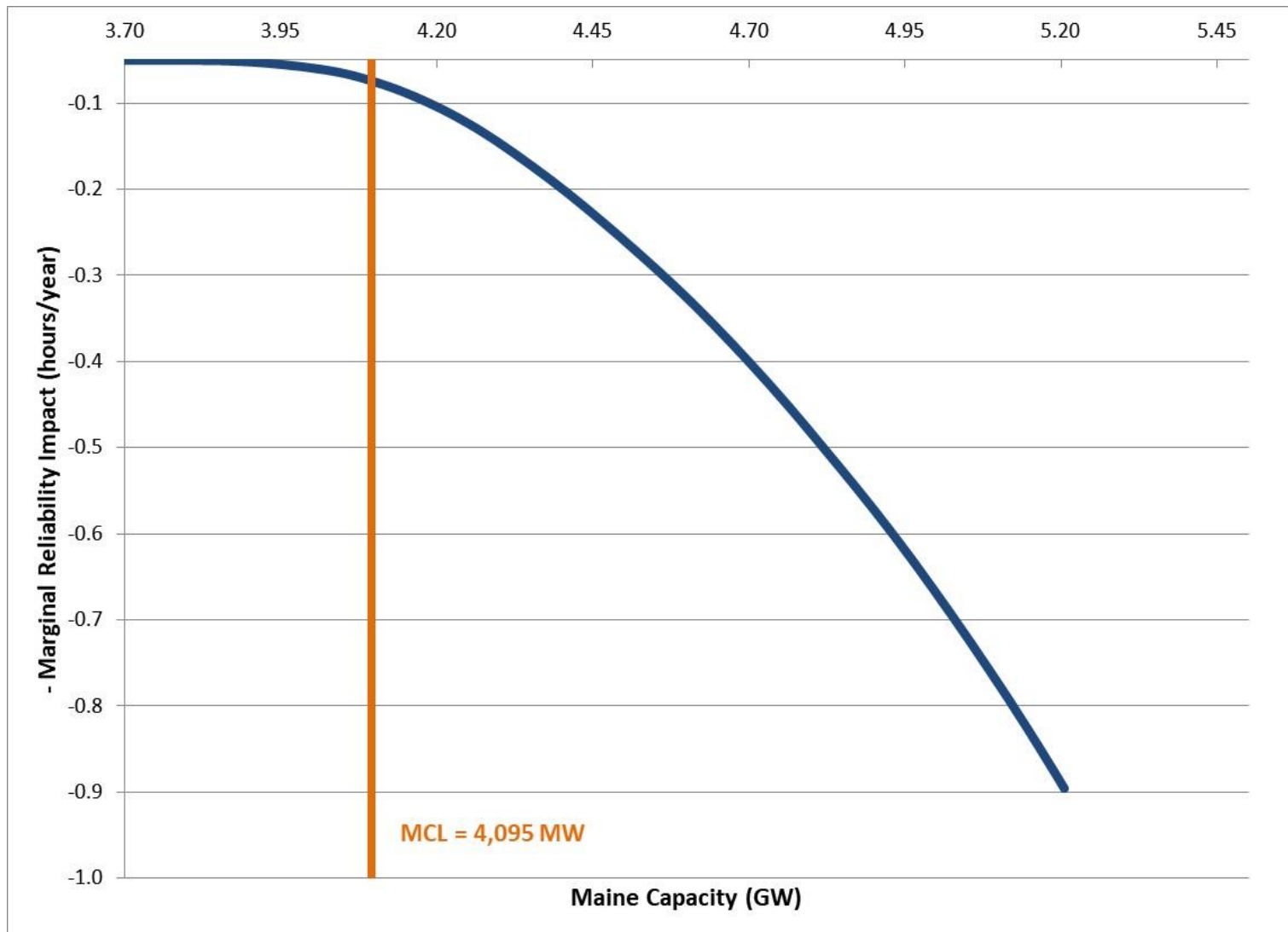
FCA 16 SENE MRI Curve



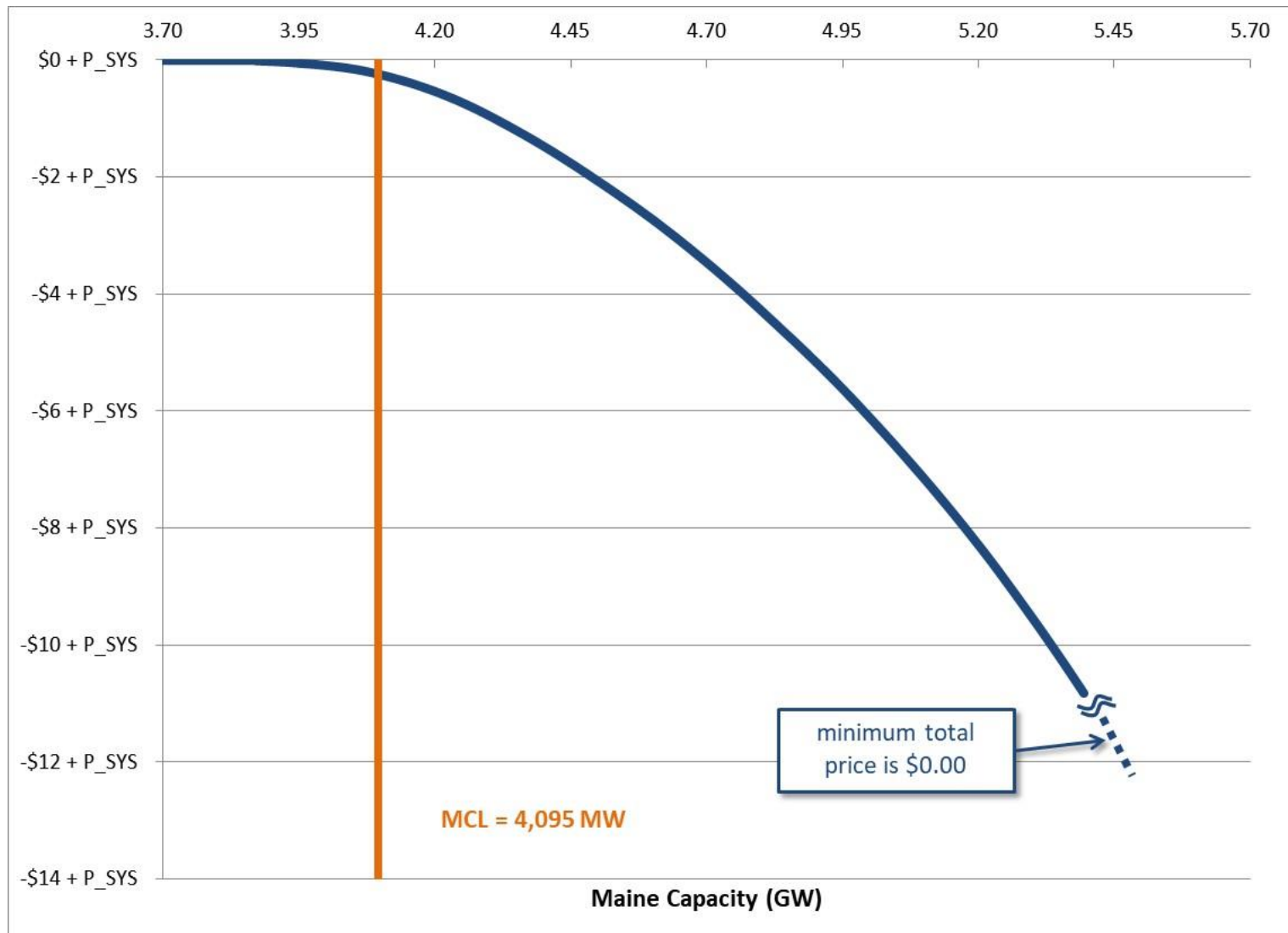
FCA 16 SENE Demand Curve



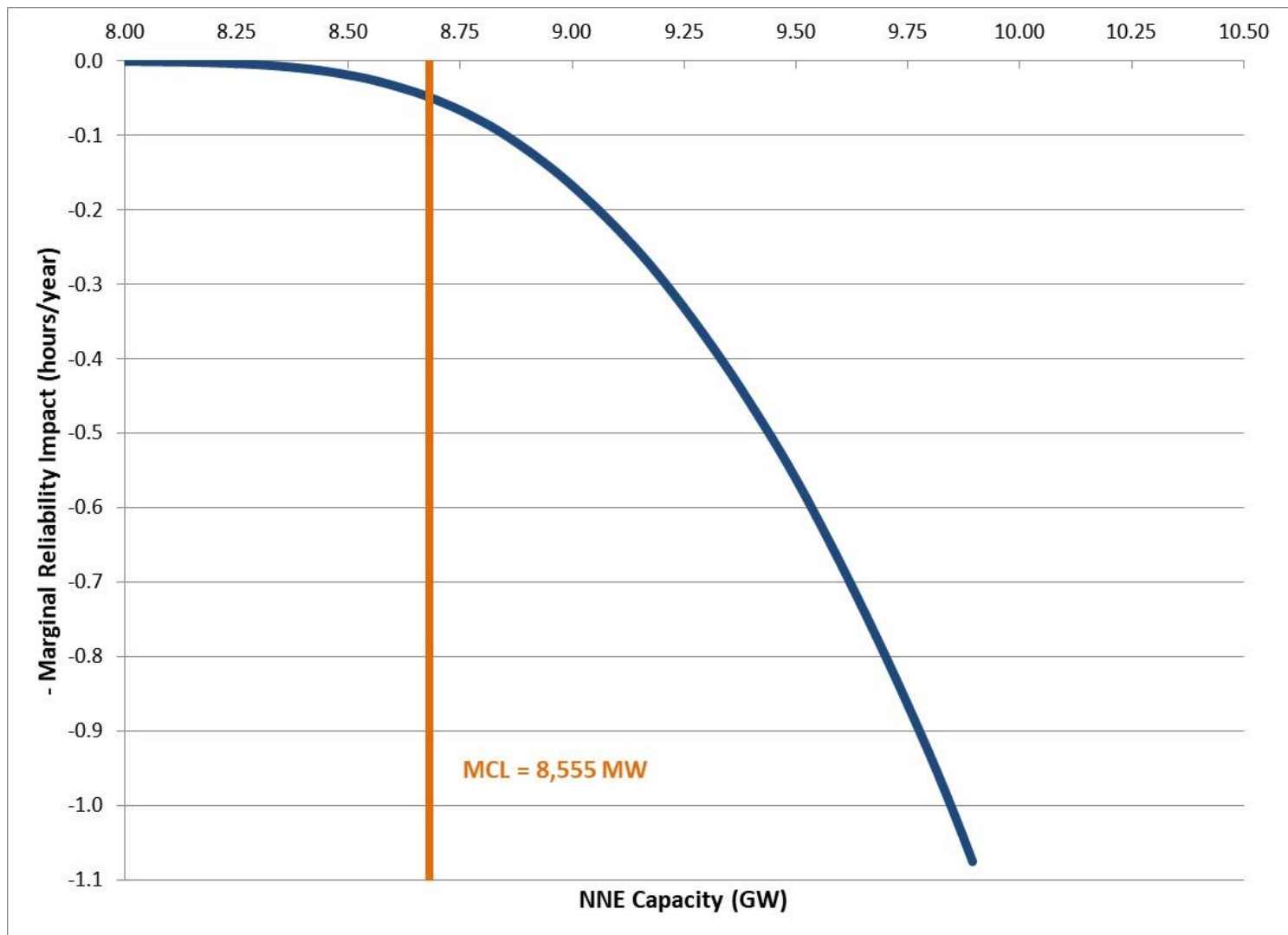
FCA 16 Maine MRI Curve



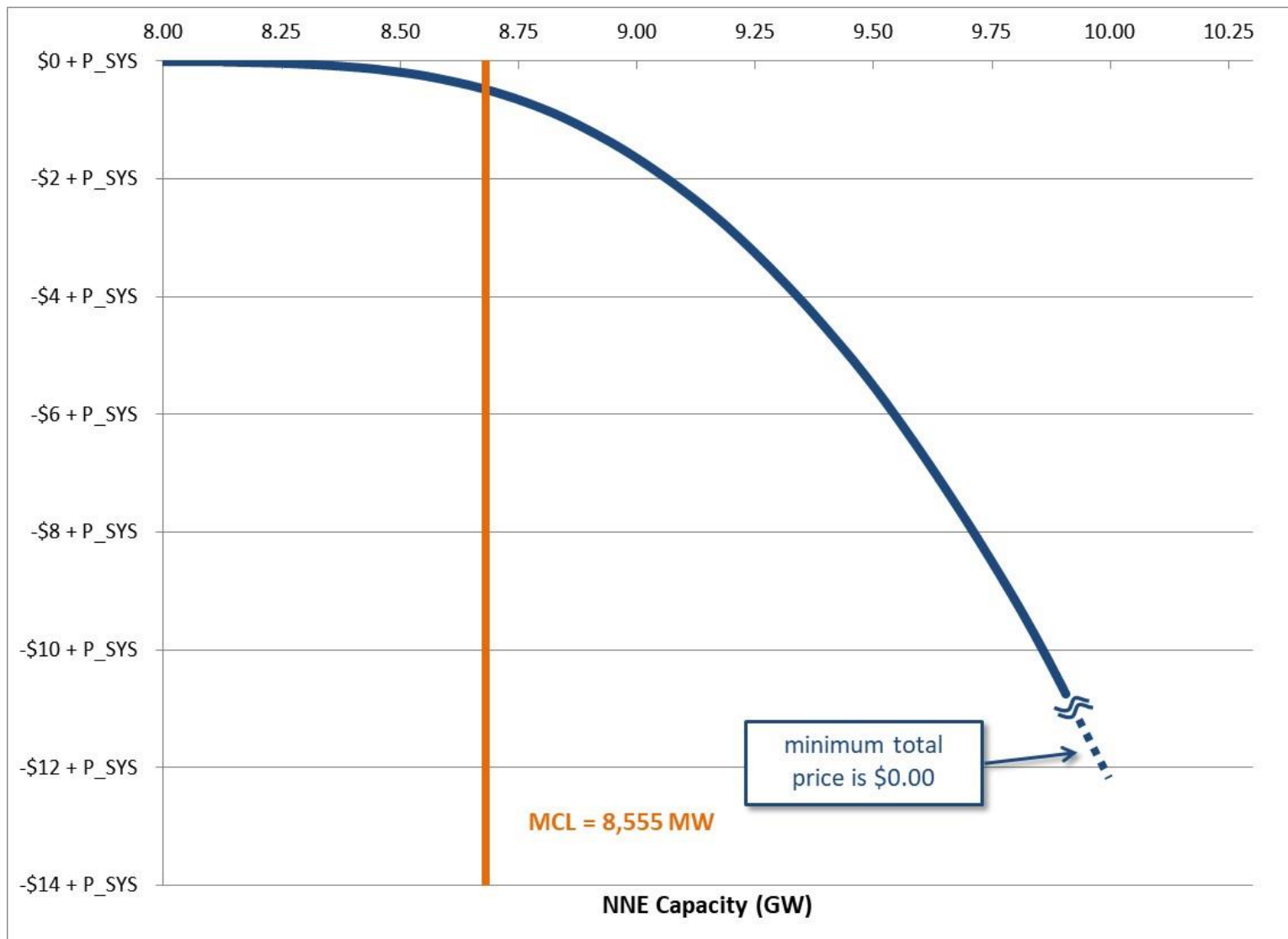
