Installed Capacity (ICAP) Market

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New York Market Orientation Course (NYMOC)

March 11 - 14, 2025

Rensselaer, NY

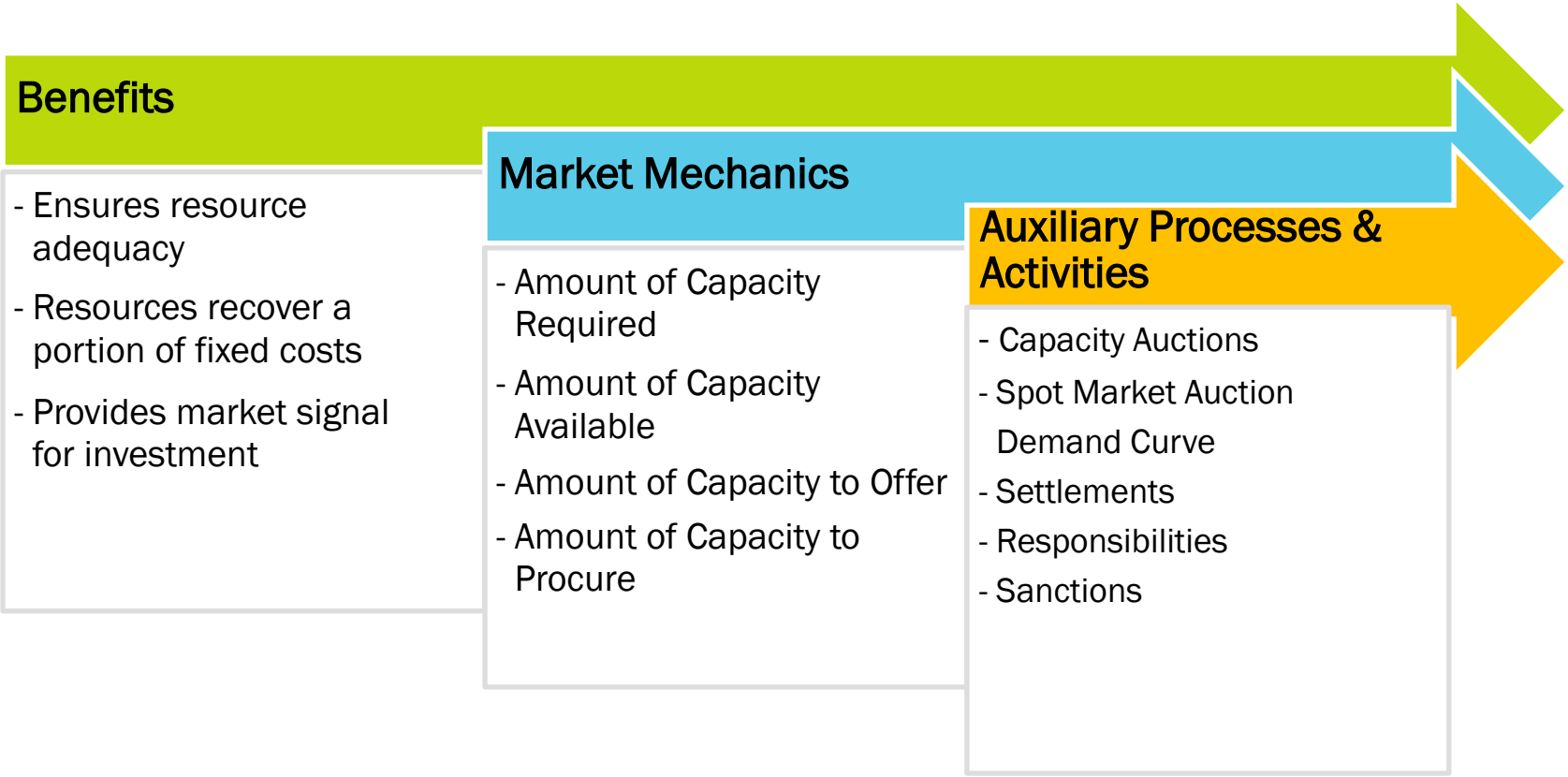
ICAP Market Module Objectives

- Define Installed Capacity
- Describe the benefits of the ICAP Market
- Identify the NY Control Area and Transmission District Capacity Requirements
- Explain the reason for Locational requirements
- Explain the difference between ICAP and UCAP

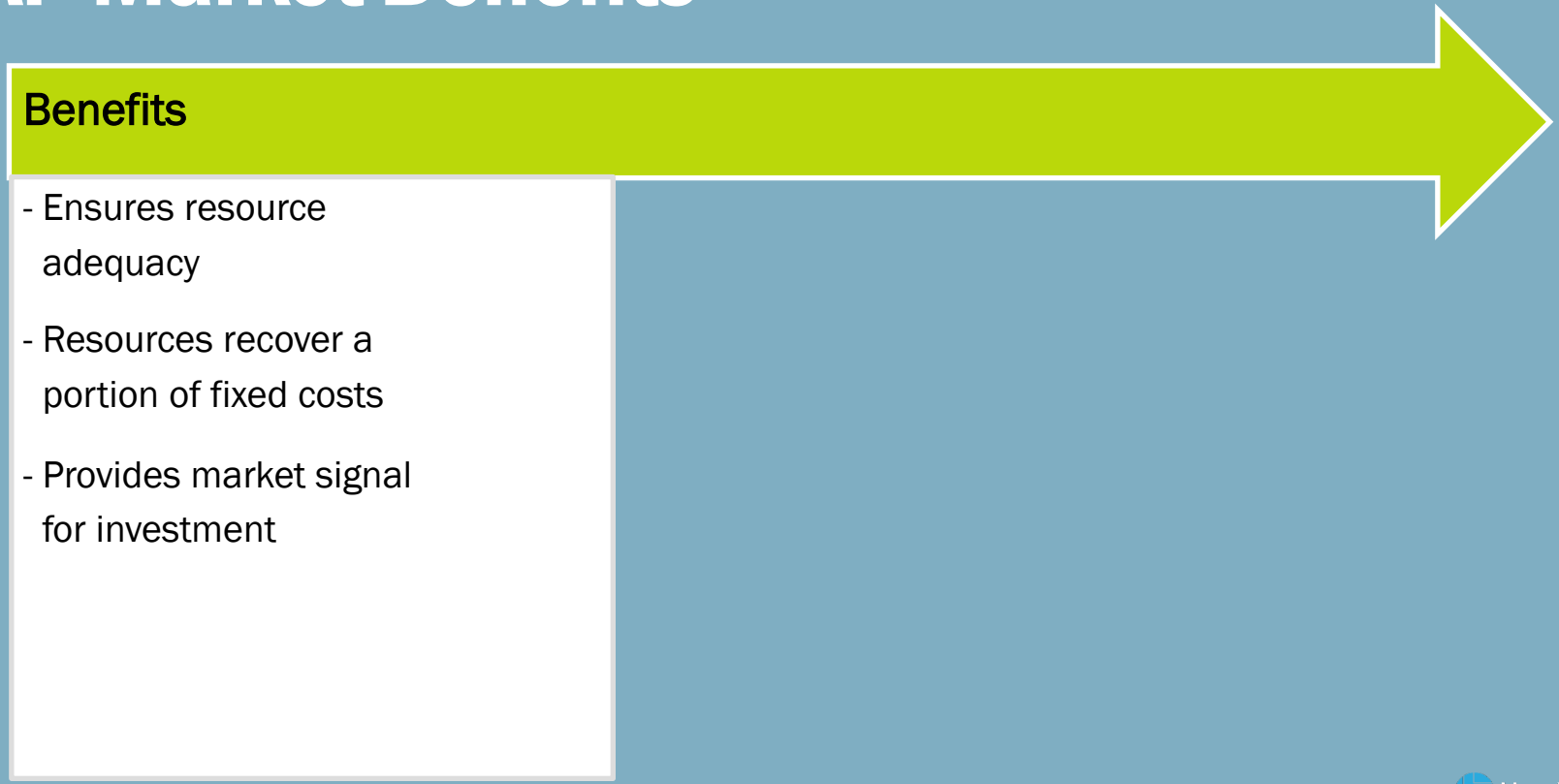
ICAP Market Module Objectives – Cont'd

- Identify the process for determining the amount of capacity available
- Explain the factors that determine the amount of capacity suppliers are able to offer
- Describe the Load obligations of an LSE
- Distinguish between the three different ICAP Auctions
- Calculate the settlement for an auction award

ICAP Roadmap



ICAP Market Benefits



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Benefits of the ICAP Market:

- **Ensures resource adequacy**
  - Do we have enough?
    - Supply is sufficient to meet load
    - Adhere to reliability standard

Benefits of the ICAP Market

- Recover portion of fixed costs

Variable Costs vs. Fixed Costs

Energy Market

(Market Clearing Prices: LBMPs)

Portion from ICAP Market

(Auction Clearing Prices)

Benefits of the ICAP Market:

- **Market signal for investment**
  - Potential Investors:
    - Is it worth building a new plant?
    - Where should I build a new plant?
    - Do I have the technology to build a plant that is competitive?

ICAP Market Mechanics

Benefits

- Ensures resource adequacy
- Resources recover a portion of fixed costs
- Provides market signal for investment

Market Mechanics

- Amount of Capacity Required
- Amount of Capacity Available
- Amount of Capacity to Offer
- Amount of Capacity to Procure

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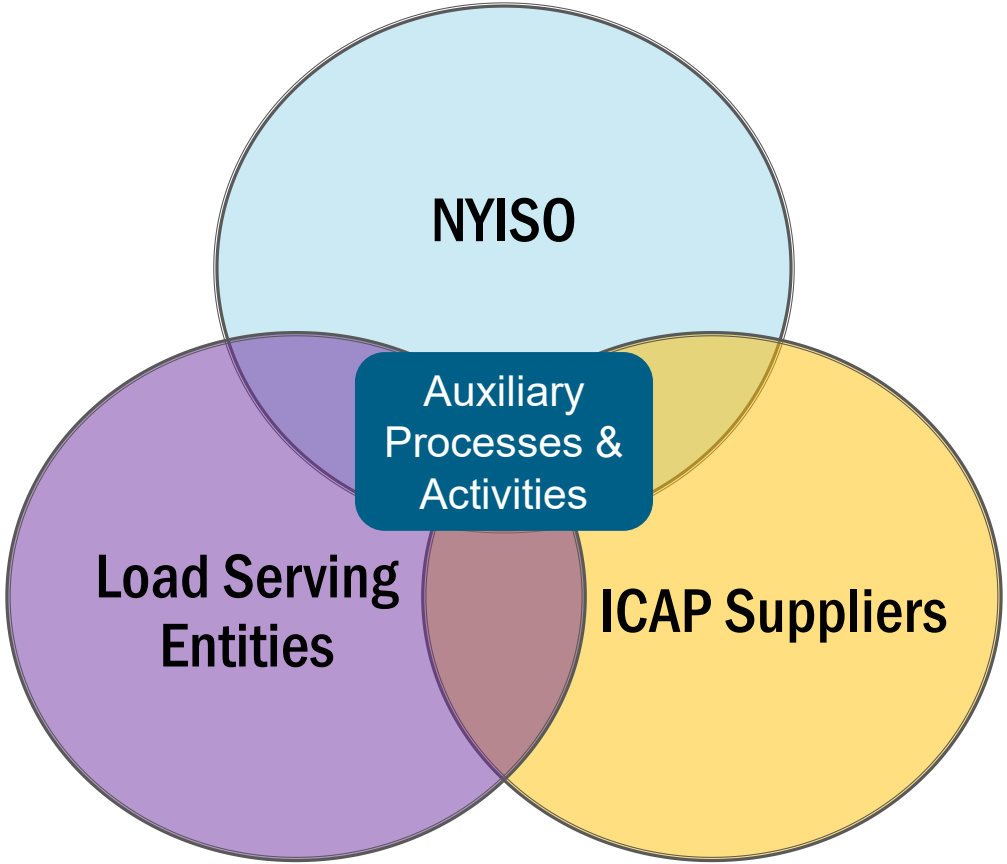
ICAP Market Mechanics



ICAP vs UCAP

ICAP	UCAP
Installed Capacity describes the market as opposed to the product.	The measure by which Installed Capacity Suppliers will be rated, in accordance with formulae set forth in the NYISO Procedures, to quantify the extent of their contribution to satisfy the NYCA Minimum Installed Capacity Requirement, and which will be used to measure the portion of that NYCA Minimum Installed Capacity Requirement for which each LSE is responsible.

Amount of Capacity Required

-How much do we need?

Amount of Capacity Required

- **NYCA Minimum Installed Capacity Requirement**
  - Ensures resource adequacy
    - Supply is sufficient to meet load
    - Meets Reliability Standards
  - Calculated by NYISO each Capability Year
  - Expressed as a MW value

NYCA Minimum ICAP Requirement = Forecasted NYCA Peak Load x (1 + IRM)

NYCA Minimum Installed Capacity Requirement

NYCA Minimum ICAP Requirement = Forecasted NYCA Peak Load x (1 + IRM)

- **Forecast Peak Load**
  - Last year's NYCA coincident peak load, adjusted for:
    - Weather
    - Changes in Load Growth
    - Load reductions provided by Demand Side Resources

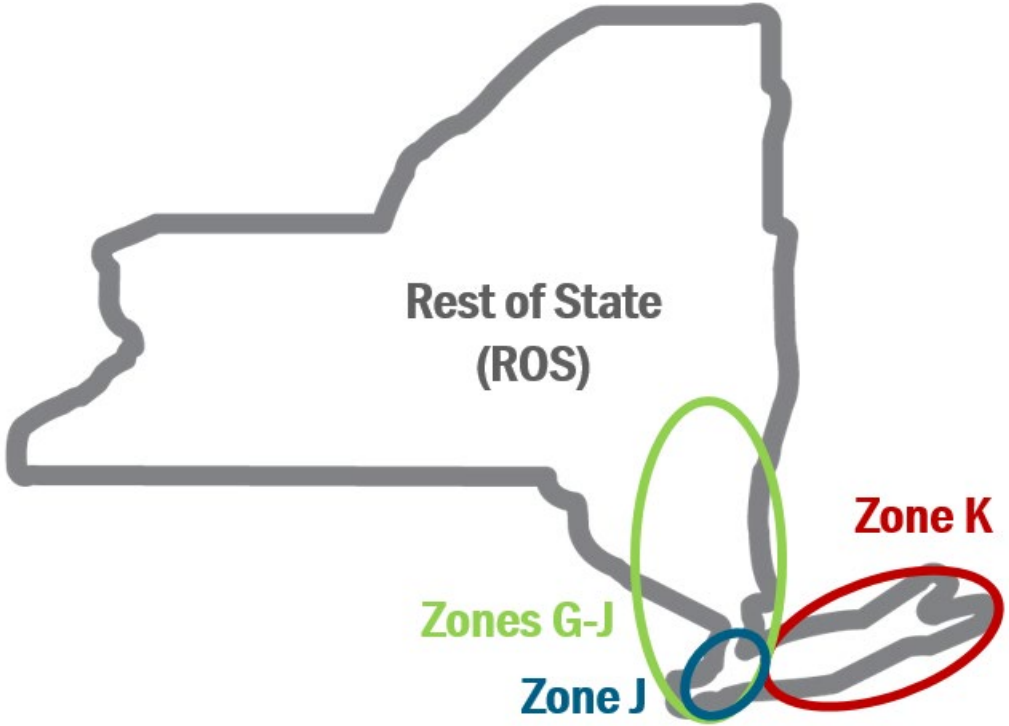
NYCA Minimum Installed Capacity Requirement

NYCA Minimum ICAP Requirement = Forecasted NYCA Peak Load x (1 + **IRM**)

- **Installed Reserve Margin (IRM)**
  - Capacity above firm system load required to provide for equipment outages (both forced and scheduled) and transmission capability limitations.
  - Established annually by the NYS Reliability Council (NYSRC) for the upcoming Capability Year
  - Based on the Northeast Power Coordinating Council (NPCC) Standard for Resource Adequacy
    - *"…the probability (or risk) of disconnecting any firm load due to resource deficiencies shall be, on average, not more than once in ten years."*
- **IRM for 2023 Capability Year is 20.0%**
  - 2022: 19.6%
  - 2021: 20.7%

NYCA and Locational Requirements

- Minimum Locational Installed Capacity Requirements also established



NYCA Minimum Unforced Capacity Requirement

- ICAP requirement converted to UCAP value
  - Accounts for historic availability of units
- Calculated by NYISO each Capability Period
- Expressed as a MW value
- Minimum Local Capacity Requirements also established

NYCA Minimum UCAP Requirement = Min ICAP x (1 – Locational Translation Factor)

NYCA Minimum Unforced Capacity Requirement

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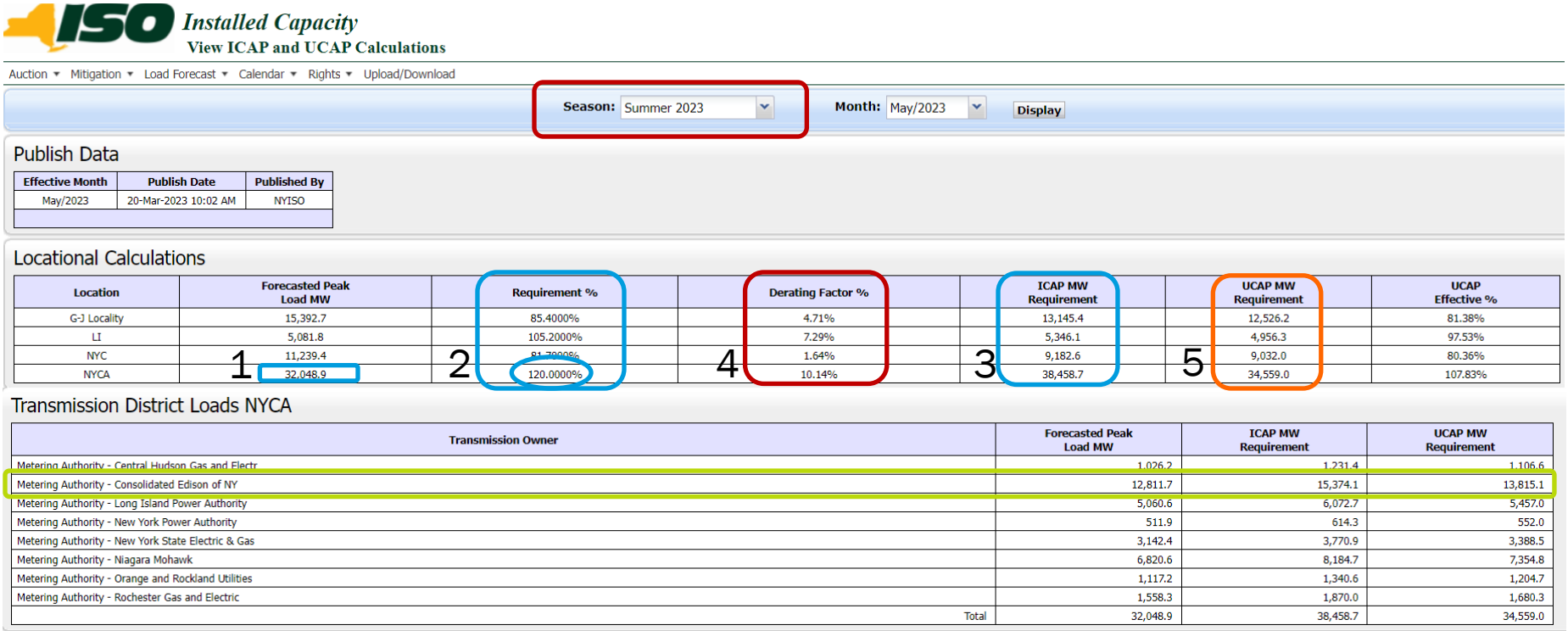
- Locational Translation Factors by location
  - Average Unavailability
  - Capacity Accreditation Factors
  - Weighted Average of all NYCA Derating Factors
  - Recalculated each Capability Period

Location	Winter 2021-2022	Summer 2022	Winter 2022-2023	Summer 2023
G-J Locality	4.46%	4.76%	5.81%	4.71%
Long Island	7.21%	6.27%	10.31%	7.29%
New York City	2.48%	3.26%	3.41%	1.64%
NYCA	8.40%	9.78%	8.91%	10.14%

ICAP and UCAP Values



ICAP and UCAP Values
Locational Requirements

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ISO Installed Capacity
View ICAP and UCAP Calculations

Auction ▾ Mitigation ▾ Load Forecast ▾ Calendar ▾ Rights ▾ Upload/Download

Season: Summer 2023 Month: May/2023 Display

Publish Data

Effective Month	Publish Date	Published By
May/2023	20-Mar-2023 10:02 AM	NYISO

Locational Calculations

Location	Forecasted Peak Load MW	Requirement %	Derating Factor %	ICAP MW Requirement	UCAP MW Requirement	UCAP Effective %
G-J Locality	15,392.7	85.4000%	4.71%	13,145.4	12,526.2	81.38%
LI	5,081.8	105.2000%	7.29%	5,346.1	4,956.3	97.53%
NYC	11,239.4	81.7000%	1.64%	9,182.6	9,032.0	80.36%
NYCA	32,048.9	120.0000%	10.14%	38,458.7	34,559.0	107.83%

Transmission District Loads G-J Locality

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Central Hudson Gas and Electr	1,042.2	890.1	848.1
Metering Authority - Consolidated Edison of NY	12,869.7	10,990.7	10,473.1
Metering Authority - New York State Electric & Gas	365.2	311.9	297.2
Metering Authority - Orange and Rockland Utilities	1,115.6	952.7	907.8
Total	15,392.7	13,145.4	12,526.2

Transmission District Loads LI

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Long Island Power Authority	5,081.8	5,346.1	4,956.3
Total	5,081.8	5,346.1	4,956.3

Transmission District Loads NYC

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Consolidated Edison of NY	11,239.4	9,182.6	9,032.0
Total	11,239.4	9,182.6	9,032.0

Transmission District (TD) Capacity

TD ICAP Requirement = TD Forecasted Peak Load x (1 + NYCA IRM)

- **TD Minimum ICAP Requirement Example for Con Edison**
  - Con Edison of NY Forecasted Peak Load: 12,811.7 MW
  - NYCA IRM: 20.0%

    = 12,811.7 x (1 + 0.20) = **15,374.1 MW**

(Summer 2023 values)