FCA 16 Maine Demand Curve



FCA 16 NNE MRI Curve



FCA 16 NNE Demand Curve

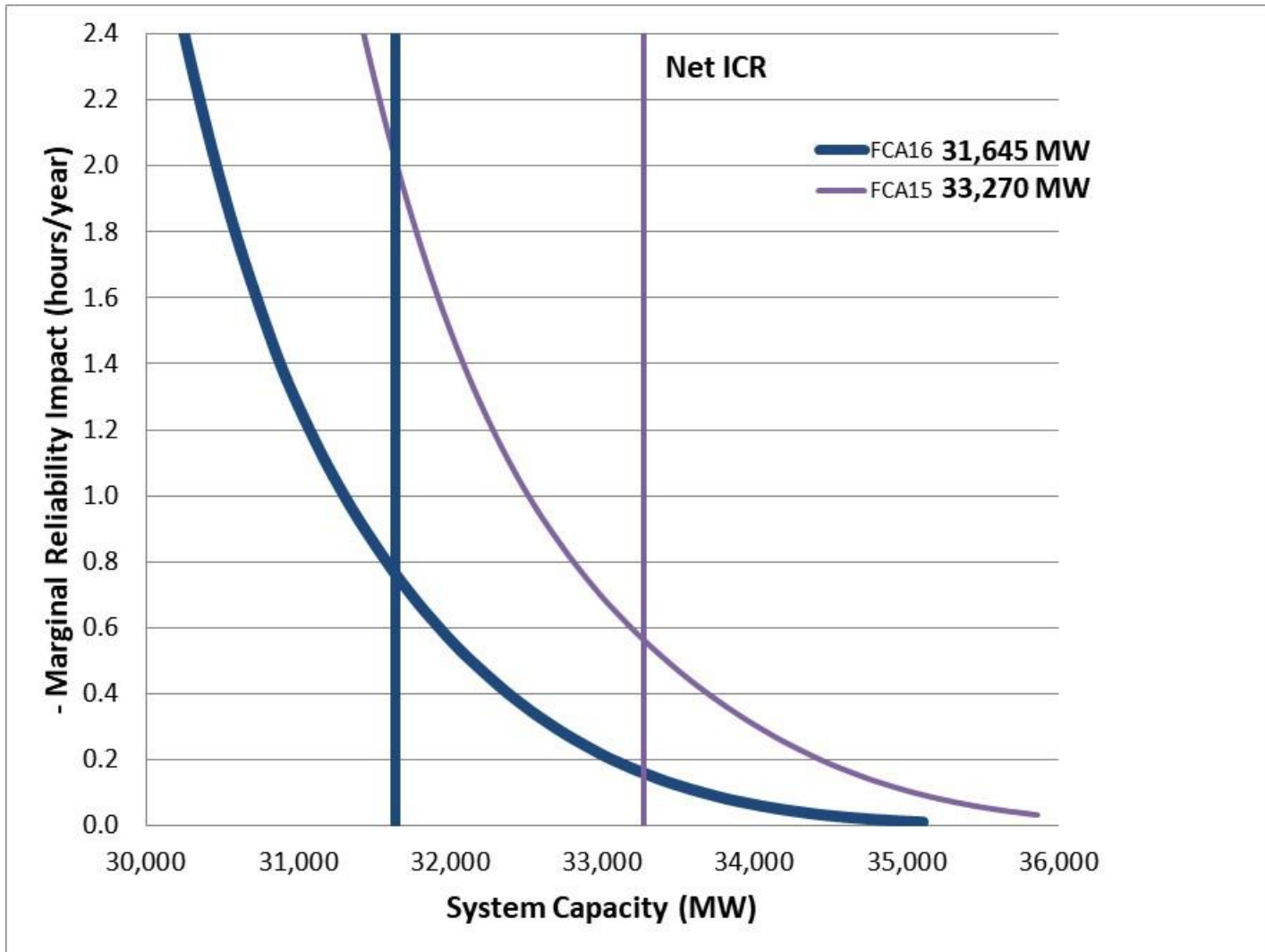


DEMAND CURVE COMPARISON

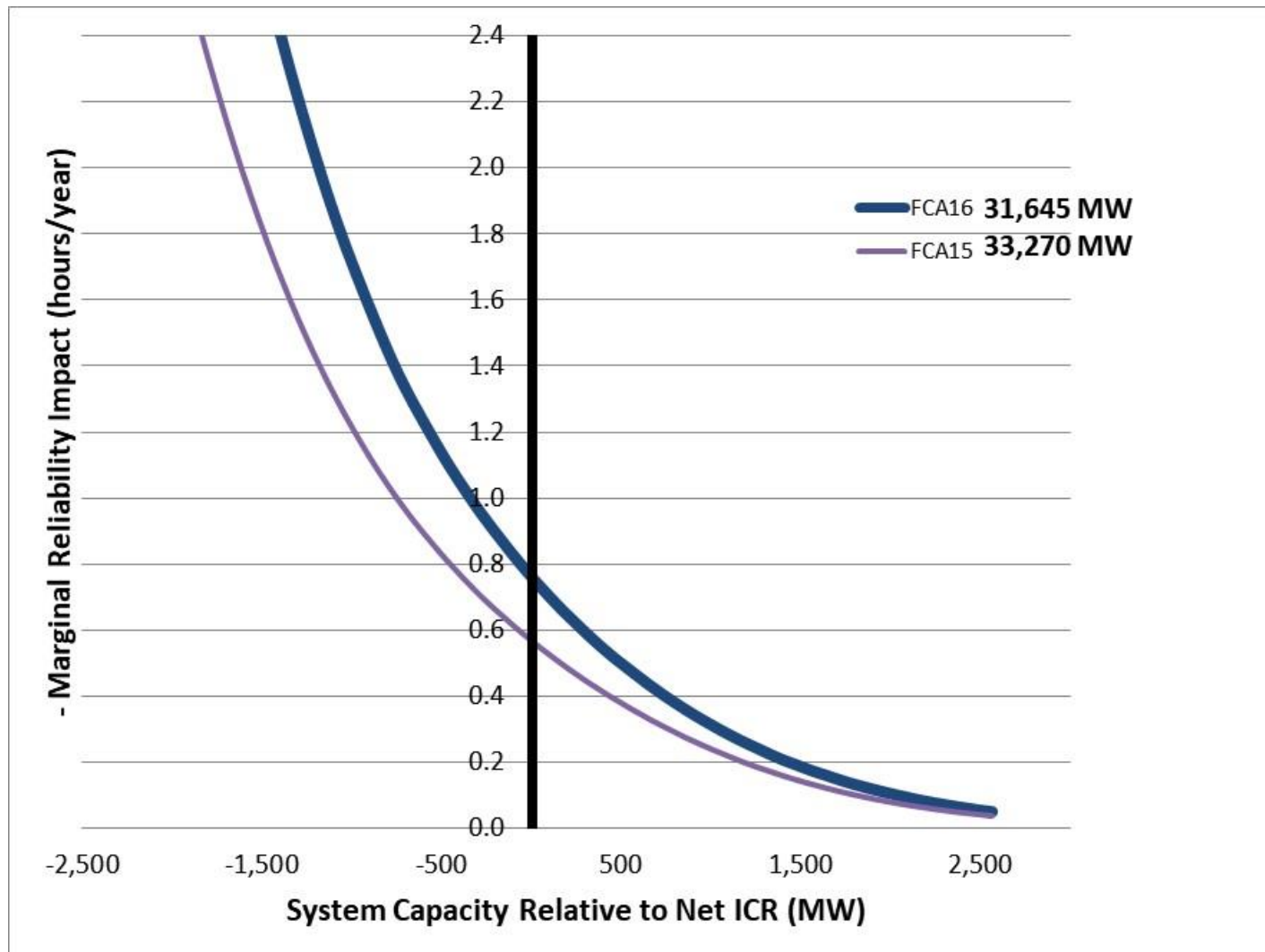
FCA 16 vs FCA 15



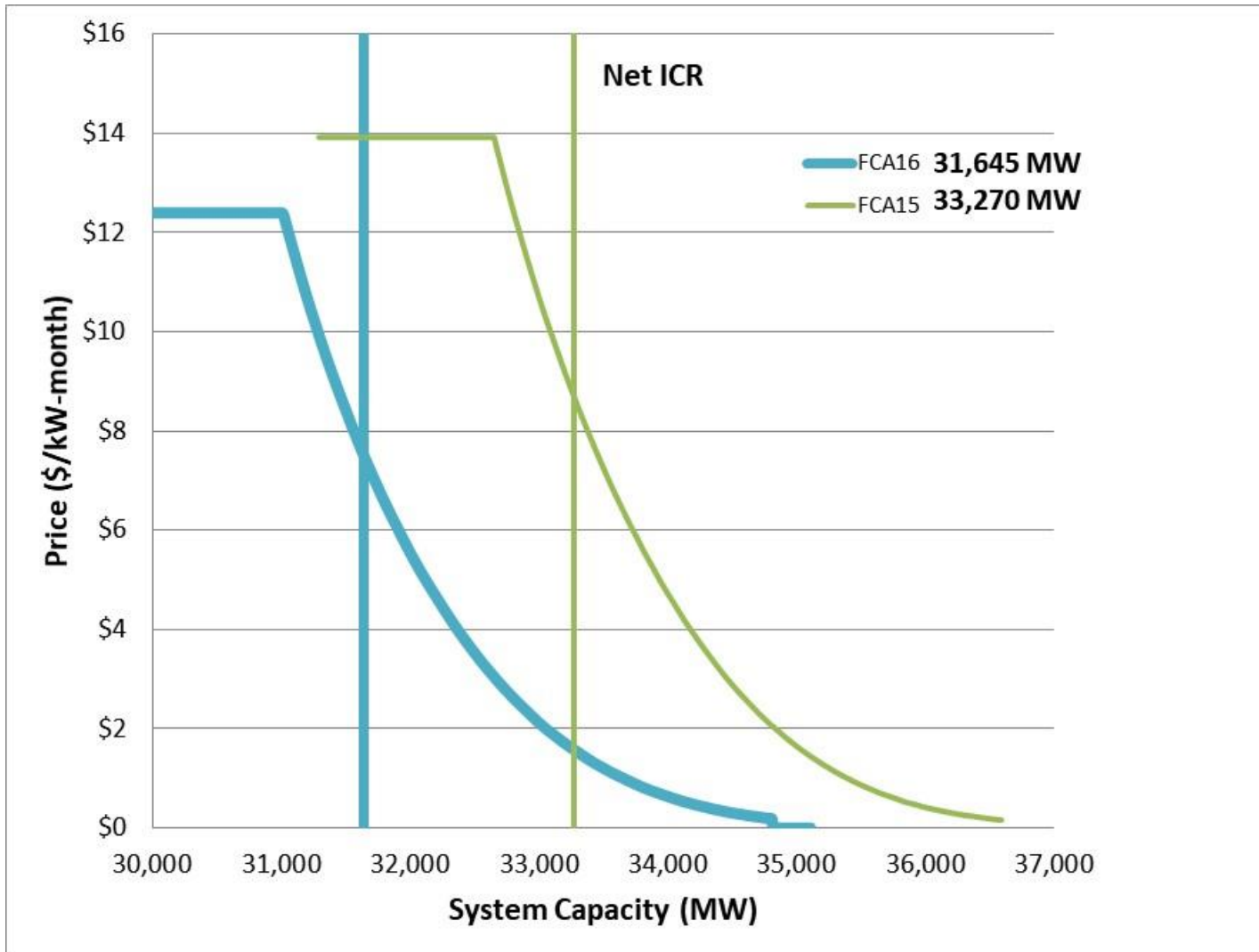