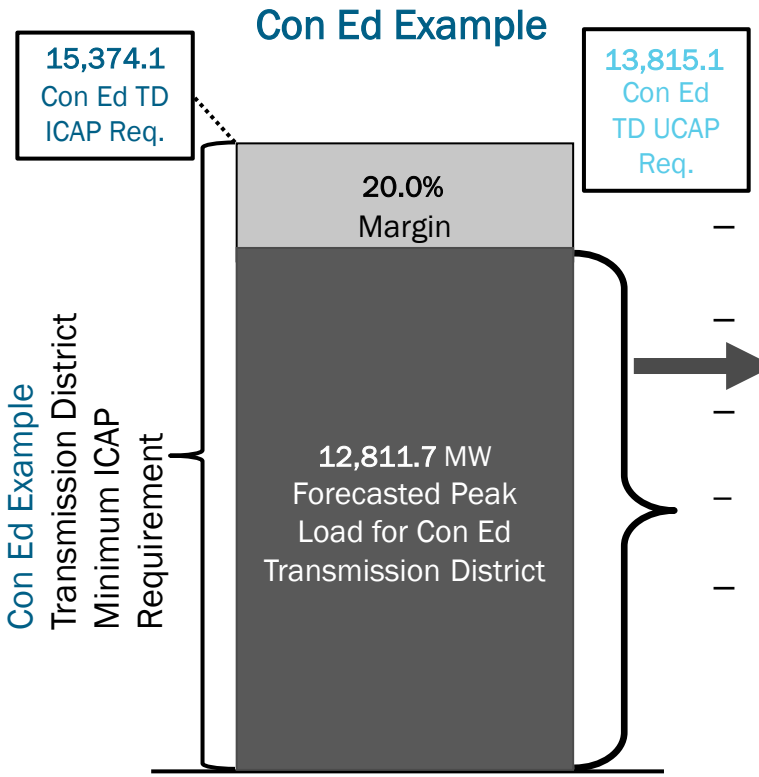
TD Minimum UCAP Requirement

- Based on the annual NYCA Forecasted Peak Load and the individual TD Forecasted Peak Load
- TD Min UCAP used to calculate LSE Minimum UCAP Requirement

$$\text{TD Min UCAP Requirement} = \text{NYCA Min UCAP Requirement} \times \frac{\text{TD Forecasted Coincident Peak Load}}{\text{Sum of Forecasted Coincident Peak Loads for all TDs}}$$

*Refer to Section 3.3 of the ICAP Manual

TD Minimum ICAP and UCAP Requirements



Minimum Requirements for the Con Edison TD

(Summer 2023 values)

- NYCA IRM is 20.0%
- Forecasted Peak Load for TD Con Edison is 12,811.7 MW
- TD ICAP Requirement = TD Forecasted Peak Load x (1 + IRM)
- TD UCAP Requirement = NYCA UCAP Requirement x (TD FPL / Sum of TD FPL)
- 34,559.0 x (12,811.7 / 32,048.9) = 13,815.1

** FPL = Forecasted Peak Load*

ICAP and UCAP Values

New York ISO
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ISO *Installed Capacity*
View ICAP and UCAP Calculations

Auction ▾ Mitigation ▾ Load Forecast ▾ Calendar ▾ Rights ▾ Upload/Download

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NYCA	32,048.9	120.0000%	10.14%	38,458.7	34,559.0	107.83%

Transmission District Loads NYCA

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Central Hudson Gas and Electr	1,026.2	1,231.4	1,106.6
Metering Authority - Consolidated Edison of NY	12,811.7	15,374.1	13,815.1
Metering Authority - Long Island Power Authority	5,060.6	6,072.7	5,457.0
Metering Authority - New York Power Authority	511.9	614.3	552.0
Metering Authority - New York State Electric & Gas	3,142.4	3,770.9	3,388.5
Metering Authority - Niagara Mohawk	6,820.6	8,184.7	7,354.8
Metering Authority - Orange and Rockland Utilities	1,117.2	1,340.6	1,204.7
Metering Authority - Rochester Gas and Electric	1,558.3	1,870.0	1,680.3
Total	32,048.9	38,458.7	34,559.0

Amount of Capacity Available

-How much do we have?

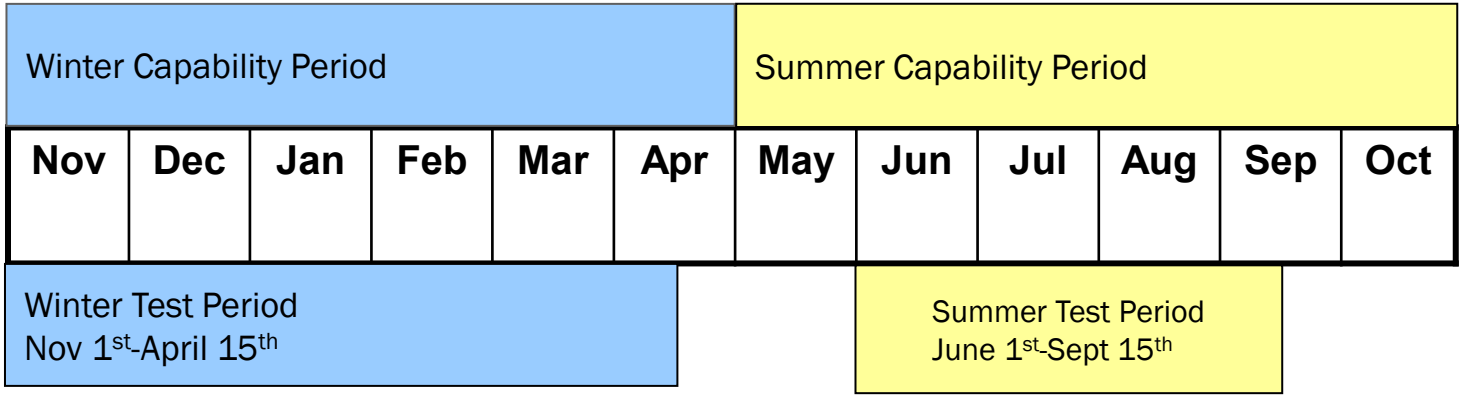
Determine the Amount of Capacity Available

- Suppliers provide data to demonstrate their capability to produce a certain number of MW (Resource Capability)
- Seasonal effects are taken into consideration
- Resource Capability determined by one of the following
  - DMNC / DMGC Test
  - Performance Test
  - Resource Nameplate
  - Actual Production Data

Determine the Amount of Capacity Available

- **Dependable Maximum Net Capability (DMNC) Test**
  - Demonstrates a generator's ability to generate power
  - Tested every Capability Period
  - Must coordinate test with NYISO
  - Different rules for different classes of generator
  - Value determines ICAP value for the Capability Period*
- **Dependable Maximum Gross Capability (DMGC) Test**
  - Applicable to Behind-the-Meter Net Generation Resources
  - The same procedures that apply to DMNC also apply to DMGC
  - Refer to ICAP Manual Section 4.2

Capability Periods and Test Periods Available



- Exceptions to these test periods are Special Case Resources
- Out of period testing permitted for specific conditions - see ICAP Manual

Let's Review

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How often must a DMNC test be conducted?

a) annually

b) weekly

c) monthly

d) every Capability Period

Let's Review

When can a DMNC test be conducted for the summer capability period?

a) April 15th – Sept 15th

b) May 1st – Aug 31st

c) June 1st – Sept 15th

d) June 1st – Oct 31st

Amount of Capacity Suppliers are Qualified to Offer

-How much can be sold?

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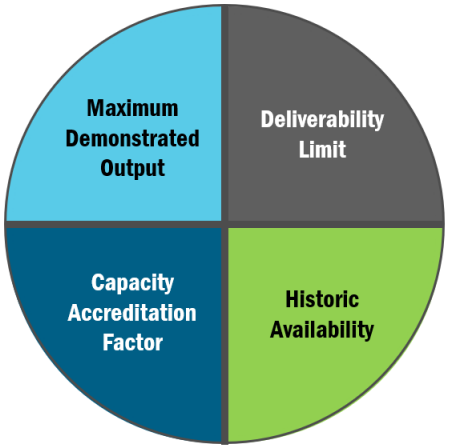
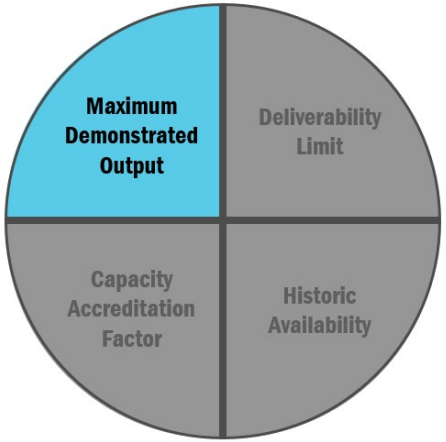
Determining UCAP

- **The four key components in determining UCAP are:**
  - Maximum Demonstrated Output
  - Deliverability Limit
  - Capacity Accreditation Factor
  - Historic Availability



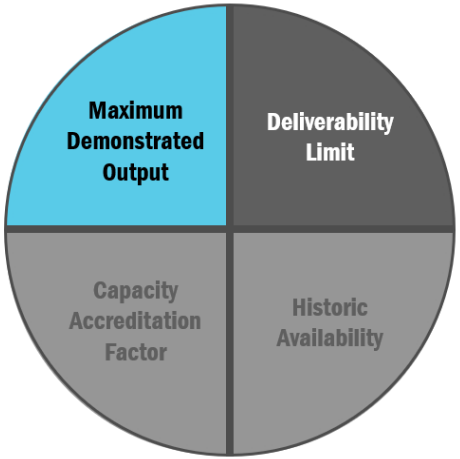
Maximum Demonstrated Output

- **Amount of capacity available**
  - Dependable Maximum Net Capability (DMNC) Test
  - Dependable Maximum Gross Capability (DMGC) Test



Deliverability Limit

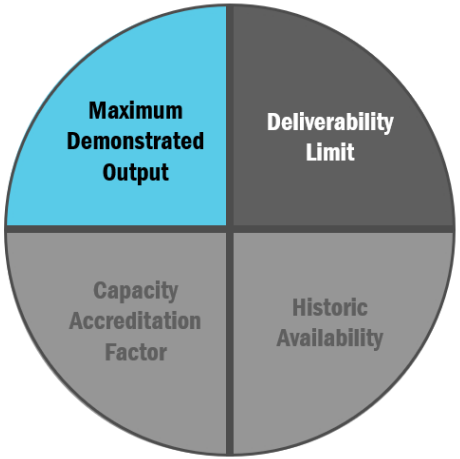
- **Demonstrated output adjusted to account for deliverability**
  - Capacity Resource Interconnection Service (CRIS)
    - Class Year Deliverability Studies are conducted to determine the amount of capacity that resources can deliver to any point in its Capacity Region
      - Applicable to new resources or existing resources that request to increase their CRIS
      - CRIS Value or “CRIS CAP”
      - Enables a resource to participate in the NYISO Installed Capacity market to the extent of its deliverable capacity
      - *Note: “Capacity Region” has a different meaning than “Locality.”



Available ICAP

- Available ICAP for Internal Resources

Available ICAP = Min (CRIS Cap*, DMNC)



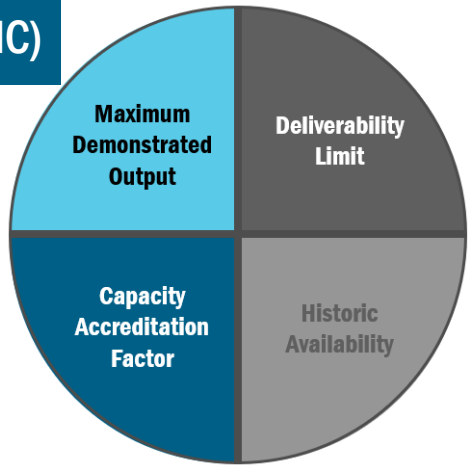
*CRIS Caps different for Summer and Winter Capability Period

Adjusted ICAP

- Adjusted ICAP: The amount of ICAP a Resource has available, taking into account its applicable Capacity Accreditation Factor

Adjusted ICAP = Available ICAP * Capacity Accreditation Factor

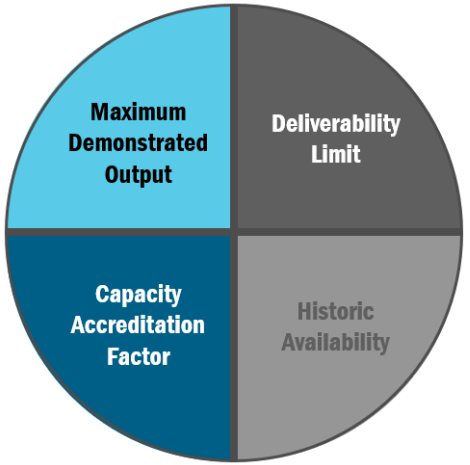
Available ICAP = Min (CRIS Cap*, DMNC)



*CRIS Caps different for Summer and Winter Capability Period

Capacity Accreditation Factor

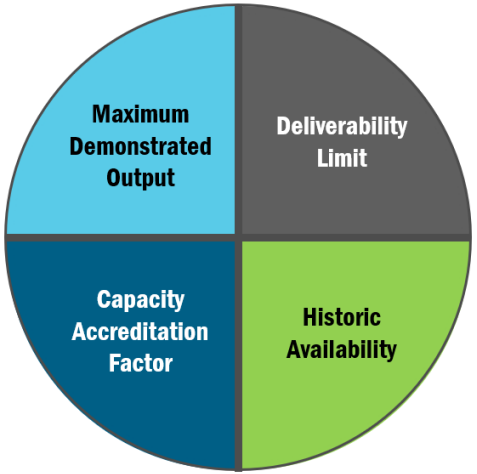
- **Capacity Accreditation Factor: Reflect the marginal reliability contribution of the ICAP Supplier's within each Capacity Accreditation Resource Class (CARC) toward meeting NYSRC resource adequacy requirements for the upcoming Capability Year**
  - Each ICAP Supplier will be assigned to a CARC and receive the applicable CAF for its assigned CARC and capacity region
    - CARC will be based on the ICAP Suppliers chosen participation model, elected Energy Duration Limitation, and resource characteristics
  - An ICAP Supplier's assigned CAF will be used in calculating its Adjusted ICAP and, in turn, the UCAP the Supplier is qualified to offer to supply to the NYCA



ICAP Manual, Section 7.1 and 7.2

Historic Availability

- Availability is based on Derating Factors that are a function of one or more of the following factors:
  - Forced Outages
  - Forced Derates
  - Actual Performance



Historic Availability

Derating Factors

Unit Type	Derating Factor	ICAP Manual Reference(s)
Conventional Generator, Energy Limited Resource (ELR)	Equivalent Demand Forced Outage Rate (EFORd)	Attach J
Special Case Resources (SCR)	Historical Performance Factor	Section 4.12
Intermittent Power Resources (IPR) (Wind, Solar, Landfill Gas)	Actual Performance “Production Factor”	Attach J
Limited Control Run-of-River Hydro	Actual Production Data	Attach J
Energy Storage Resources (ESR)	Average Unavailability Factor	Attach J
Co-located Storage Resources (CSR)	Derating Factor for each individual resource type (IPR and ESR), adjusted for Derating Factor for shared Point of Injection (POI)	Attach J

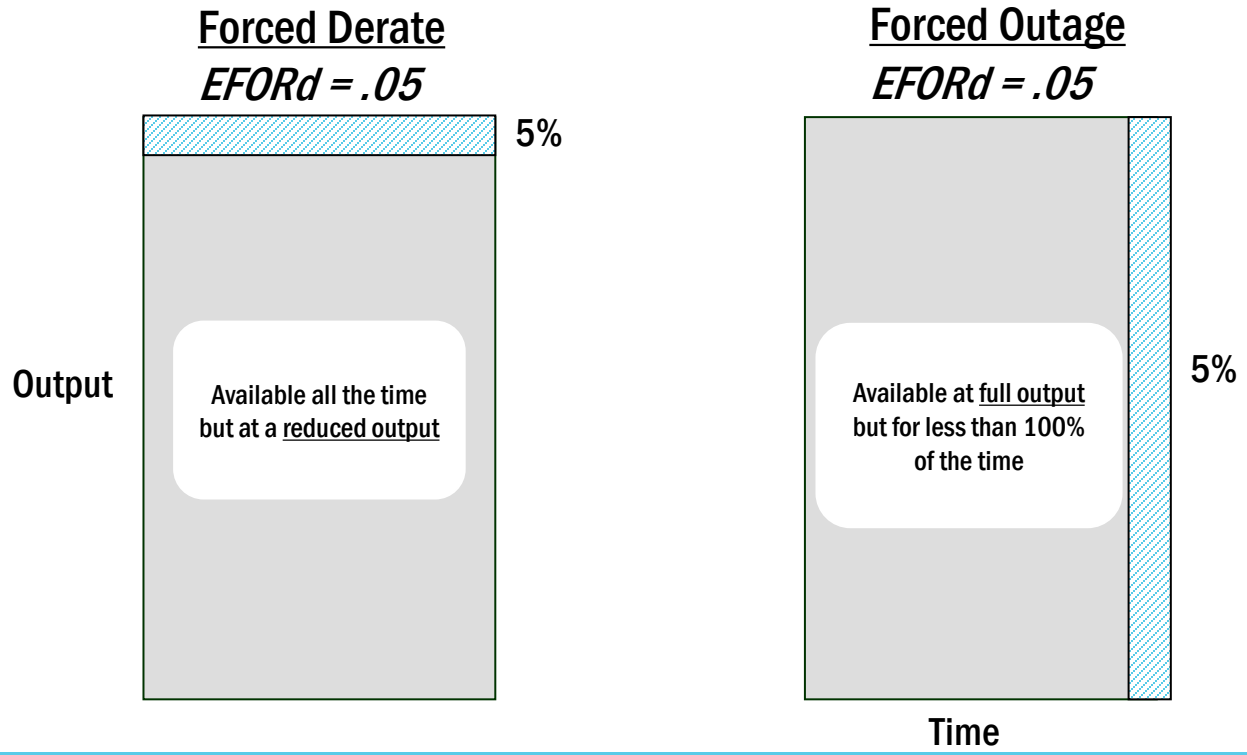
Historic Availability

EFORd

- **Equivalent Demand Forced Outage Rate**
  - Calculated from Generating Availability Data System (GADS)
    - Year-to-Date Data Submitted to NYISO Monthly
    - Forced Outages and Forced Derates
      - Dispatched and unable to respond
      - Unplanned event

Historic Availability

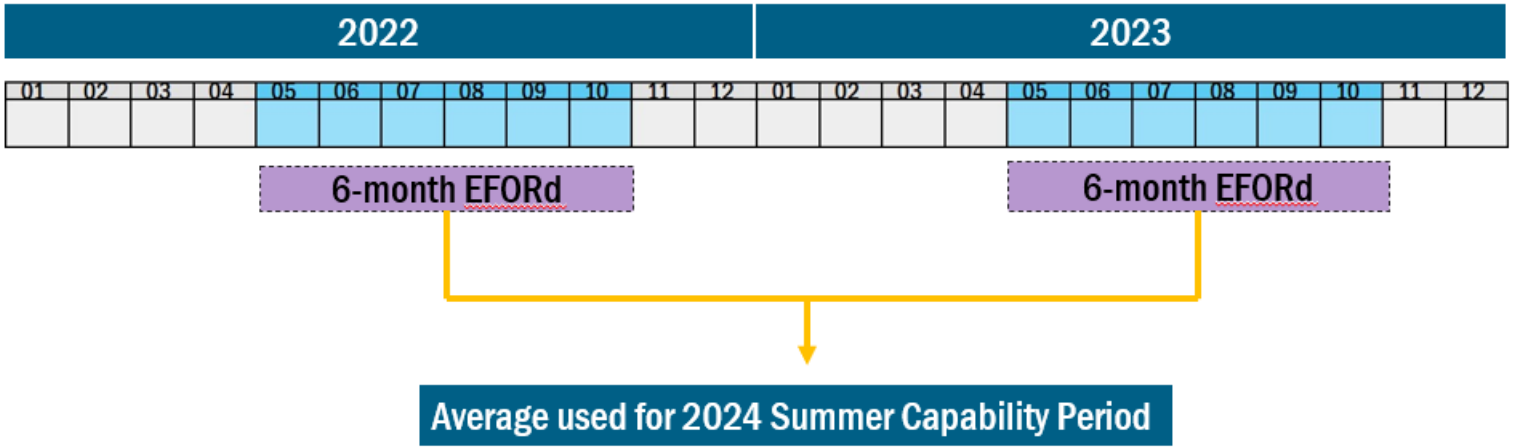
Derates and Outages



Availability-Based Resources

- Summer UCAP Calculation

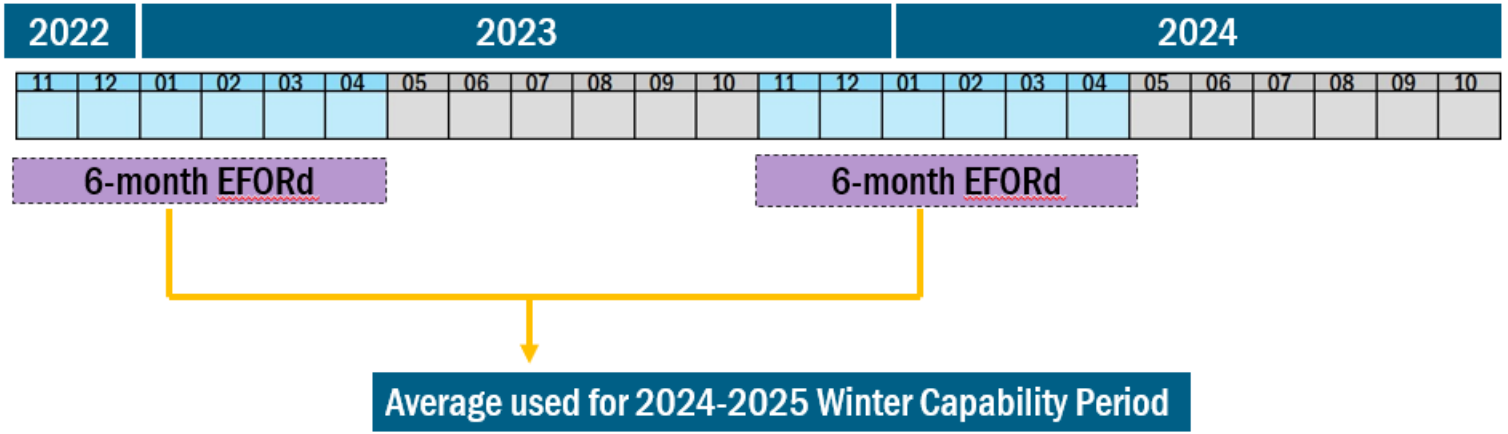
NYISO will use an average of two previous Summer 6-month EFORd calculations to establish a Summer ICAP to UCAP derating factor (Avg EFORd, $AEFORd_{summer}$)



Availability-Based Resources

- Winter UCAP Calculation

NYISO will use an average of two previous Winter 6-month EFORd calculations to establish a Winter ICAP to UCAP derating factor (Avg EFORd, $AEFORd_{winter}$)



UCAP for Resources

A generator may sell Capacity equal to its adjusted ICAP multiplied by its historic availability.

UCAP = Adjusted ICAP * (1 – Derating Factor)

Adjusted ICAP = Available ICAP * Capacity Accreditation Factor

Available ICAP = Min (CRIS Cap*, DMNC)

*This formula is for Internal Generators that are not BTM:NG

UCAP for Resources

A generator may sell Capacity equal to its adjusted ICAP multiplied by its historic availability.