System MRI Curves



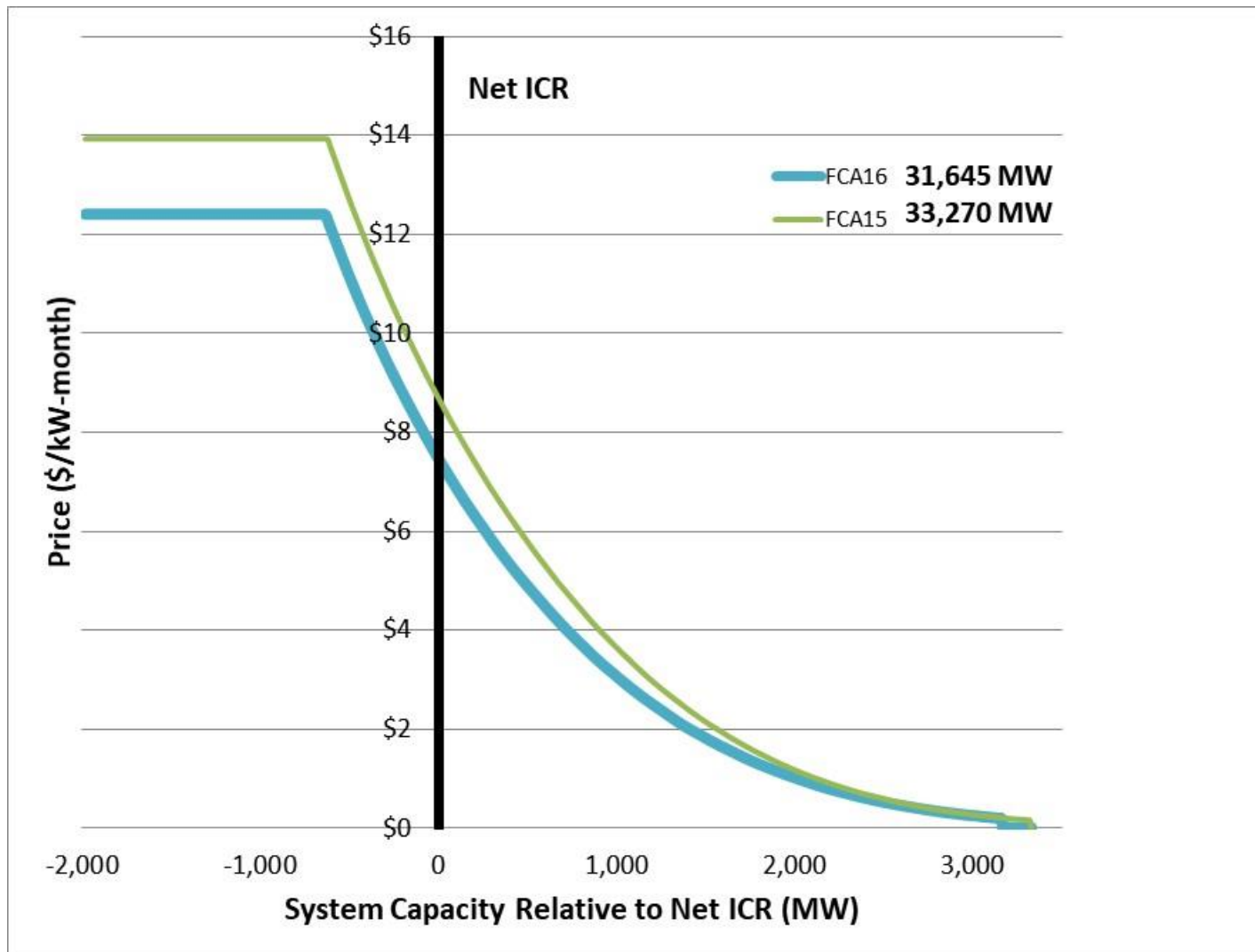
System MRI Curves - Relative to Net ICR



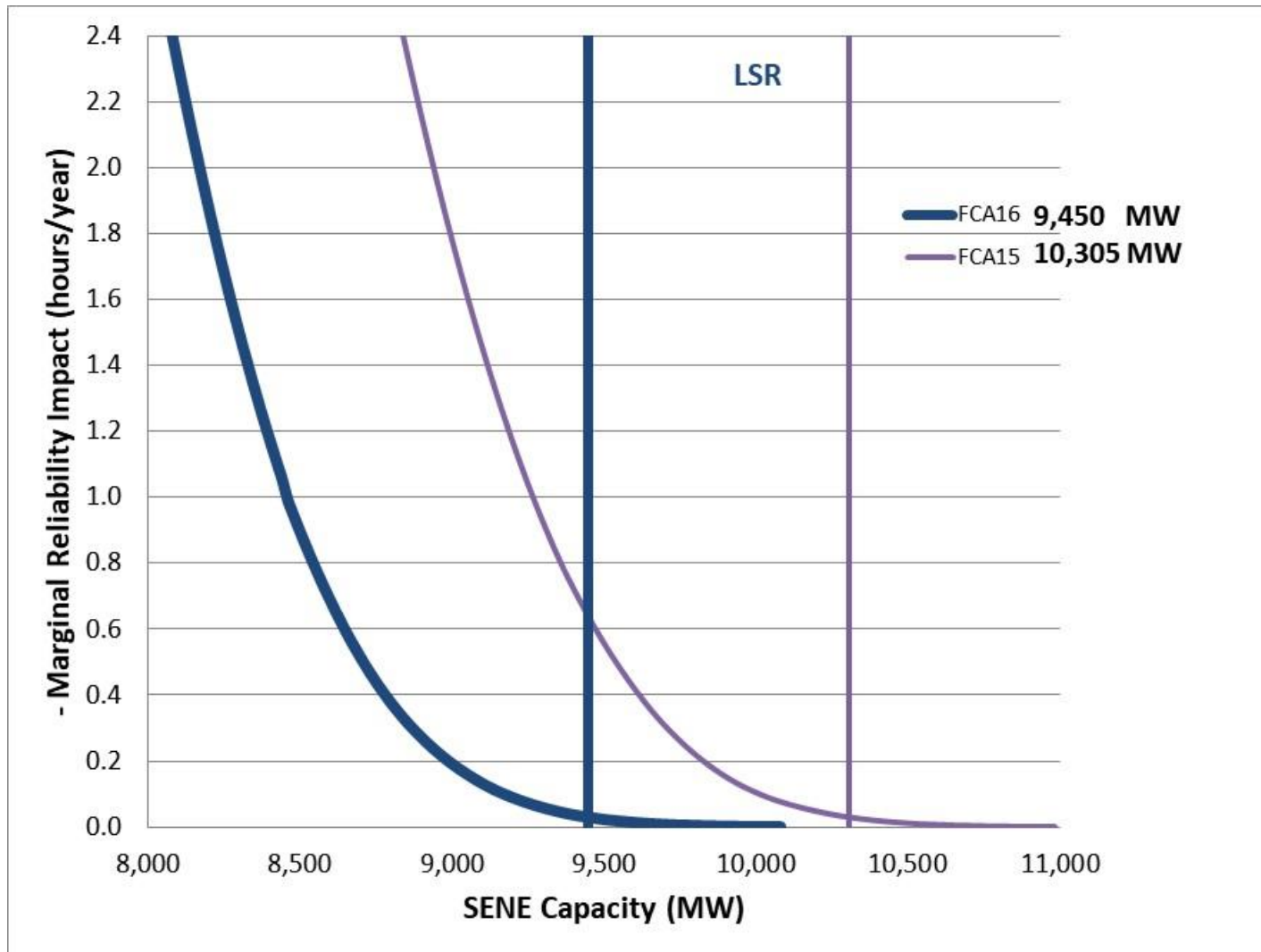
System Demand Curves



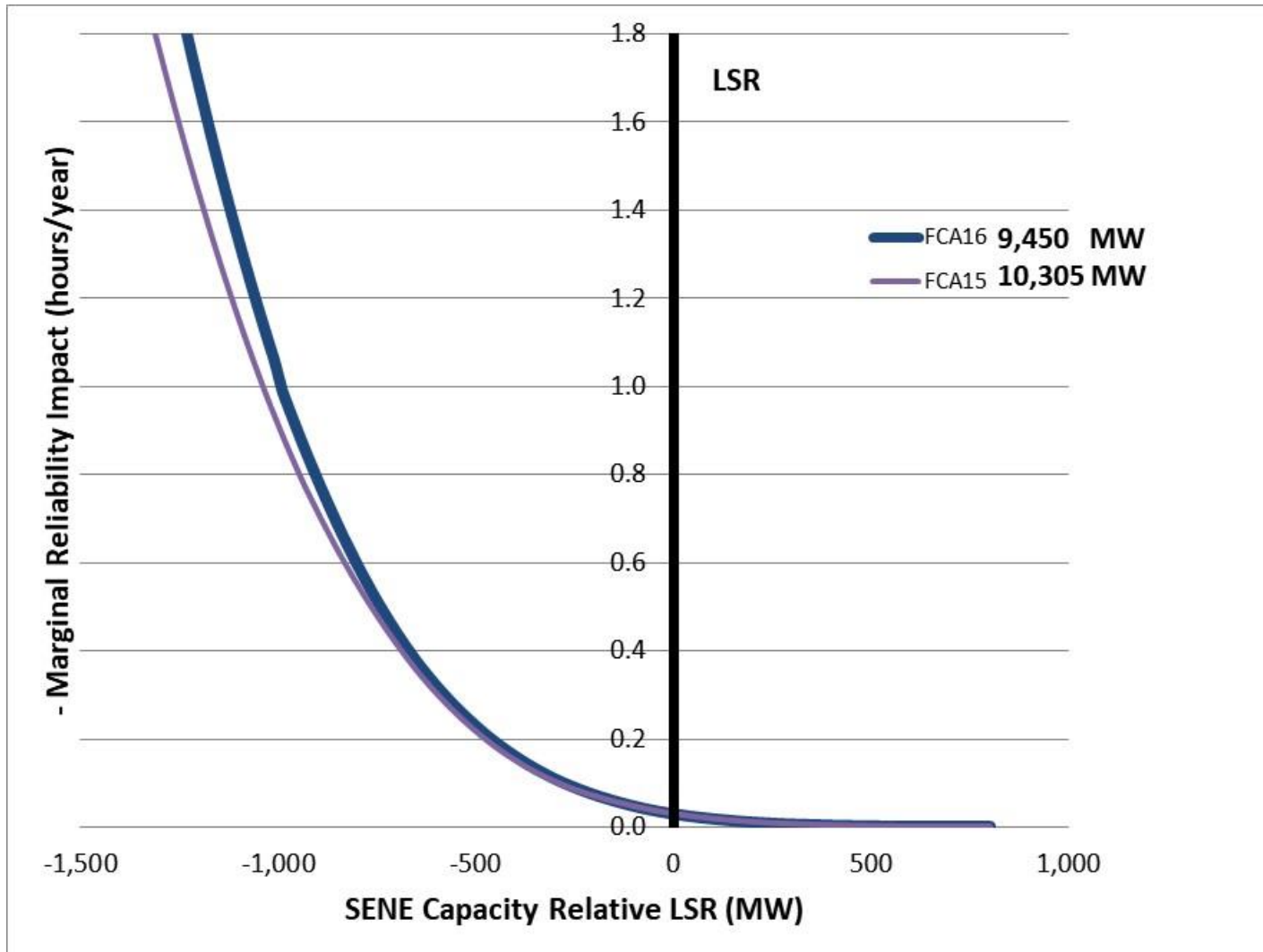
System Demand Curves - Relative to Net ICR



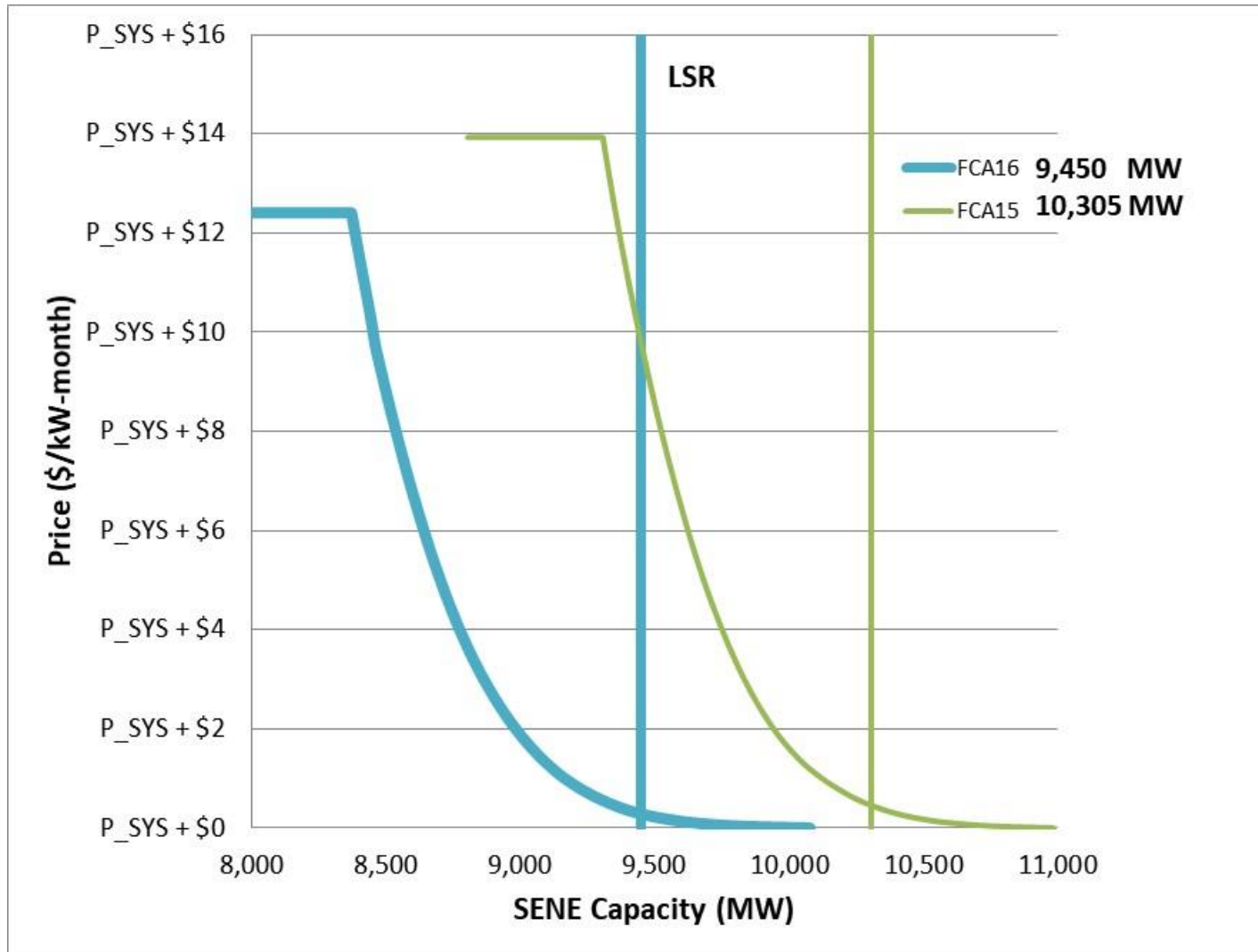
SENE MRI Curves



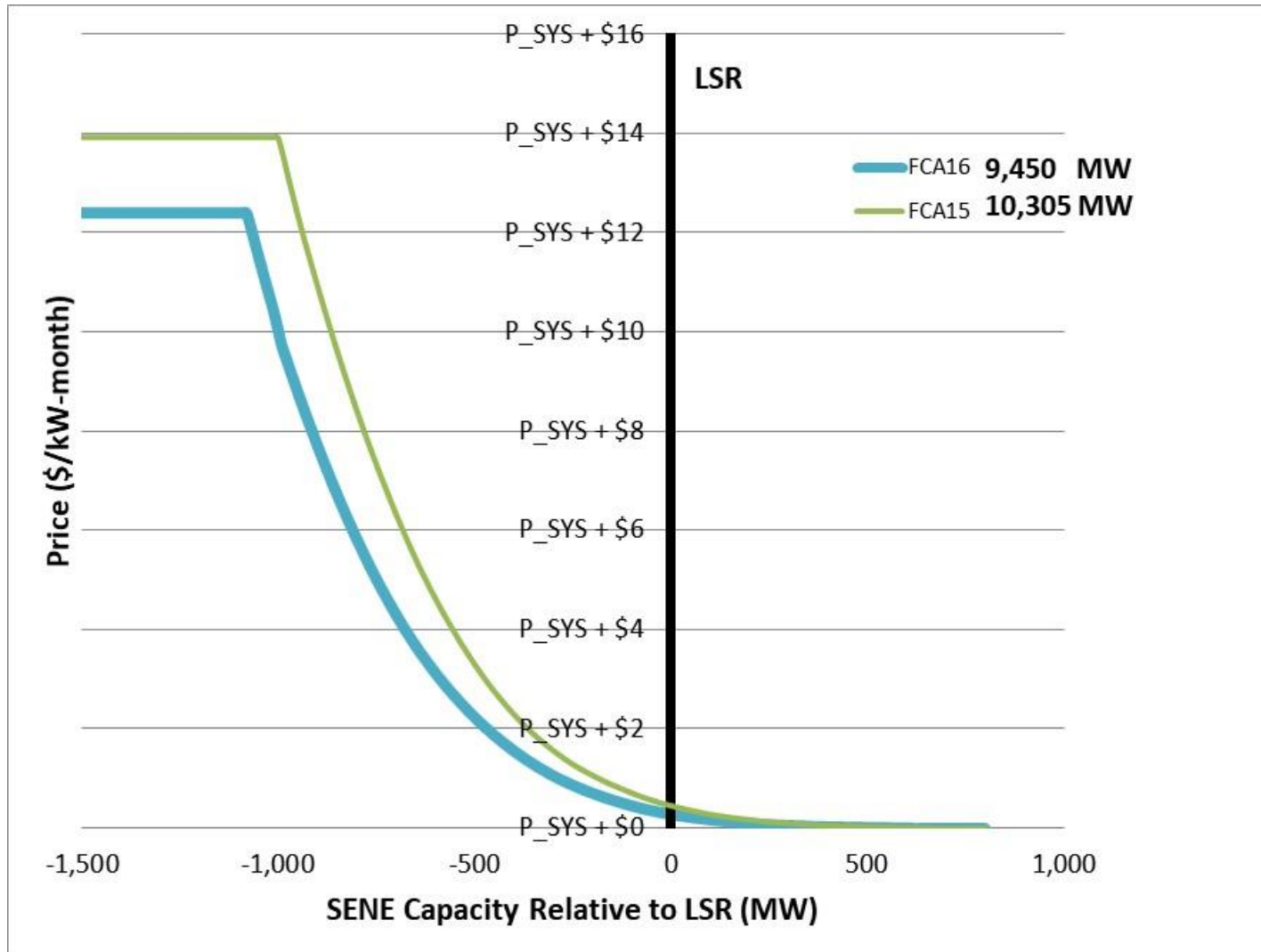
SENE MRI Curves - Relative to LSR



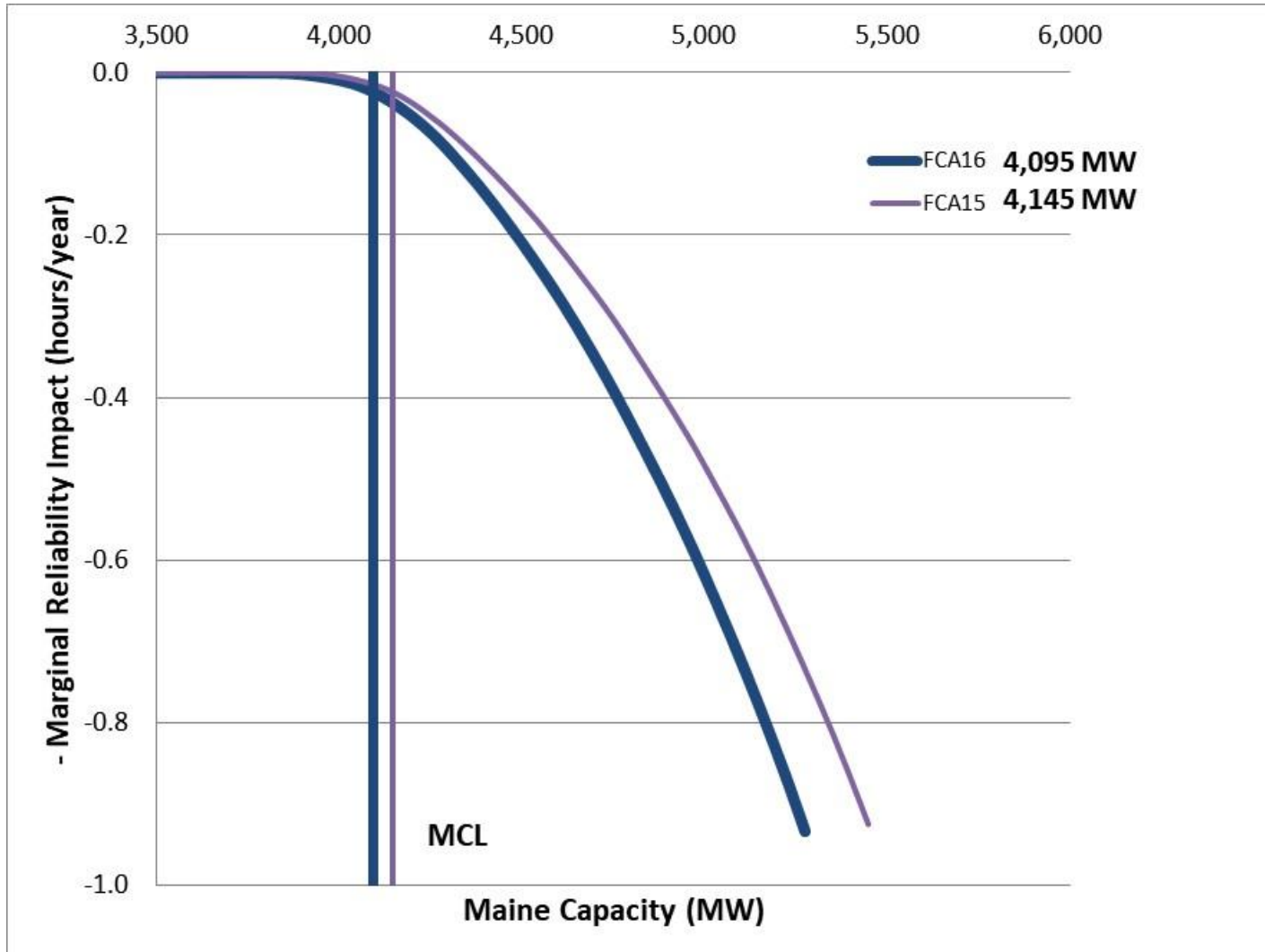
SENE Demand Curves



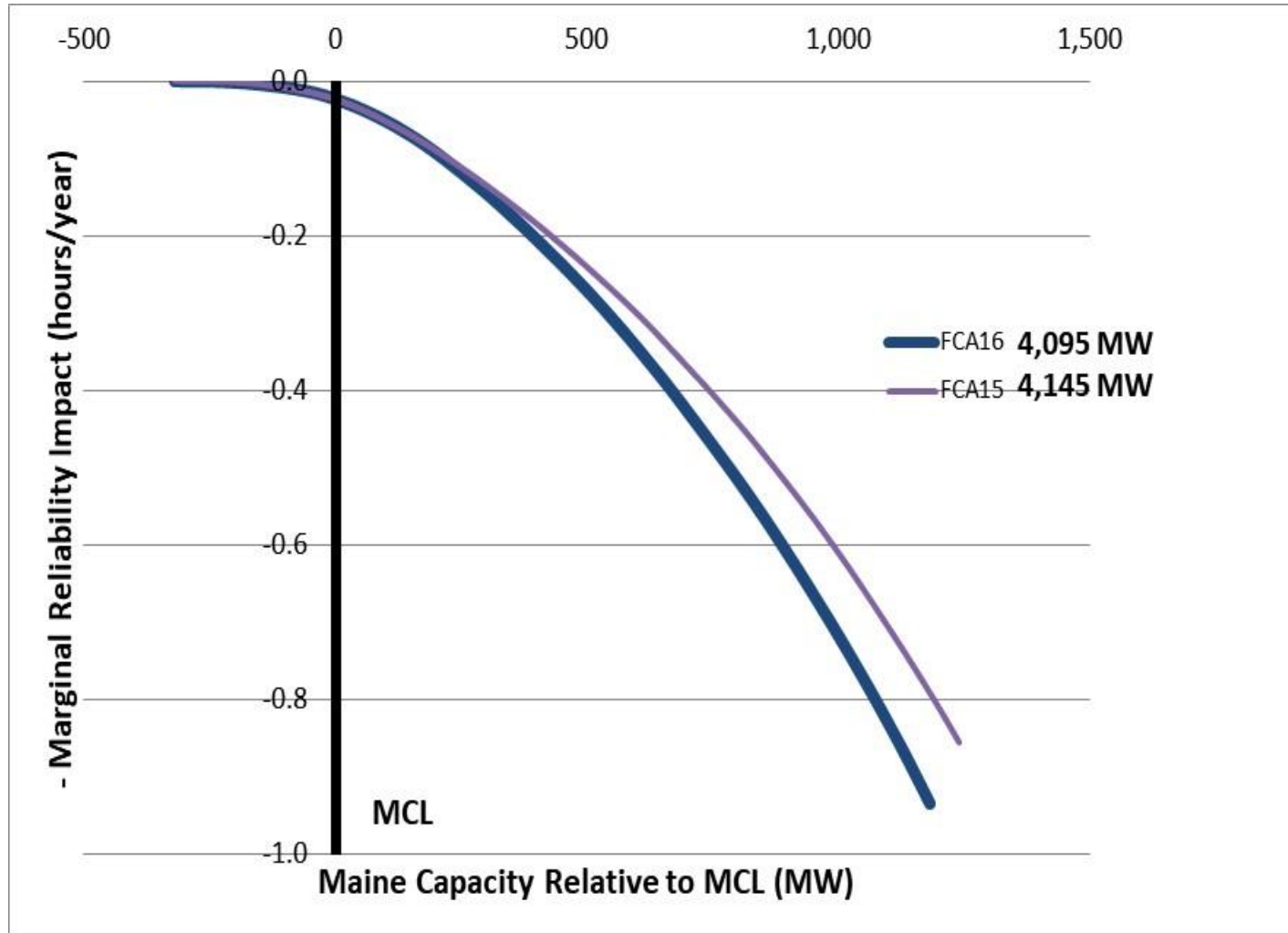
SENE Demand Curves - Relative to LSR



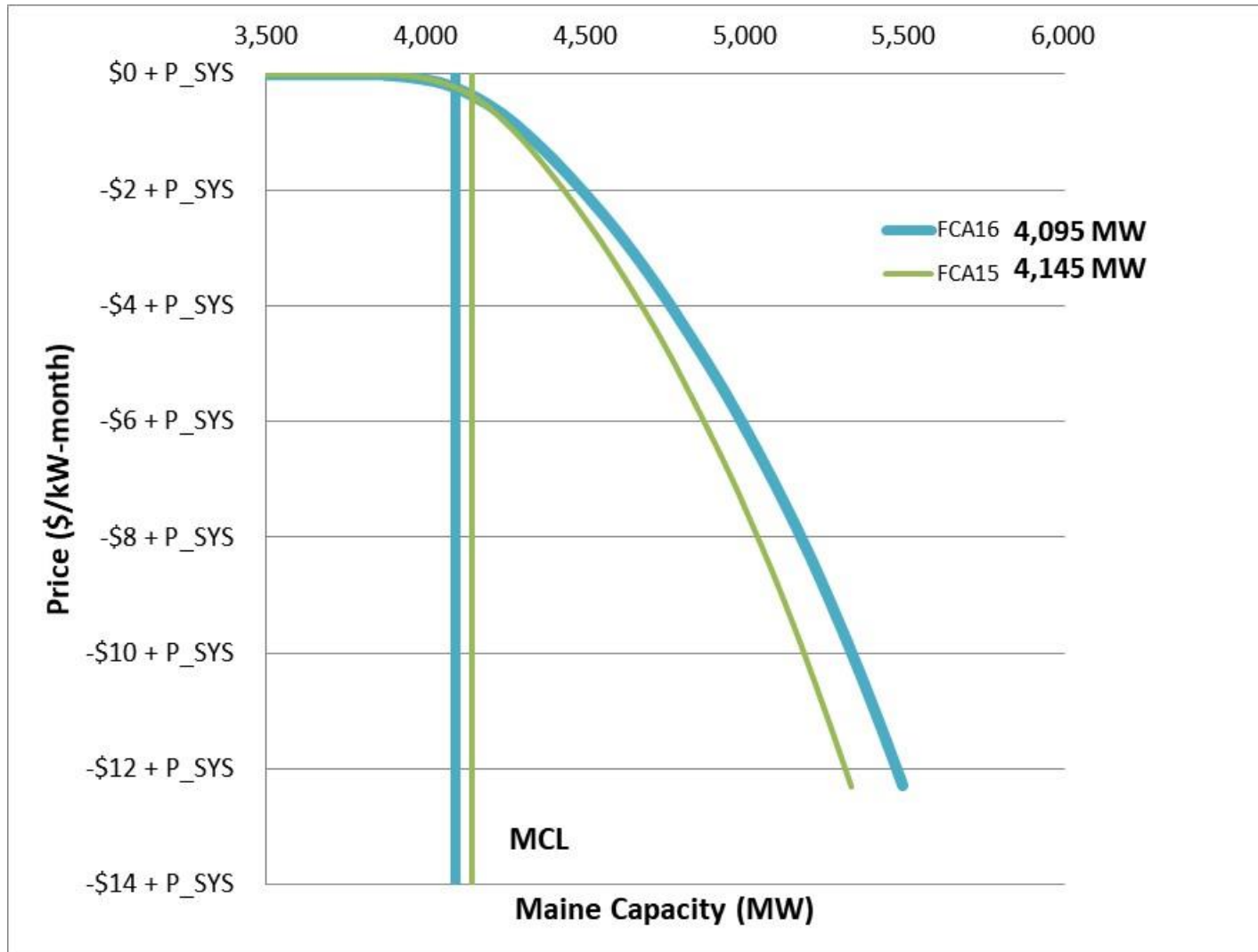
Maine MRI Curves



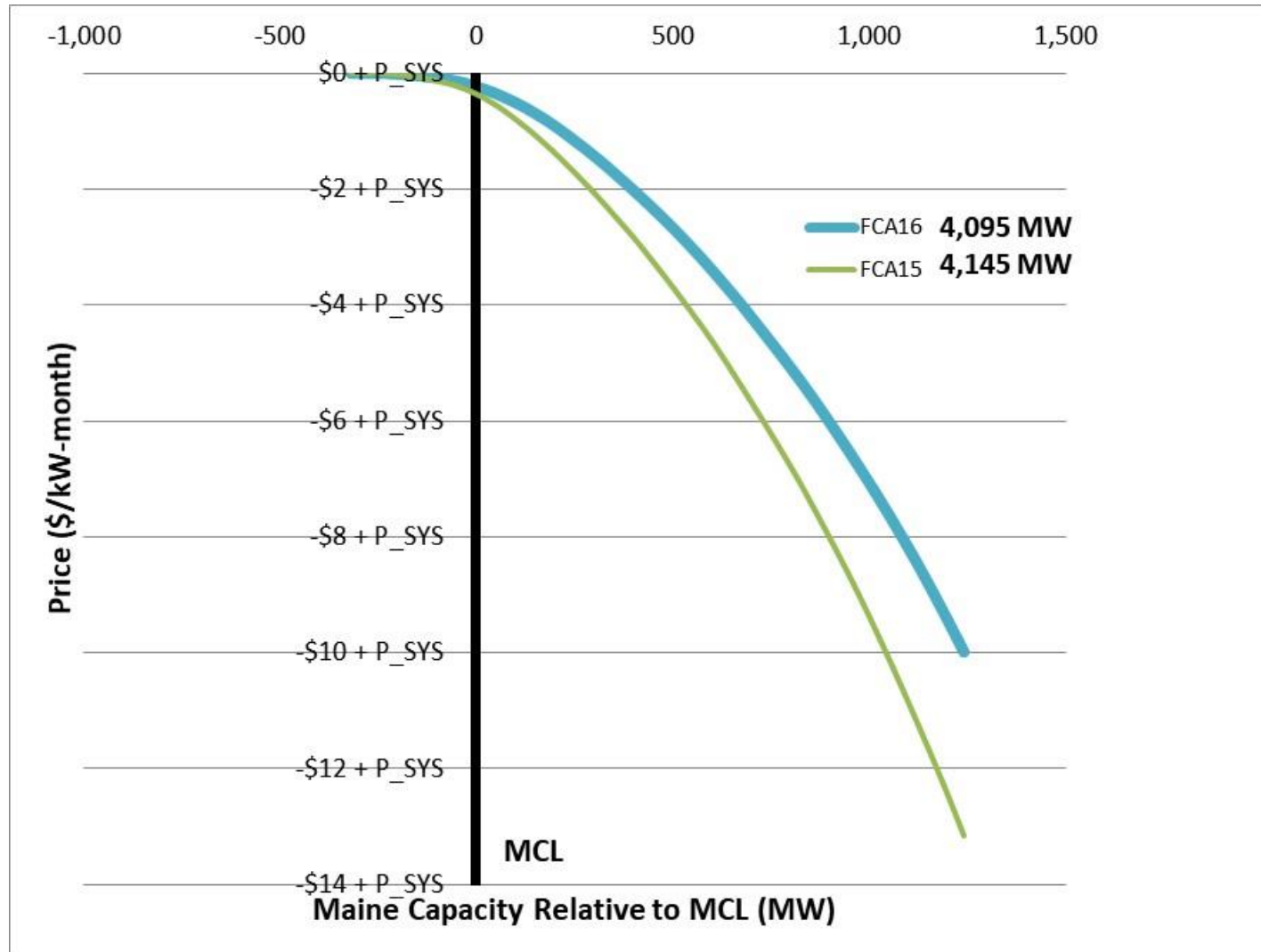
Maine MRI Curves - Relative to MCL



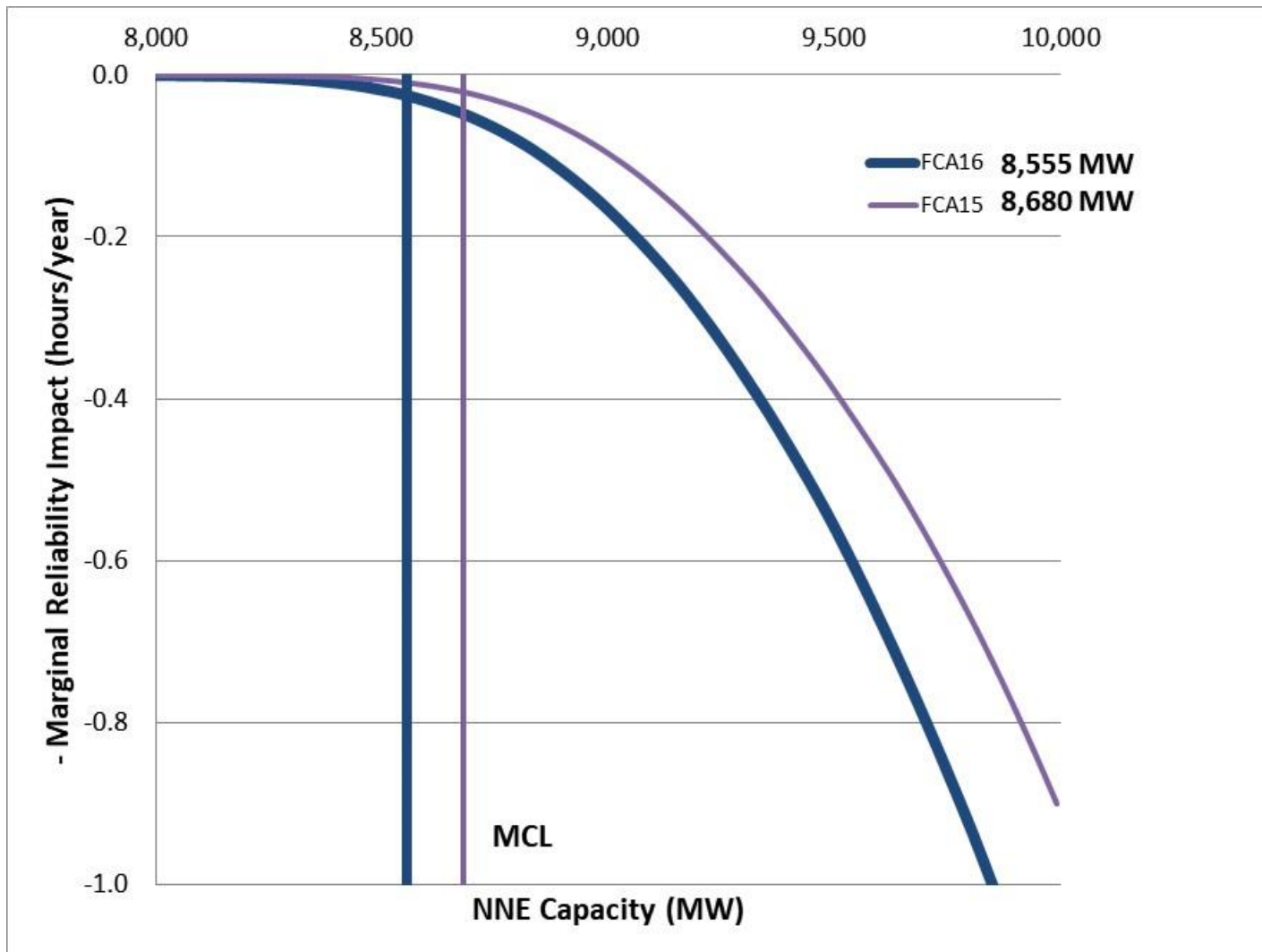
Maine Demand Curves



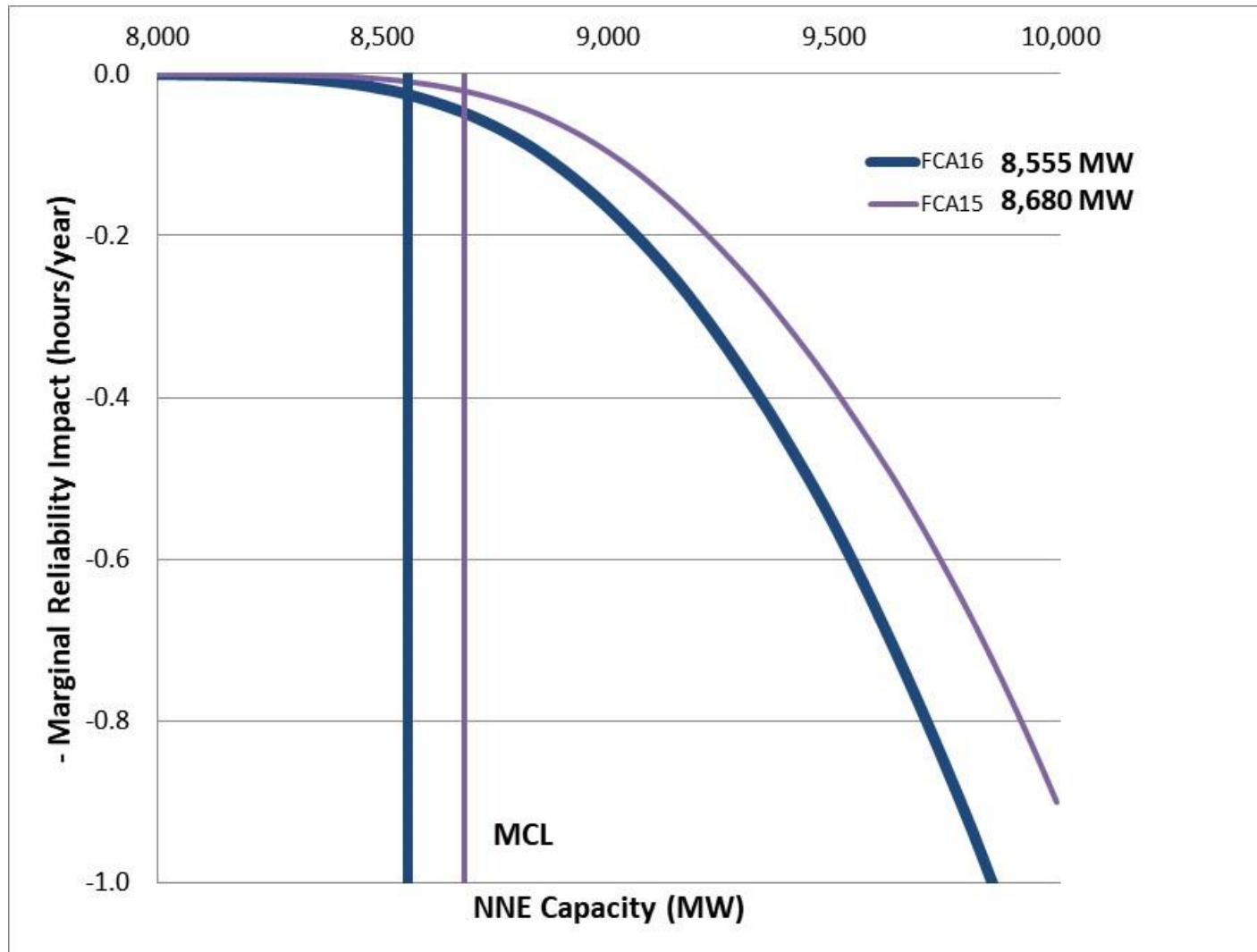
Maine Demand Curves - Relative to MCL



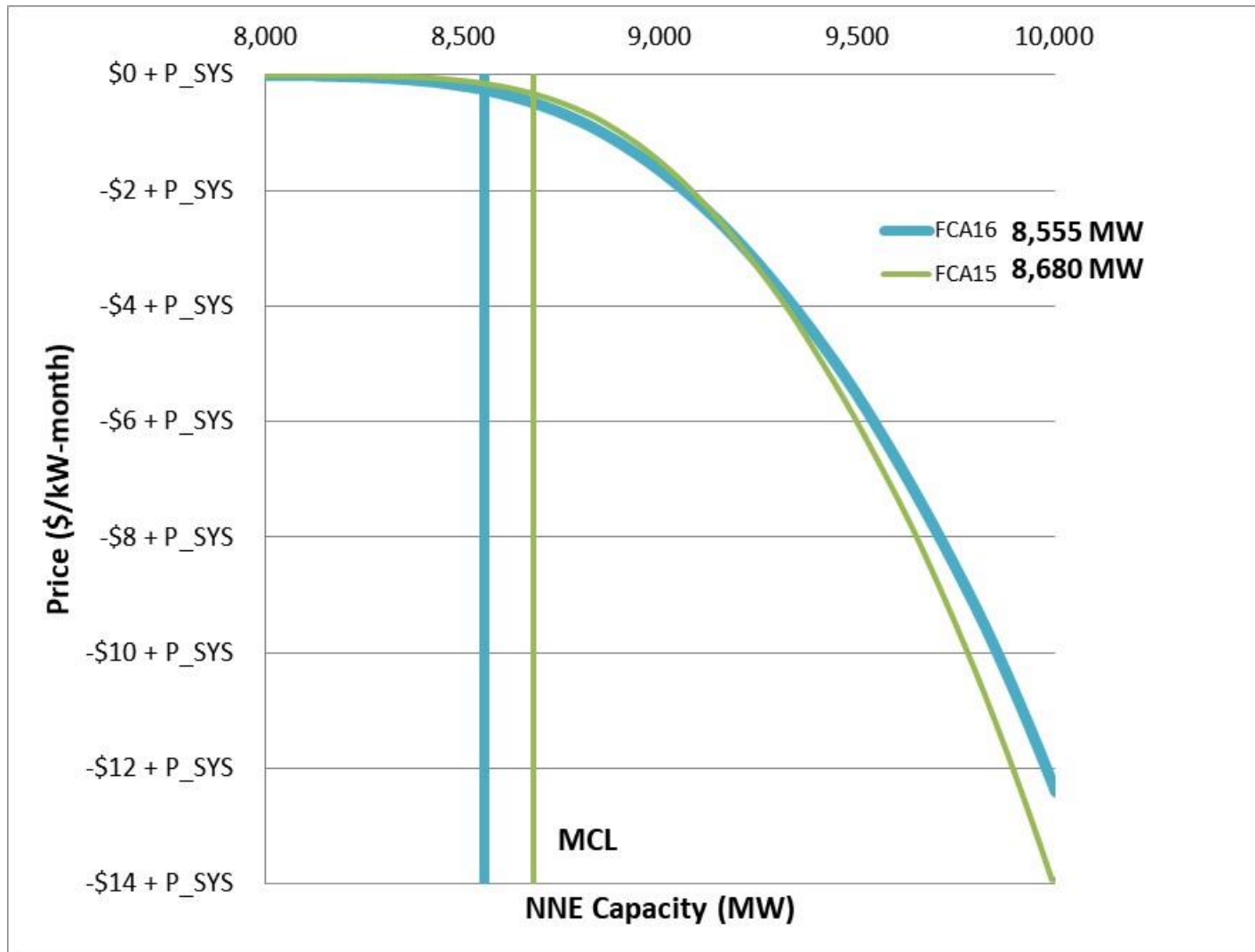
NE MRI Curves



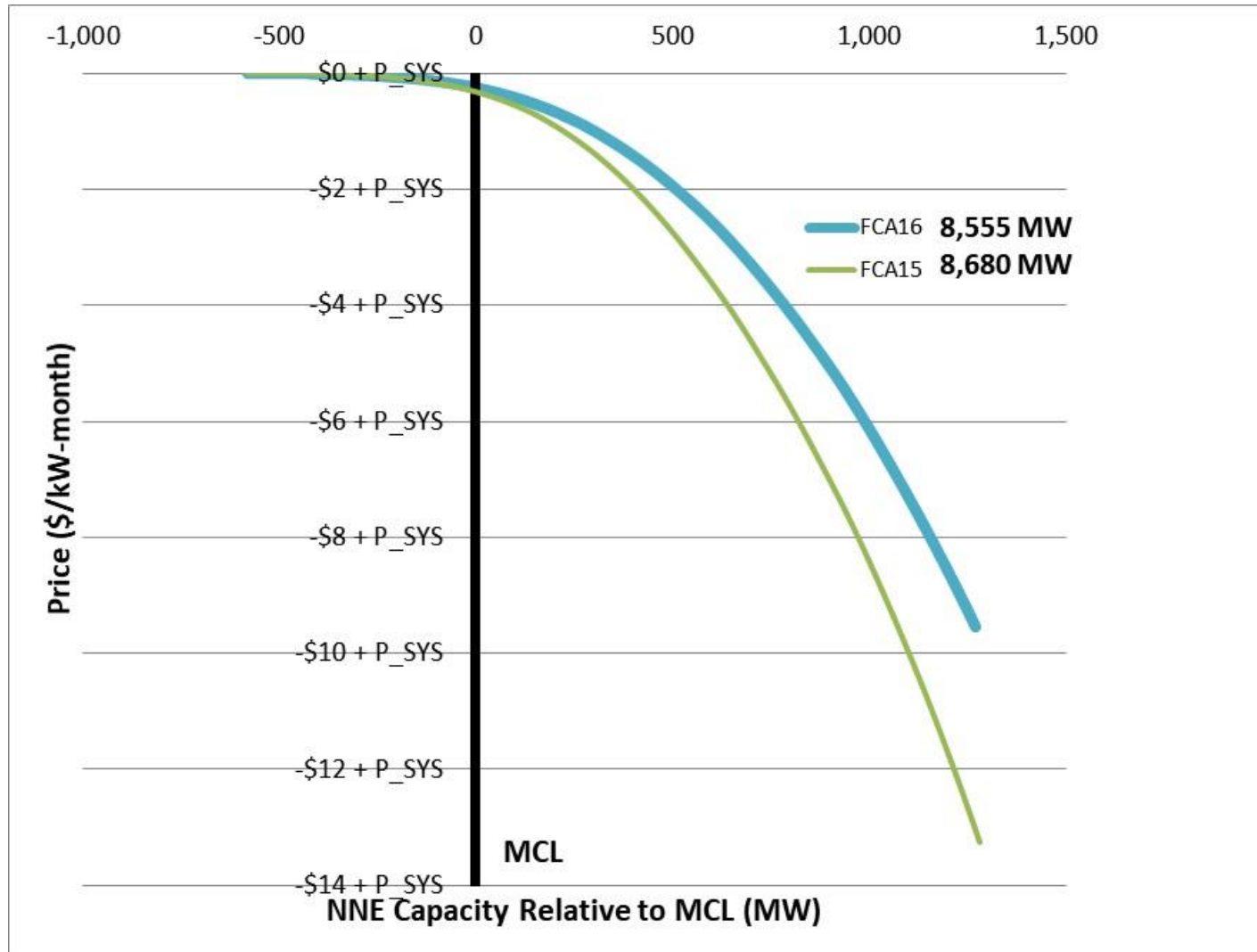
NE MRI Curves - Relative to MCL



NE Demand Curves



NE Demand Curves - Relative to MCL



Questions



APPENDIX-I

Assumptions for the FCA 16 ICR-Related Values Calculations



Modeling the New England Control Area for FCA 16

- The General Electric Multi-Area Reliability Simulation model (GE MARS) is used to calculate several of the ICR-Related Values
- Internal transmission constraints are not modeled in the ICR calculation; loads and resources are assumed to be connected to a single electric bus
 - Internal transmission constraints are addressed through the LSR and MCLs
- A LSR will be calculated for the import-constrained Southeast New England (SENE) Capacity Zone, consisting of the NEMA/Boston, SEMA and RI Load Zones
- MCLs will be calculated for two export-constrained Capacity Zones: the Maine Capacity Zone and the Northern New England (NNE) Capacity Zone, consisting of the combined Load Zones of Maine, New Hampshire and Vermont
 - The Maine Capacity Zone will be nested in the NNE Capacity Zone
- The MRI based method for calculating demand curves will be used to develop System-Wide and Capacity Zone Demand Curves

Note: For more info on the development of FCA 16 Capacity Zones, see https://www.iso-ne.com/static-assets/documents/2021/05/a02_2021-05-20_pspc_review_objective_criteria_testing_for_capacity_zone_determinations.pdf

ASSUMPTIONS FOR THE 2025-2026 FCA ICR-RELATED VALUES CALCULATIONS



Assumption for the System-Wide Demand Curve

- Cost of New Entry (CONE) for the cap of the System-Wide Demand Curve for FCA 16 has been calculated as:
 - Gross CONE: \$12.400/kW-month
 - Net CONE: \$7.468/kW-month
 - FCA Starting Price: \$12.400/kW-month