UCAP = Adjusted ICAP * (1 – Derating Factor)

Adjusted ICAP = Available ICAP * Capacity Accreditation Factor

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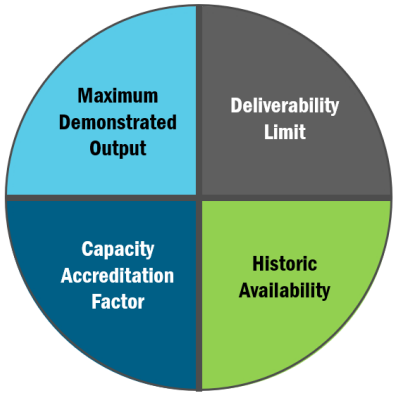


*This formula is for Internal Generators that are not BTM:NG

Unforced Capacity (UCAP)

Resource Type	How UCAP is Calculated
Generators, System Resources and ELRs	Based on Equivalent Demand Forced Outage Rate (EFORd)
Special Case Resources (SCR)	Based on their Average Coincident Load and use Performance Factor instead of EFORd
Control Area System Resource	Based on Control Area Resource and Load (CARL) Data
Intermittent Power Resources (Wind, Solar, Landfill Gas)	Based on the amount the intermittent can provide during system peak Load hours, as determined per ISO Procedures
Limited Run-of-River Hydro Resource	Determined separately for Winter and Summer Capability Periods as rolling average of the hourly net Energy provided by each resource during the 20 highest NYCA integrated real-time load hours in each of the five previous Summer or Winter Capability Periods
Energy Storage Resources	Based upon time-weighted UOL availability evaluated against the ICAP sold
Co-located Storage Resources	Based on existing methods for each resource type, with adjustments for shared Point of Injection (POI) availability

Let's Review

If a resource has a Derating Factor of .05, what is its historic availability?

a) 5%

b) 10%

c) 50%

d) 95%

Let's Review

What is the maximum capacity that a unit can sell given that it has a DMNC of 200 MW, deliverable CRIS CAP of 190 MW, a Capacity Accreditation Factor of 1, and a historic availability of 0.95?

a) 100 MW

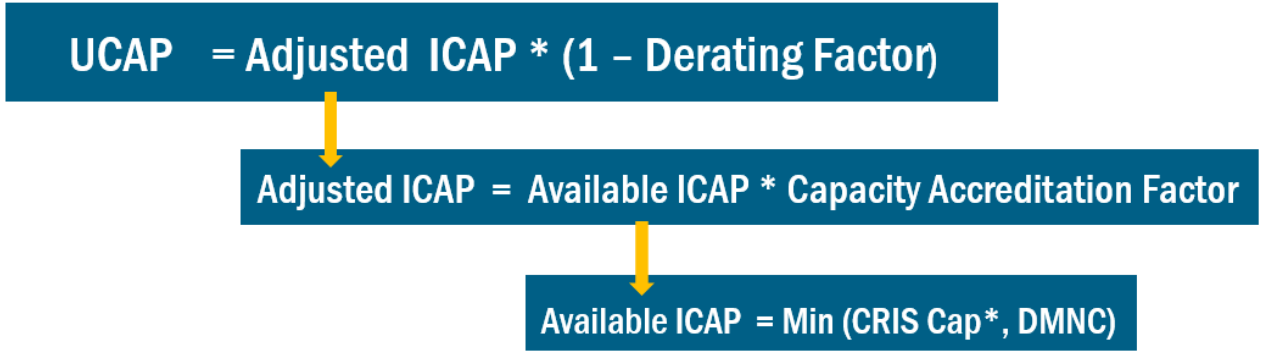
b) 180.5 MW

c) 190 MW

d) 200 MW

Let's Review – *Answer Key*

What is the maximum capacity that a unit can sell given that it has a DMNC of 200 MW, deliverable CRIS CAP of 190 MW, a Capacity Accreditation Factor of 1, and a historic availability of 0.95?



UCAP = 180.5 MW

Capacity Resources

Capacity Resources

- Generators
  - Within NYCA
  - Outside NYCA
- Special Case Resources (SCRs)
  - Within NYCA
- External Capacity Resources
- Unforced Capacity Deliverability Rights (UDRs)
- External-to-ROS Deliverability Rights (EDRs)

Special Case Resources

- Load reductions achieved through interruptible / curtailable loads or loads able to operate a qualified behind-the-meter Local Generator to remove load off the grid
- Each SCR is enrolled by Responsible Interface Party (RIP)

SCR UCAP = ICAP * Applicable Performance Factor * Capacity Accreditation Factor

ICAP = Load Reduction Capability * (1 + Transmission Loss Factor)

**Refer to Section 4.12 of ICAP Manual

External Capacity Resources

- **External CRIS Rights: (ECRs)**
  - One time opportunity to convert Grandfathered Rights were to External CRIS Rights or awarded through the Class Year process
  - Contract or Non-Contract Commitment
  - Consequences for not supplying
- **Capacity associated with Existing Transmission Capacity for Native Load ("ETCNL")**
- **Capacity associated with Unforced Capacity Deliverability Rights (UDRs)**
- **Import Rights**
  - First Come First Served: Subject to Import Limits

*External Installed Capacity Supplier requirements listed in ICAP Manual, Section 4.9

External Capacity Resources: Import Limits

- Import Limits are set to determine the amount of capacity that can be imported into NYCA using the “First Come First Served” Process
- Limit is established after considering External CRIS Rights and ETCNL
  - Established by NYISO
  - Based on reliability studies
  - Determined annually
  - Available Import Rights are based on Import Limits
    - Calculated for each month of upcoming Capability Period

*Import Limits: ICAP Manual, Attachment B

External Capacity Resources: Import Limits

Maximum provided by resources outside NYCA

(Excluding Resources Using UDRs, EDRs, ETCNL, and External CRIS Rights)

2023-2024 Capability Year

Amount of External ICAP Permitted to be Allocated for NYCA Interfaces	Total (MW)	Grandfathered (MW) and Cap. Year External CRIS (MW)	Remaining (MW)
PJM	1138	38	1100
ISO-NE	75	0	75
Ontario	80	0	80
Quebec via Chateauguay	1121	1110 (May - Oct) 914 (Nov) 0 (Dec - Feb) 20 (Mar) 914 (Apr)	11 (May - Oct) 207 (Nov) 1121 (Dec - Feb) 1101 (Mar) 207 (Apr)
Quebec via Cedars	0	0	0
Total NYCA Interfaces	2414		

***Neighboring Control Area rules must provide that the resource will not be recalled or curtailed to satisfy the Control Areas own load.

***Import Limits: ICAP Manual, Attachment B**

Unforced Capacity Deliverability Rights (UDRs) & External-to-ROS Deliverability Rights (EDRs)

- Rights associated with a specific transmission interface in a Locality (UDR) or in “Rest of State” (EDR)
  - Either from an External Control Area or a non-constrained region in NYCA
- Allows remote capacity external to the area to be treated as if it were physically located in the Locality/Rest of State zone
- Only associated with Scheduled Lines
- UDRs approved based on CRIS requested and received in relation to transfer capability

Unforced Capacity Deliverability Rights (UDRs)

Current UDRs Awarded	
Cross Sound Cable (CSC) New England to Long Island, Zone K	330 MW
Neptune Cable PJM to Long Island, Zone K	660 MW
Linden VFT PJM to New York City, Zone J	315 MW
Hudson Transmission Project (HTP) PJM to New York City, Zone J	660 MW

**ICAP Manual – Section 4.9.6*

External-to-ROS Deliverability Rights (EDRs)

Current EDRs Awarded	
Cedars HQ to Rest-of-State (ROS), Zone D	80 MW

**ICAP Manual – Section 4.9.6*

UCAP for UDR

- The UDR Rightsholder/ICAP Supplier designates which resources will be used to supply capacity via the UDR.
- Each Rightsholder's UDRs are reduced by its share of:
  - UDR Line Losses
  - Each Resource's Derating Factor
  - UDR Line Unavailability

∑ of each UDR Resource's [(Resource ICAP – Resource Loss MWs) * (1- Resource Derating Factor) * (1- UDR Unavailability) * CAF]

UCAP for UDR Example

- A UDR Line XYZ from NE to LI is configured
- This UDR has Resource A and Resource B