Note: See link to Forward Capacity Market (FCM) parameters by Capacity Commitment Period:
https://www.iso-ne.com/static-assets/documents/2015/09/FCA_Parameters_Final_Table.xlsx



Assumptions for the ICR-Related Values Calculations

- *Load forecast*
 - Net of behind-the-meter (BTM) photovoltaic (PV) forecast
 - Transportation and heating electrification
 - Load forecast distribution
- *Resource data will be based on existing Qualified Capacity values for FCA 16*
 - Non-intermittent Generating Capacity Resources
 - Intermittent Power Resources (IPR)
 - Import Capacity Resources
 - Demand Capacity Resources

Note: Qualified Capacity values reflect

- Significant decrease of existing qualified resources
- Resource retirements and terminations
 - Permanent and Retirement De-List Bids that elected unconditional treatment pursuant to Tariff Section III.13.1.2.4.1 (a) and that are at or above the Forward Capacity Auction Starting Price for FCA 16

Assumptions for the ICR-Related Values Calculations, cont.

- *Resource availability*
 - Non-intermittent Generating Capacity Resources availability
 - IPR availability
 - Demand Capacity Resources availability
- *Load or capacity relief assumed obtainable from implementing the following actions of the Operating Procedure No. 4, Action during a Capacity Deficiency (OP-4)*
 - Request emergency assistance from neighboring Control Areas (Tie reliability benefits)
 - Quebec (includes Hydro-Quebec Interconnection Capability Credits (HQICCs))
 - Maritimes
 - New York
 - Initiate 5% voltage reduction



Load Forecast Data Assumptions

- Load forecast assumption from the *2021 Forecast Report of Capacity, Energy, Loads and Transmission (CELT)* load forecast
- The load forecast weather-related uncertainty is represented by specifying a series of multipliers on the peak load and the associated probabilities of each load level occurring
 - The multipliers used to describe the load forecast uncertainty are derived from the 52 weekly peak load distributions described by the expected value (mean), the standard deviation, and the skewness

Note: The 2021 CELT load forecast is available at:

https://www.iso-ne.com/static-assets/documents/2021/04/2021_celt_report.xlsx

Load Forecast Data Assumptions, cont.

Modeling of BTM PV

- FCA 16 ICR calculations will use an hourly profile of BTM PV corresponding to the load shape for the year 2002, used by the Northeast Power Coordinating Council (NPCC) for reliability studies. For more information on the development of the hourly profile see: https://www.iso-ne.com/static-assets/documents/2017/06/pspc_6_22_2017_2002_PV_profile.pdf
 - Used for all probabilistic ICR-Related Values calculations
 - Modeled in GE MARS by groupings using the Regional System Plan (RSP) 13-subarea representation
 - Includes an 8% transmission and distribution gross-up
 - Peak load reduction uncertainty is modeled (randomly selected by MARS from a seven day window distribution)
- The values of BTM PV published in the 2021 CELT Report are the values of BTM PV subtracted from the gross load forecast to determine the net load forecast
- The published 90/10 net load forecast for the SENE sub-areas is used in the TSA

Note: For more info on the PV forecast, see

https://www.iso-ne.com/static-assets/documents/2021/04/final_2021_pv_forecast.pdf



Load Forecast Data Assumptions, cont.

Modeling of Transportation and Heating Electrification

Transportation Electrification

- The ICR-Related Values calculations will use an **hourly profile** for the transportation electrification forecast
 - Includes an 8% transmission and distribution gross-up
 - Uncertainty is currently not modeled due to lack of performance data
- More information on the development of the transportation electrification forecast can be found at: https://www.iso-ne.com/static-assets/documents/2021/04/final_2021_transp_elec_forecast.pdf

Heating Electrification

- The ICR-Related Values calculations will use the 2021 CELT gross load forecast that include the heating electrification loads which occur during the winter months
 - The hourly gross load forecast ([2021 Forecast Data workbook](#)) is inclusive of the heating electrification forecast. The heating electrification loads are weather sensitive and therefore, the uncertainties relating to weather also apply to these loads
- More information on the development of the heating electrification forecast can be found at : https://www.iso-ne.com/static-assets/documents/2021/04/final_2021_heat_elec_forecast.pdf

Load Forecast Data Assumptions, cont.

New England System Load Forecast

Monthly Peak Load (MW) - Net of BTM PV

CCP	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
2025-2026	24,893	26,899	26,263	23,009	19,060	20,467	21,874	22,484	21,702	20,476	18,437	21,394