Resource A has 117.7 MWs of UCAP Available to Offer in LI

UCAP =

(125 – 3.6 MW) * (1 – 0.01) * (1- 0.02) * 1

121.4 * 0.99 * 0.98 * 1

117.78228

Resource B has 186.2 MWs of UCAP Available to Offer in LI

UCAP =

(206 – 5.9 MW) * (1 – 0.05) * (1- 0.02) * 1

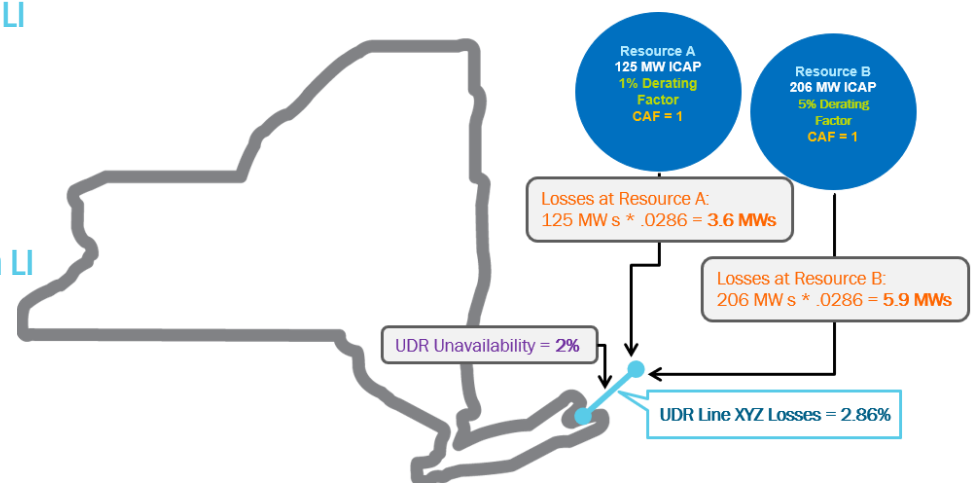
200.1 * 0.95 * 0.98 * 1

186.2931

UDR Total UCAP Available to Offer in LI =

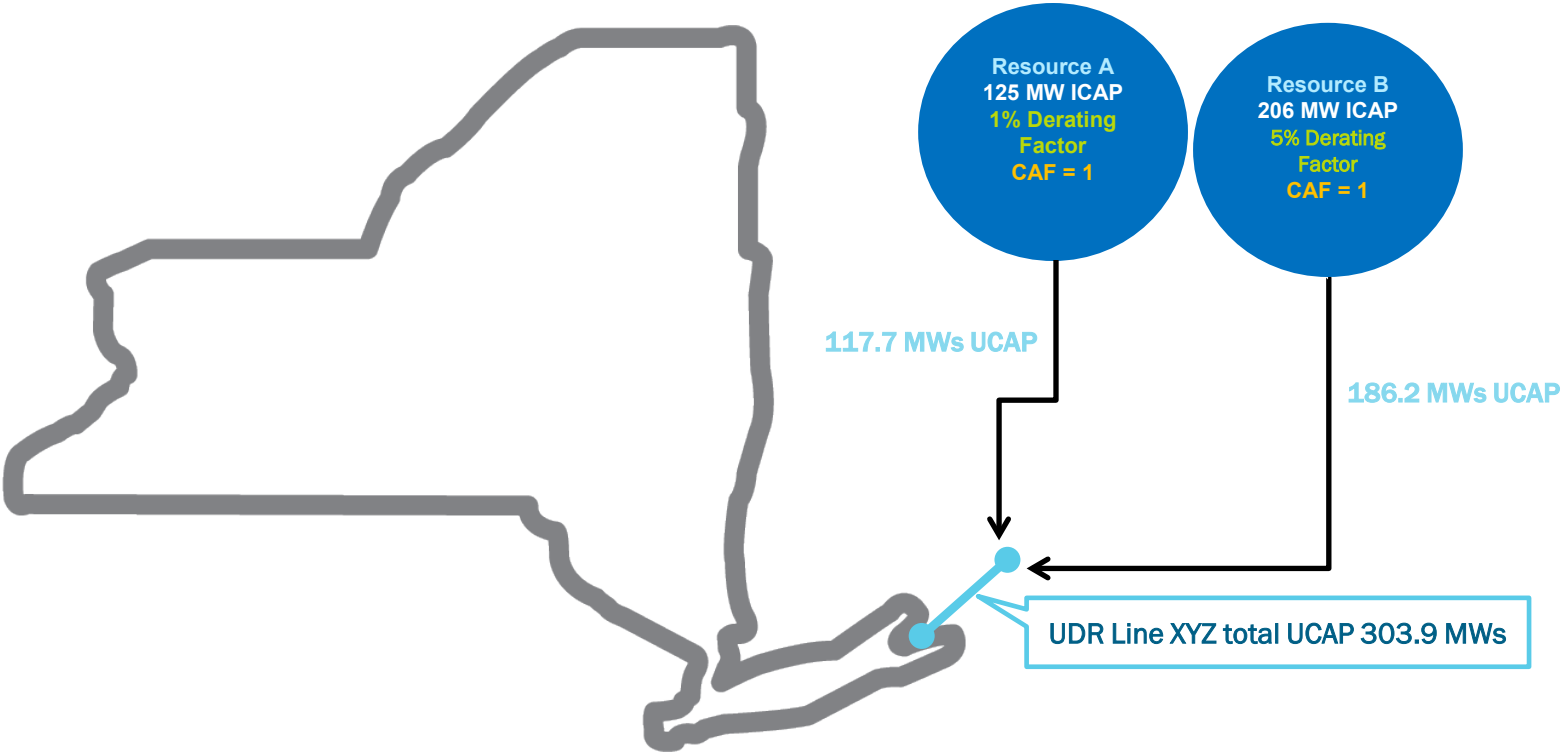
117.7 + 186.2

303.9



UCAP for UDR Example

- A UDR Line XYZ from NE to LI is configured
- This UDR has Resource A and Resource B



Amount of LSE Capacity Obligation to Procure

-How much must be purchased?

LSE Capacity Requirements Obligation to Procure

- **How much must be procured?**
  - All LSEs are required to purchase a specific amount of the Total NYCA Capacity Requirement
    - Based on their contribution to the Transmission District's peak load coincident with the NYCA peak load
  - LSEs may also have Locational Capacity Requirements
    - (G-J Locality, LI and NYC)

LSE Capacity Requirements

- **LSE Minimum ICAP Requirement**
  - Each LSE required to procure a certain percentage of the Total Capacity Requirement
  - The amount that forms the base is calculated each Capability Year and includes:
    - Forecasted Peak Load
    - IRM and Locational Capacity Requirement percentages
    - System changes due to transmission capability

LSE Capacity Requirements

- **LSE Minimum UCAP Requirement**
  - Min UCAP calculated separately for each Transmission District in which it serves load
  - NYISO calculates for a Capability Period
  - Each month each LSE must satisfy its minimum UCAP requirement
    - May satisfy via self-supply, bilateral transactions or through NYISO administered auctions
    - UCAP requirement adjusted monthly for customer switching

LSE Capacity Requirements

- **Why ICAP to UCAP ?**
  - Incorporates Locational Translation Factor
  - Calculated by NYISO every Capability Period
  - Calculated for NYCA and localities
    - For LSEs serving load in G-J Locality, Zone K (LI), or Zone J (NYC), a specified amount of their requirement must be purchased within the LSE's respective Locality (based on their local load forecast)

Locational Capacity Requirements

Locational Minimum ICAP Requirements

- Locational Capacity Requirements (LCRs) established annually for the following Localities:

2023/2024 Capability Year (May 1, 2023 – April 30, 2024)	
G-J Locality Requirement	85.4% *of G-J forecasted peak load*
Zone K (LI) Requirement	105.2% *of LI forecasted peak load*
Zone J (NYC) Requirement	81.7% *of NYC forecasted peak load*

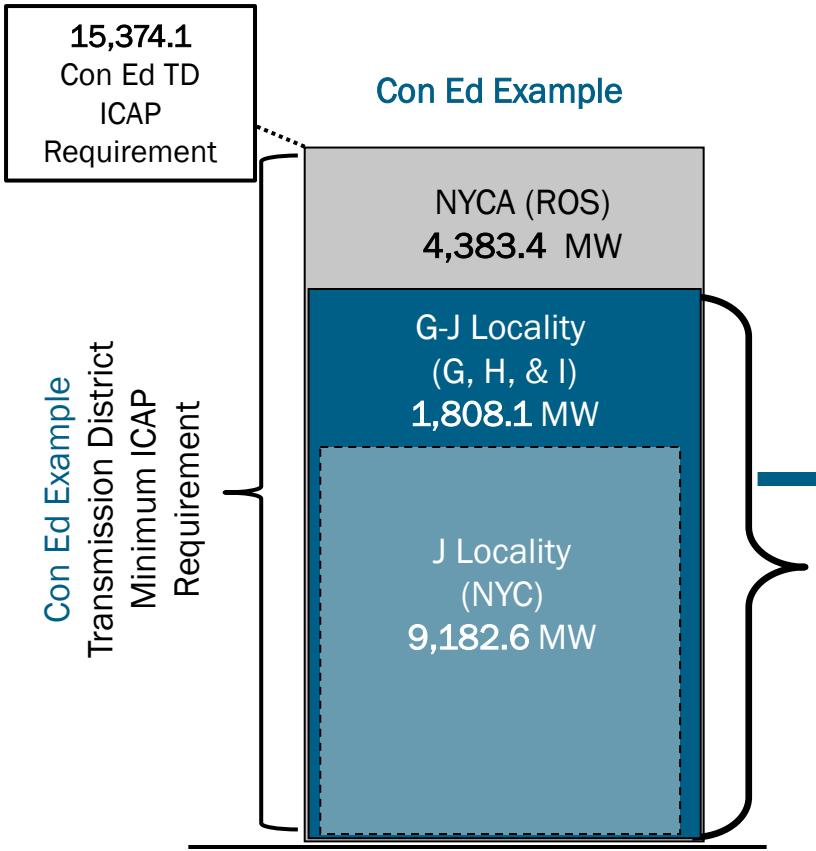
Note: These values are the NYSRC Executive Committee approved IRM and the NYISO approved LCRs for the applicable Capability Year

Locational Minimum ICAP Requirement = Locational Forecasted Peak Load x LCR Percentage

Locational Minimum UCAP Requirement = Locational Minimum ICAP x (1 – Locational Translation Factor)

Example: Locational Minimum ICAP Requirement

(Summer 2023 values)



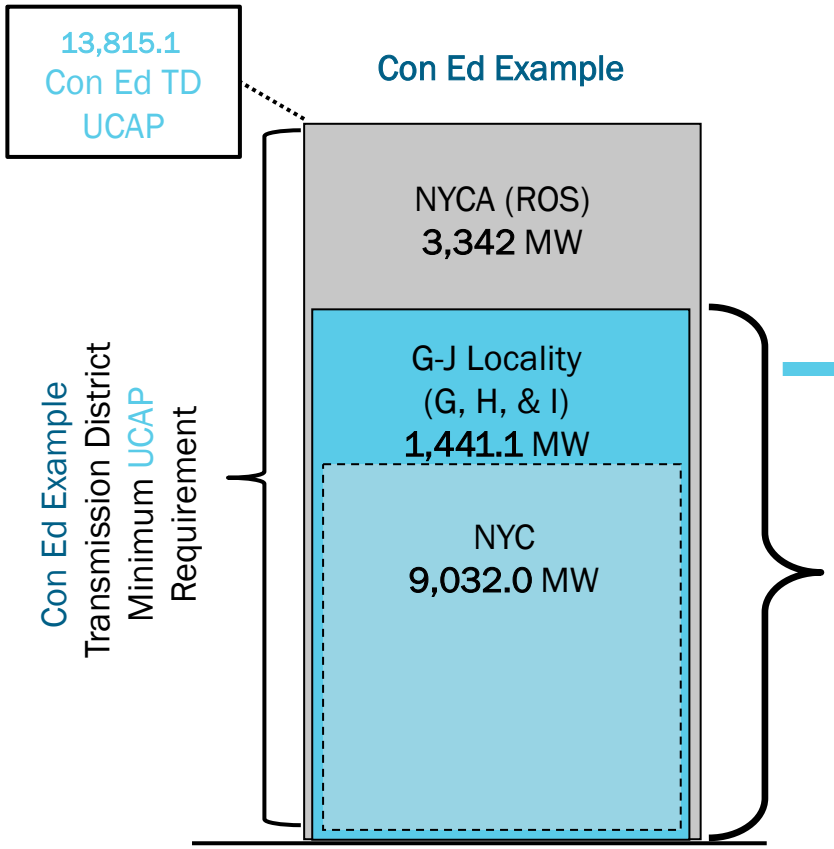
For Con Ed's portion only:

- Con Ed's TD ICAP Requirement = **15,374.1**

	Forecasted Peak Load (FPL)	Requirement
Con Ed TD NYCA	12,811.7	120.0%
Con Ed TD G-J	12,869.7	85.4%
Con Ed TD NYC	11,239.4	81.7%

- G-J Locational ICAP Requirement is 85.4% of G-J Locality FPL:
  12,869.7 x 85.4% = 10,990.7 MW
- NYC Locational ICAP Requirement is 81.7% of NYC FPL:
  11,239.4 x 81.7% = 9,182.6 MW
- Remaining G-J Locational Requirement after meeting the NYC requirement must be purchased in G, H, I, J:
  10,990.7 – 9,182.6 = 1,808.1 MW
- Remaining NYCA requirement can be purchased in G, H, I, J, K, or ROS:
  15,374.1 – 10,990.7 = 4,383.4 MW

Example: Locational Minimum UCAP Requirement



(Summer 2023 values)

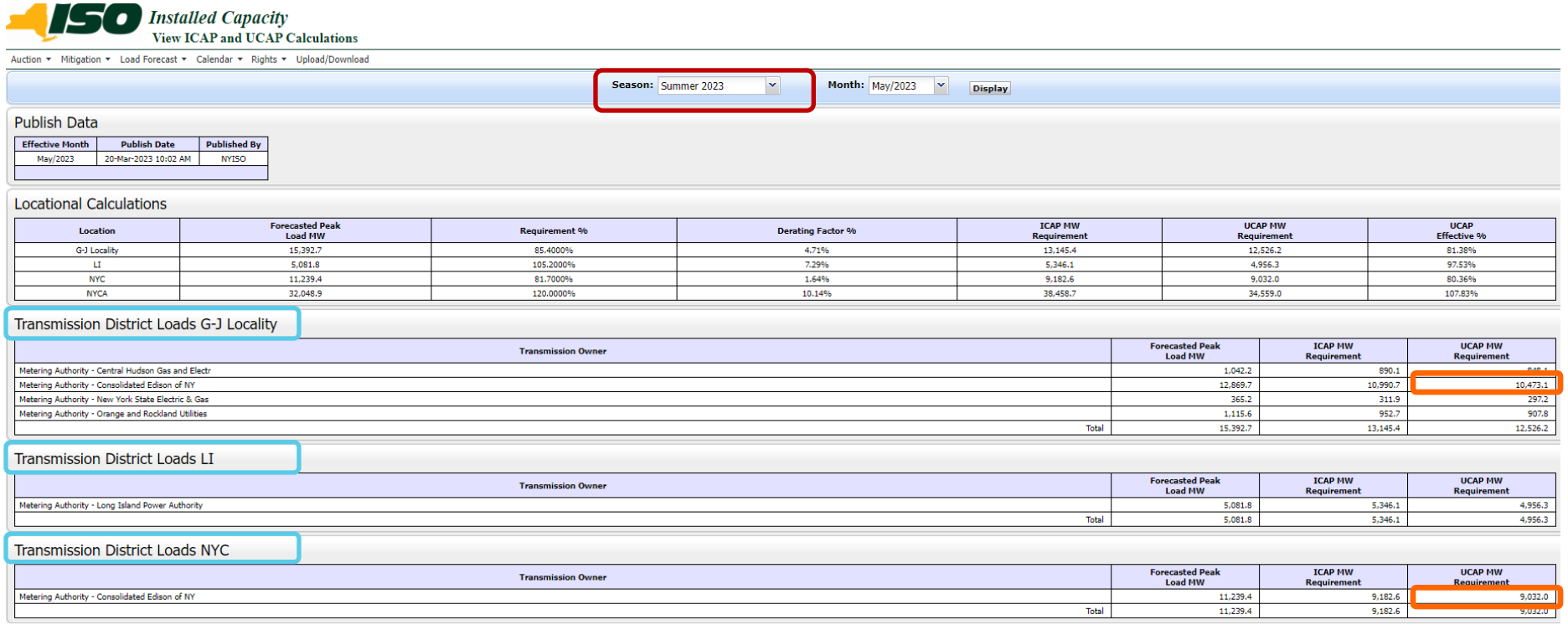
For Con Ed's portion only:

- Con Ed's TD UCAP Requirement = 13,815.1 MW

Locational Min ICAP x (1 – Locational Translation Factor)

- G-J Locational UCAP Requirement is:
  10,990.7 x (1 – 4.71%) = 10,473.1 MW
- NYC Locational UCAP Requirement is:
  9,182.6 x (1 – 1.64%) = 9,032.0 MW
- Remaining G-J Locational UCAP Requirement after meeting the NYC UCAP Requirement must be purchased in G, H, I, J:
  10,473.1 – 9,032.0 = 1,441.1 MW
- Remaining NYCA UCAP Requirement after meeting the G-J Locational UCAP Requirement can be purchased in G, H, I, J, K, or ROS:
  13,815.1 – 10,473.1 = 3,342 MW

ICAP and UCAP Values
Locational Requirements



ISO Installed Capacity
View ICAP and UCAP Calculations

Auction ▾ Mitigation ▾ Load Forecast ▾ Calendar ▾ Rights ▾ Upload/Download

Season: Summer 2023 Month: May/2023 Display

Publish Data

Effective Month	Publish Date	Published By
May/2023	20-Mar-2023 10:02 AM	NYISO

Locational Calculations

Location	Forecasted Peak Load MW	Requirement %	Derating Factor %	ICAP MW Requirement	UCAP MW Requirement	UCAP Effective %
G-J Locality	15,392.7	85.4000%	4.71%	13,145.4	12,526.2	81.38%
LI	5,081.8	105.2000%	7.29%	5,346.1	4,956.3	97.53%
NYC	11,239.4	81.7000%	1.64%	9,182.6	9,032.0	80.36%
NYCA	32,048.9	120.0000%	10.14%	38,458.7	34,559.0	107.83%

Transmission District Loads G-J Locality

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Central Hudson Gas and Electr	1,042.2	890.1	848.1
Metering Authority - Consolidated Edison of NY	12,869.7	10,990.7	10,473.1
Metering Authority - New York State Electric & Gas	365.2	311.9	297.2
Metering Authority - Orange and Rockland Utilities	1,115.6	952.7	907.8
Total	15,392.7	13,145.4	12,526.2

Transmission District Loads LI

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Long Island Power Authority	5,081.8	5,346.1	4,956.3
Total	5,081.8	5,346.1	4,956.3

Transmission District Loads NYC

Transmission Owner	Forecasted Peak Load MW	ICAP MW Requirement	UCAP MW Requirement
Metering Authority - Consolidated Edison of NY	11,239.4	9,182.6	9,032.0
Total	11,239.4	9,182.6	9,032.0

Let's Review

The Locational Minimum ICAP Requirement for the G-J locality is 85.4% of _____.

a) NYCA Minimum ICAP Requirement

b) NYCA Forecasted Peak Load

c) G-J Forecasted Peak Load

ICAP Auxiliary Processes & Activities

Benefits

- Ensures resource adequacy
- Resources recover a portion of fixed costs
- Provides market signal for investment

Market Mechanics

- Amount of Capacity Required
- Amount of Capacity Available
- Amount of Capacity to Offer
- Amount of Capacity to Procure

Auxiliary Processes & Activities

- Capacity Auctions
- Spot Market Auction Demand Curve
- Settlements
- Responsibilities
- Sanctions

New York ISO

Capacity Auctions

ICAP Market Auctions

Capability Period Auction (Strip Auction)

- Matches Bids & Offers
- Sets Market-Clearing Price

Monthly Auction

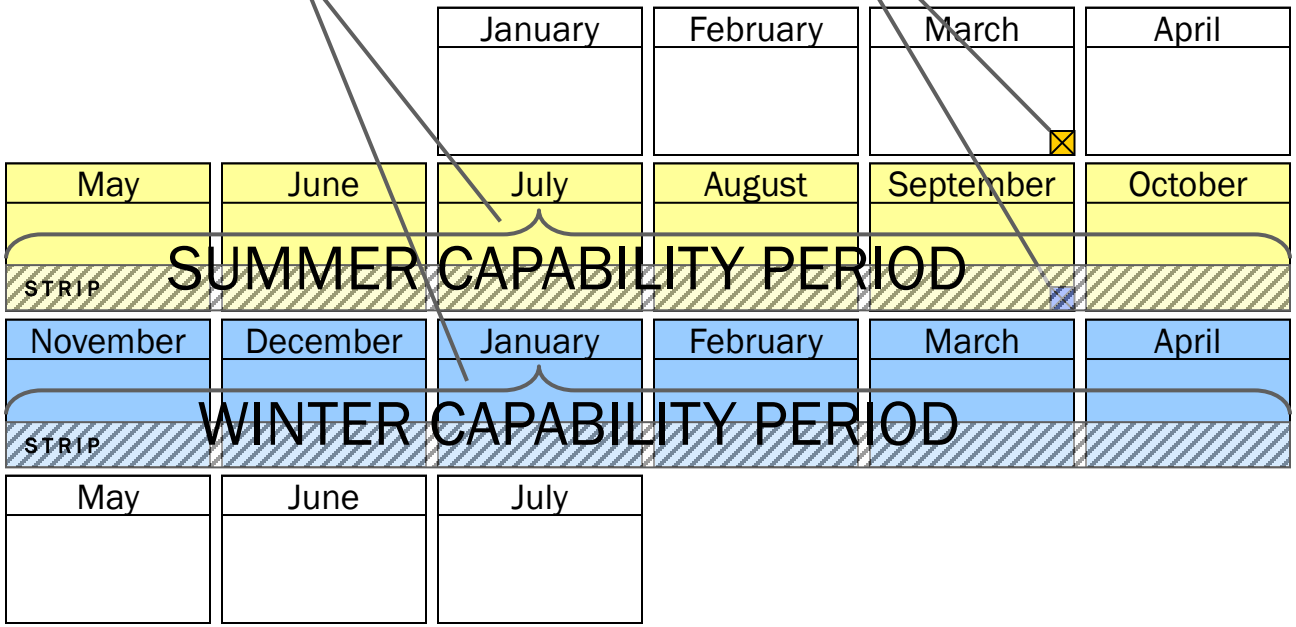
- Matches Bids & Offers
- Sets Market-Clearing Price

Spot Market Auction

- Deficiency and Excess UCAP
- Market Clearing Price based on Demand Curve

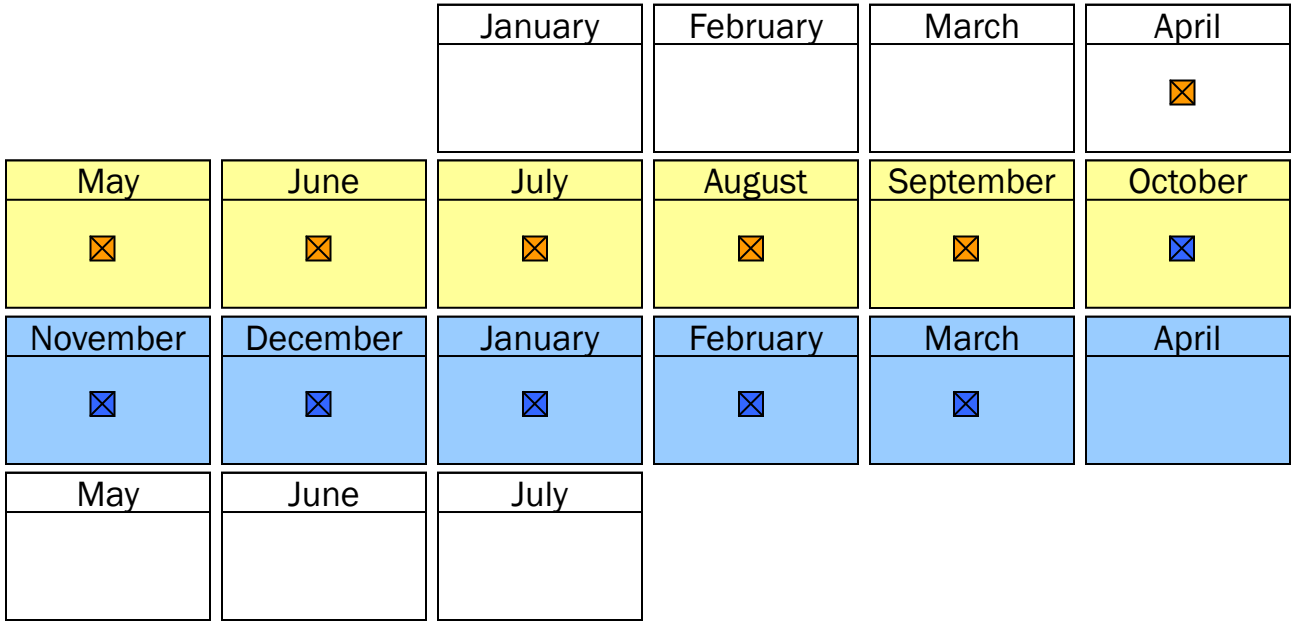
Capability Period Auction

- A bid in this auction is for the same MW level and price for the entire capability period
- Auction is run at least 30 days prior to the start of the Capability Period
- Auction solves for a (6) Month Strip of UCAP at a Single Price/Month