- Corresponds to the reference forecast labeled “ISO-NE Control Area & New England States Monthly Peak Load Forecast” from worksheet “4 Mnth Peak” of the 2021 Forecast Data
 - https://www.iso-ne.com/static-assets/documents/2021/04/forecast_data_2021.xlsx

There is a distribution associated with each monthly peak. The distribution associated with the seasonal peak load forecast is shown below:

Probability Distribution of Seasonal Peak Load (MW)

	10/90	20/80	30/70	40/60	50/50	60/40	70/30	80/20	90/10	95/5
Summer 2025	26,531	26,899	27,343	27,674	28,025	28,488	28,800	29,221	29,988	30,352
Winter 2025-26	22,633	22,735	22,823	22,897	22,989	23,129	23,302	23,455	23,662	23,859

- From Table 1.6 - Seasonal Peak Load Forecast Distributions (forecast is reference with reduction for BTM PV) of the 2021 CELT
- https://www.iso-ne.com/static-assets/documents/2021/04/2021_celt_report.xlsx

Resource Data Assumptions

Generating Capacity Resources (MW)

Load Zone	Non-Intermittent Generating Capacity Resources		Intermittent Power Resources		Total	
	Summer	Winter	Summer	Winter	Summer	Winter
MAINE	3,055.870	3,239.197	274.892	328.854	3,330.762	3,568.051
NEW HAMPSHIRE	4,064.064	4,308.469	79.239	161.805	4,143.303	4,470.274
VERMONT	199.623	232.077	61.180	106.158	260.803	338.235
CONNECTICUT	9,840.270	10,215.624	93.750	66.180	9,934.020	10,281.804
RHODE ISLAND	1,899.569	2,051.291	50.104	41.741	1,949.673	2,093.032
SOUTH EAST MASSACHUSETTS	4,778.498	5,118.294	285.234	358.085	5,063.732	5,476.379
WEST CENTRAL MASSACHUSETTS	3,643.463	3,862.584	167.345	115.115	3,810.808	3,977.699
NORTH EAST MASSACHUSETTS & BOSTON	1,307.215	1,405.944	54.931	44.081	1,362.146	1,450.025
Total New England	28,788.572	30,433.480	1,066.675	1,222.019	29,855.247	31,655.499

Qualified Existing Generating Capacity Resources for FCA 16 reflect:

- Significant decreases
- Resource retirements and known terminations
 - Unconditional Permanent and Retirement De-List Bids
 - Permanent De-List Bids that are at or above the Forward Capacity Auction Starting Price for FCA 16
- IPRs have both summer and winter values modeled; non-intermittent Generating Capacity Resources' winter values provided for informational purpose

Resource Data Assumptions, cont.

Import Capacity Resources (MW)

- There are no Existing Import Capacity Resources qualified for FCA 16



Resource Data Assumptions , cont.

Demand Capacity Resources (MW)

Load Zone	On-Peak Demand Resources		Seasonal Peak Demand Resources		ADCR		Total	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
MAINE	210.184	207.947	-	-	137.803	155.699	347.987	363.646
NEW HAMPSHIRE	136.442	138.504	-	-	48.407	47.687	184.849	186.191
VERMONT	119.904	135.113	-	-	51.904	57.510	171.808	192.623
CONNECTICUT	199.380	81.923	518.359	550.728	192.829	192.123	910.568	824.774
RHODE ISLAND	270.227	240.576	-	-	44.737	41.207	314.964	281.783
SOUTH EAST MASSACHUSETTS	405.098	334.120	-	-	59.395	57.566	464.493	391.686
WEST CENTRAL MASSACHUSETTS	392.023	344.254	25.363	20.044	112.072	108.417	529.458	472.715
NORTH EAST MASSACHUSETTS & BOSTON	643.330	490.020	-	-	99.802	99.903	743.132	589.923
Grand Total	2,376.588	1,972.457	543.722	570.772	746.949	760.112	3,667.259	3,303.341

Notes:

- Qualified Existing Demand Capacity Resources for FCA 16
- Includes the 8% transmission and distribution loss adjustment (gross-up)



Capacity Zone Resource Breakdown and 50/50 & 90/10 Peak Load Forecast Assumptions Used in LRA and MCL Calculations (MW)

Resource Type	SENE	NNE	Maine	New England
Non-intermittent Generating Capacity Resources	7,985	7,320	3,056	28,789
Intermittent Power Resources	390	407	275	1,067
Import Capacity Resources	-	-	-	-
On-Peak Demand Resources	1,336	459	207	2,377
Seasonal-Peak Demand Resources	1	-	-	544
ADCR	209	235	136	747
Total	9,922	8,421	3,674	33,523

	SENE	NNE	Maine	New England
50/50 Load Forecast Net BTM PV	11,991	5,462	2,129	28,025
90/10 Load Forecast Net BTM PV	12,960	5,739	2,240	29,988

- An LSR will be calculated for the SENE Capacity Zone; MCLs will be calculated for the Maine and NNE Capacity Zones
- Zonal requirements will be determined using the load forecast and resource assumptions for the identified Capacity Zones for FCA 16
- The 50/50 and 90/10 load forecast values for the Capacity Zones will be the sum of the appropriate RSP sub-areas and are shown for informational purposes
- Note that the values presented are based on RSP subarea



LRA, TSA & MCL Internal Transmission Transfer Capability Assumptions

- Maine - New Hampshire Export
 - N-1 Limit: 1,900 MW
- Northern New England Export (North-South interface)
 - N-1 Limit: 2,725 MW
- Southeast New England Import
 - N-1 Limit: 5,250 MW
 - N-1-1 Limit: 4,550 MW

Note: Based on transmission transfer capability limits presented at the March, 2021 Reliability Committee meeting. The presentation is available at: https://www.iso-ne.com/static-assets/documents/2021/03/a8_fca_16_transmission_transfer_capability_and_capacity_zonal_development.pdf

Resource Availability Assumptions

Non-Intermittent Generating Capacity Resources

- **Forced outages assumption**

- Each generating unit's Equivalent Forced Outage Rate on Demand (non-weighted EFORd) will be modeled
- Based on a 5-year average (January 2016 – December 2020) of Generation Availability Data System (GADS) data submitted by generators
- NERC GADS class average data will be used for immature/non-commercial units

- **Scheduled outage assumption**

- Each generating unit's weeks of maintenance modeled
- Based on a 5-year average (January 2016 – December 2020) of each generator's actual historical average of planned and maintenance outages scheduled at least 14 days in advance
- NERC GADS class average data will be used for immature/non-commercial units



Resource Availability Assumptions , cont.

Non-Intermittent Generating Capacity Resources

Resource Category	Summer MW	Assumed Average EFORd (%) Weighted by Summer Ratings	Assumed Average Maintenance Weeks Weighted by Summer Ratings
Combined Cycle	13,379	4.1	4.6
Fossil	4,888	16.4	5.1
Combustion turbine	3,337	9.7	2.9
Nuclear	3,311	1.6	3.3
Hydros (includes pumped storage)	3,109	2.3	5.9
Diesel	112	10.6	2.8
Stand-alone battery	600	5.0	0.0
Co-located battery	30	0.0	0.0
Miscellaneous	22	12.6	3.8
Total	28,789	6.4	4.4

Notes:

- FOR for stand-alone battery is assumed as 5% based on MISO's information: <https://cdn.misoenergy.org/20180808%20RASC%20Item%2003b%20Capacity%20Determination%20for%20ESR263475.pdf>
- Average summer MW weighted EFORd and maintenance weeks are shown by resource category for informational purposes. In the LOLE simulations used for determining ICR-Related Values, individual unit assumptions will be modeled

Resource Availability Assumptions, cont.

Intermittent Power Resources

- Modeled as 100% available since their outages have been incorporated in their 5-year historical output used in calculating their existing Qualified Capacity



Resource Availability Assumptions, cont.

Battery Storage Resources

- For FCA 16 ICR-Related Values calculations to be conducted in 2021, the ISO proposed to model battery storage resources as follows:

Resource Type	Availability Assumptions
Non-intermittent battery storage resources	
Stand-alone battery storage	Use the class model available in GE MARS
Co-located battery storage	Model as 100% available
Intermittent battery storage resources	Model as 100% available

- For details on the proposed changes to the modeling methodologies for battery storage resources, see [June 2021](#) and [May 2021](#) PSPC meeting materials

Resource Availability Assumptions, cont.

Demand Capacity Resources

Load Zone	On-Peak Demand Resources		Seasonal Peak Demand Resources		ADCR		Total	
	Summer (MW)	Performance (%)	Summer (MW)	Performance (%)	Summer (MW)	Performance (%)	Summer (MW)	Performance (%)
MAINE	210	100			138	97	348	99
NEW HAMPSHIRE	136	100			48	89	185	97
VERMONT	120	100			52	91	172	97
CONNECTICUT	199	100	518	100	193	90	911	98
RHODE ISLAND	270	100			45	80	315	97
SOUTH EAST MASSACHUSETTS	405	100			59	87	464	98
WEST CENTRAL MASSACHUSETTS	392	100	25	100	112	87	529	97
NORTH EAST MASSACHUSETTS & BOSTON	643	100			100	81	743	97
Total New England	2,377	100	544	100	747	88	3,667	98

- Demand Capacity Resources average performance percentages will be applied to FCA 16 qualified Existing Demand Capacity Resources
- Average of 2017 – 2020 historical summer and winter Demand Capacity Resource performance based on the new ADCR availability methodology
- Modeled as a forced outage rate of 1-performance in blocks by Demand Capacity Resource type and Load Zone

Note: For calculation details on ADCR availability (performance), see [June 2021](#) and [May 2021](#) PSPC meeting materials

Resource Availability Assumptions, cont.

Import Capacity Resources

- System Import Capacity Resources
 - The forced and planned outage assumptions will be based on the availability assumptions associated with the transmission line used to import the capacity resource. The following table shows the availability assumptions for the external ties based on external tie lines' forced and scheduled outage rates:

External Ties	Forced Outage Rate (%)	Maintenance (Weeks)
Cross Sound Cable	0.2	6.7
Highgate	0.1	0.8
HQ Phase II	1.6	3.0
New Brunswick Ties	0.1	2.4
New York AC Ties	0.6	6.2

- Unit/Plant Import Capacity Resources
 - The forced and planned outage assumptions will be based on the assumptions associated with the unit/plant supplying the import capacity
- Please note, for FCA 16 there are no qualified existing Import Capacity Resources



New England External Transmission Interface Availability Assumptions

- Annual forced outage rates and maintenance weeks associated with the external transmission ties are shown in the table below. These forced outage rates and maintenance weeks are developed based on each tie line's 5-year (2016- 2020) historical rolling average performance data
 - These assumptions are calculated using the methodology established in 2019 https://www.iso-ne.com/static-assets/documents/2019/05/a5_tie_line_availability_05302019.pdf
- These assumptions are also used to model the availability of the Import Capacity Resources that are system based (shown in the previous slide)

	Cross Sound Cable		Highgate		HQ Phase II		New Brunswick Ties		New York AC Ties	
	FCA 15	FCA 16	FCA 15	FCA 16	FCA 15	FCA 16	FCA 15	FCA 16	FCA 15	FCA 16
Annual forced outage rate (%)	0	0.2	0	0.1	1.3	1.6	0.1	0.1	0.5	0.6
Annual maintenance requirement (weeks)	3.4	6.7	0.9	0.8	2.9	3.0	2.6	2.4	5.9	6.2

TSA Requirements Assumptions

Load, Interface Limits, and Resource Assumptions

- Recall
 - Load Forecast Data
 - SENE sub-area 90/10 peak load: 12,960 MW
 - Interface Limits for SENE
 - N-1 Limit: 5,250 MW
 - N-1-1 Limit: 4,550 MW
- Resource Data for SENE
 - 2025-2026 Existing Capacity Resource qualification data
 - Generating capacity: 8,375 MW
 - 7,985 MW of non-intermittent Generating Capacity Resources
 - 390 MW of IPRs
 - Passive Demand Capacity Resources: 1,337 MW
 - ADCRs: 209 MW

Notes:

- Net forecast is 90-10 peak gross load (including both transportation and heating electrification forecast) forecast minus BTM PV
- Retirement De-List Bids at or above the Forward Capacity Auction Starting Price for FCA 16 or that elected unconditional treatment are deducted from the existing capacity qualification data
- All values have been rounded off to the nearest whole number



TSA Requirements Assumptions, cont.

Resource Assumptions

- Resource Unavailability Assumptions
 - Generation Resources - Weighted average EFORd: 7%
 - Passive Demand Resources: 0%
 - ADCR- de-rating based on performance factors
 - NEMA/Boston sub-area: 19%
 - SEMA sub-area: 13%
 - RI sub-area: 20%

Note: All values have been rounded off to the nearest whole number



OP-4 Assumptions

Action 6 & 8 - 5% Voltage Reduction (MW)

	90-10 Peak Load (Net BTMPV)	Passive DR	ADCR	Actions 6 & 8 5% Voltage Reduction
June 2025-Sept 2025	29,988	2,920	747	263
October 2025-May 2026	23,662	2,543	760	204

Note: Uses the 90-10 peak Gross load (including both transportation and heating electrification forecast) forecast minus BTM PV and all passive DR and ADCR, multiplied by the 1.0% estimated relief obtainable from OP-4 voltage reduction pursuant to Tariff Section III.12.7.4

OP-4 Assumptions, cont.

Minimum Operating Reserve Requirement (MW)

- The system reserves assumption will be consistent with those needed for reliable system operations during Emergency Conditions
- Modeled at 700 MW in the ICR-Related Values calculations



ICR-Related Values Calculations Summary (MW)

Resource Type/OP-4	FCA 16
Non-intermittent Generating Capacity Resource	28,789
IPR	1,067
Import Capacity Resource	0
Demand Capacity Resource	3,667
OP-4 voltage reduction	263
Minimum operating reserves	-700
Tie benefits	1,830
Total MW modeled in ICR	34,196

Notes:

- The tie benefits assumptions are updated based on the [2021](#) study
- IPRs have both the summer and winter capacity values modeled
- OP-4 voltage reduction includes both Action 6 and Action 8 MW assumptions



APPENDIX-II

*Acronyms for ICR-Related Values**

*Not all acronyms are used in this presentation

Acronyms

- ADCR – Active Demand Capacity Resource
- ALCC – Additional Load Carrying Capability
- APk – Gross peak load net of BTM PV
- ARA – Annual Reconfiguration Auction
- ART – Annual Reconfiguration Transaction
- BTM PV – Behind-the-meter Photovoltaic
- CCP – Capacity Commitment Period
- CDD – Cooling Degree Days
- CELT – Capacity, Energy, Loads and Transmission
- CSC – Cross Sound Cable
- CSO – Capacity Supply Obligation
- CT – Connecticut
- DR – Demand Resource



Acronyms, cont.

- EE – Energy Efficiency
- EFORd – Equivalent Forced Outage Rate on Demand
- FCA – Forward Capacity Auction
- FCM – Forward Capacity Market
- FERC – Federal Energy Regulatory Commission
- HQICCs – Hydro-Quebec Interconnection Capability Credits
- ICR – Installed Capacity Requirement
- IPR – Intermittent Power Resource
- ISO – ISO New England
- LRA – Local Resource Adequacy
- LSR – Local Sourcing Requirement
- MARS – Multi-Area Reliability Simulation
- MCL – Maximum Capacity Limit
- MRI – Marginal Reliability Impact
- NEMA – Northeast Massachusetts
- NEPOOL – New England Power Pool

Acronyms, cont.

- Net ICR – ICR minus HQICCs
- NNE – Northern New England
- NPCC – Northeast Power Coordinating Council
- OP-4 – Operating Procedure No. 4, Action During a Capacity Deficiency
- PAC – Planning Advisory Committee
- PC – Participants Committee
- PK – Peak (gross load forecast)
- PSPC – Power Supply Planning Committee
- RC – Reliability Committee
- RI – Rhode Island
- SEMA – Southeast Massachusetts
- SENE – Southeast New England
- SWCT – Southwest Connecticut
- TSA – Transmission Security Analysis
- VR – Voltage Reduction
- WEFORd – Weighted Equivalent Forced Outage Rated on Demand