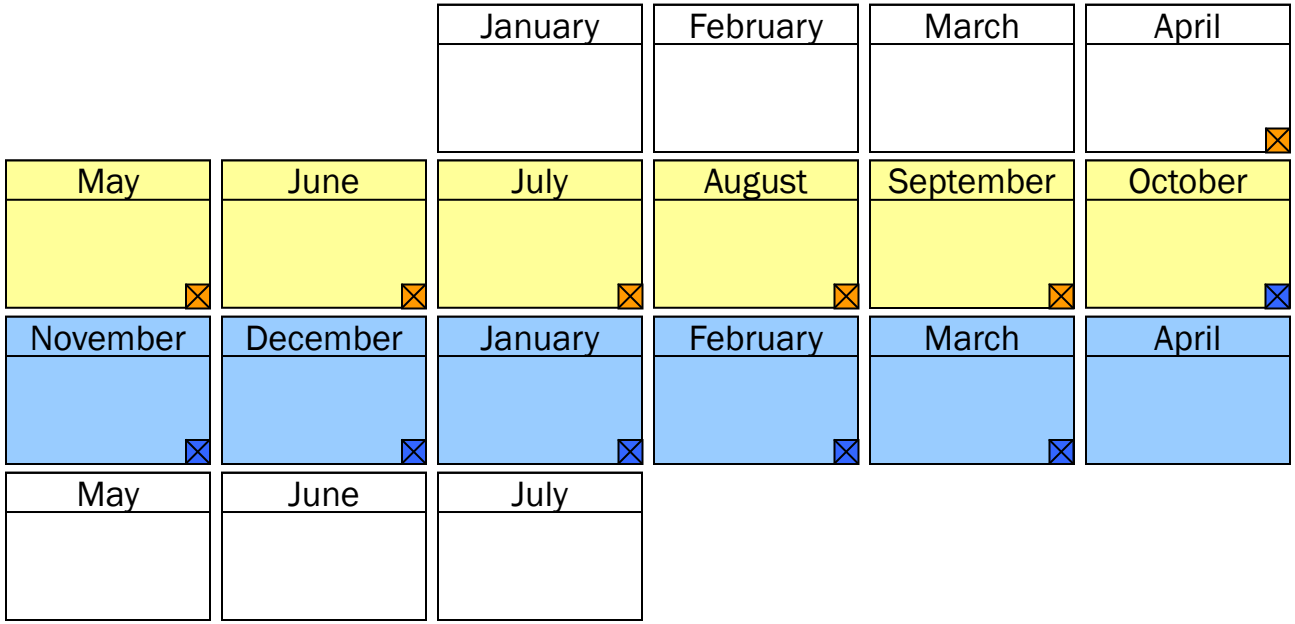
Monthly Auction

- May buy/sell for any month remaining in the Capability Period
- Auction is run at least 15 days prior to the start of the month



Spot Market Auction

- May sell for upcoming month only
- Must certify all Capacity before Auction
- Auction solves using the Demand Curve
- Auction is run 2 days prior to the start of the month



Spot Market Auction and Demand Curve

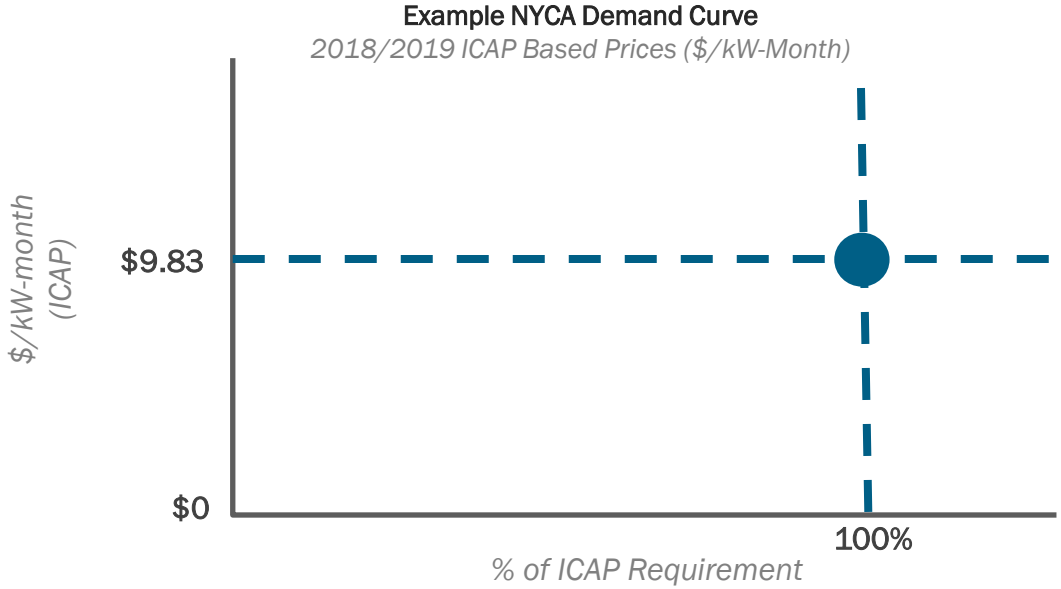
- **Demand Curve used to determine a spot market clearing price**
  - Values additional UCAP above Minimum NYCA and Locational requirements
  - Reduces price volatility
  - Provides signal for capacity investment

Spot Market Auction and Demand Curve

- **Separate ICAP Demand Curves to determine**
  - Total [NYCA] LSE UCAP Obligation
  - NYC Locational component of LSE UCAP Obligation
  - Long Island Locational component of LSE UCAP Obligation
  - G-J Locality component of LSE UCAP Obligation
- **Demand Curves are reset every four years and include annual adjustments**

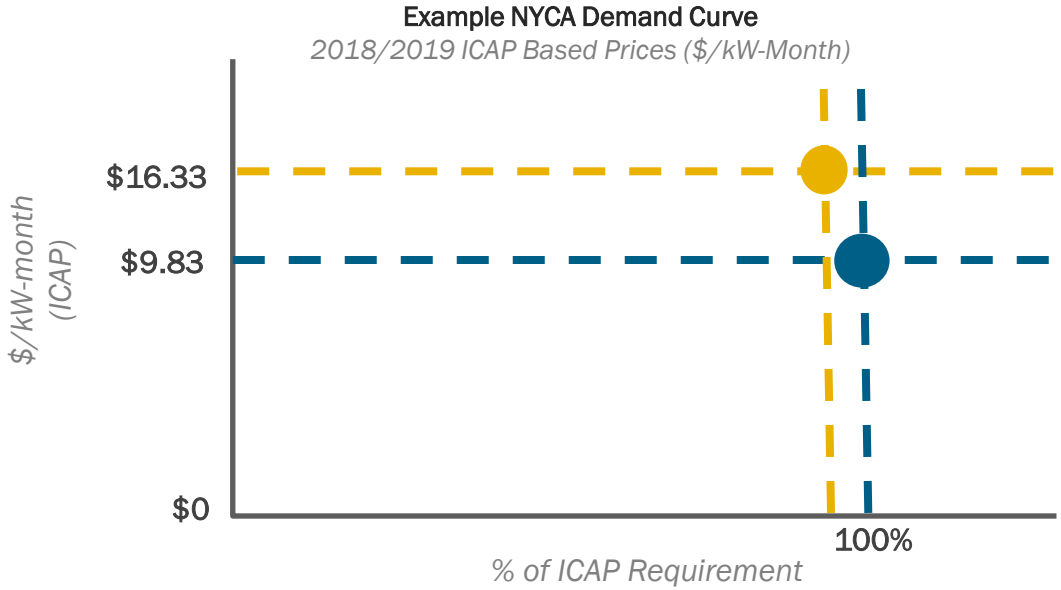
Demand Curve Components

- Reference Point: Set price point for 100% of minimum requirement



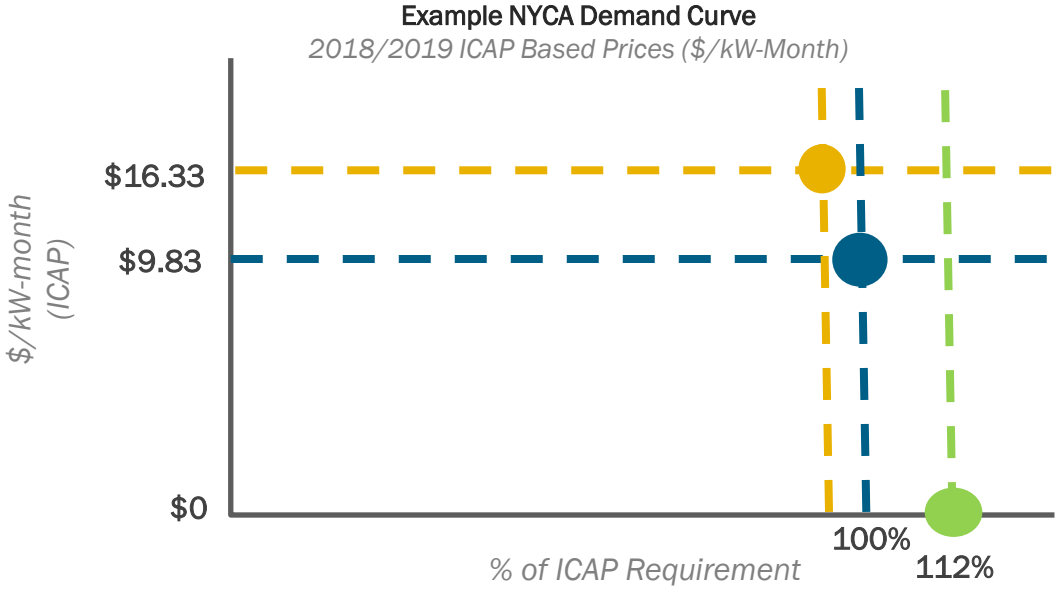
Demand Curve Components

- Reference Point: Set price point for 100% of minimum requirement
- Maximum Clearing Price: Equal to 1.5 times the estimated localized levelized cost of new peaking unit



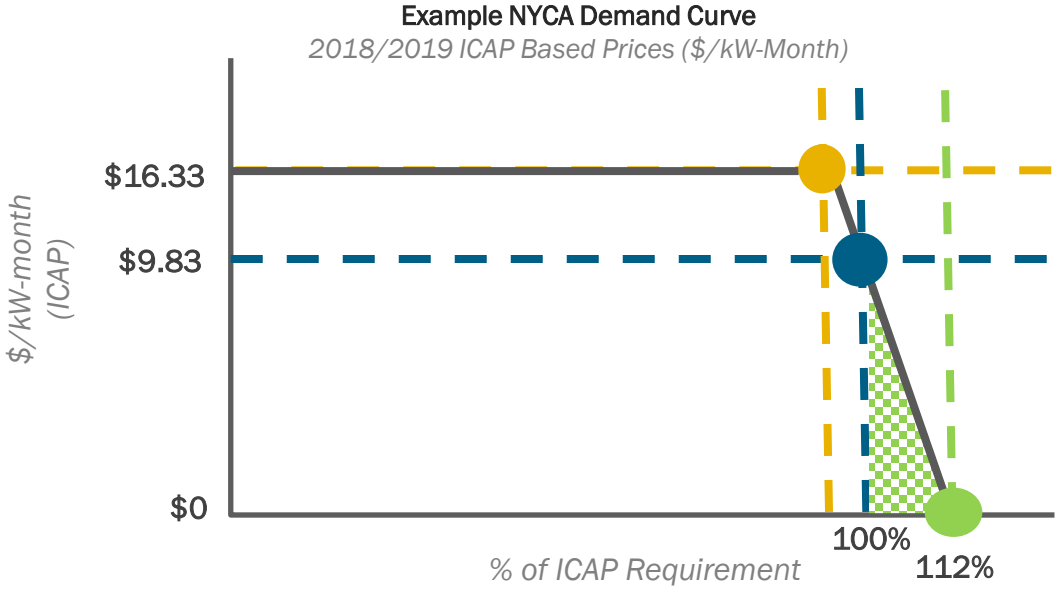
Demand Curve Components

- Reference Point: Set price point for 100% of minimum requirement
- Maximum Clearing Price: Equal to 1.5 times the estimated localized levelized cost of new peaking unit
- Zero Crossing Point: Percentage of requirement where price is $0



Demand Curve Components

- Reference Point: Set price point for 100% of minimum requirement
- Maximum Clearing Price: Equal to 1.5 times the estimated localized levelized cost of new peaking unit
- Zero Crossing Point: Percentage of requirement where price is $0



Demand Curve Components

- **Reference Point: Set price point for 100% of minimum requirement**
  - NYCA: $9.83
  - G-J Locality: $16.59
  - NYC: $21.95
  - LI: $15.96

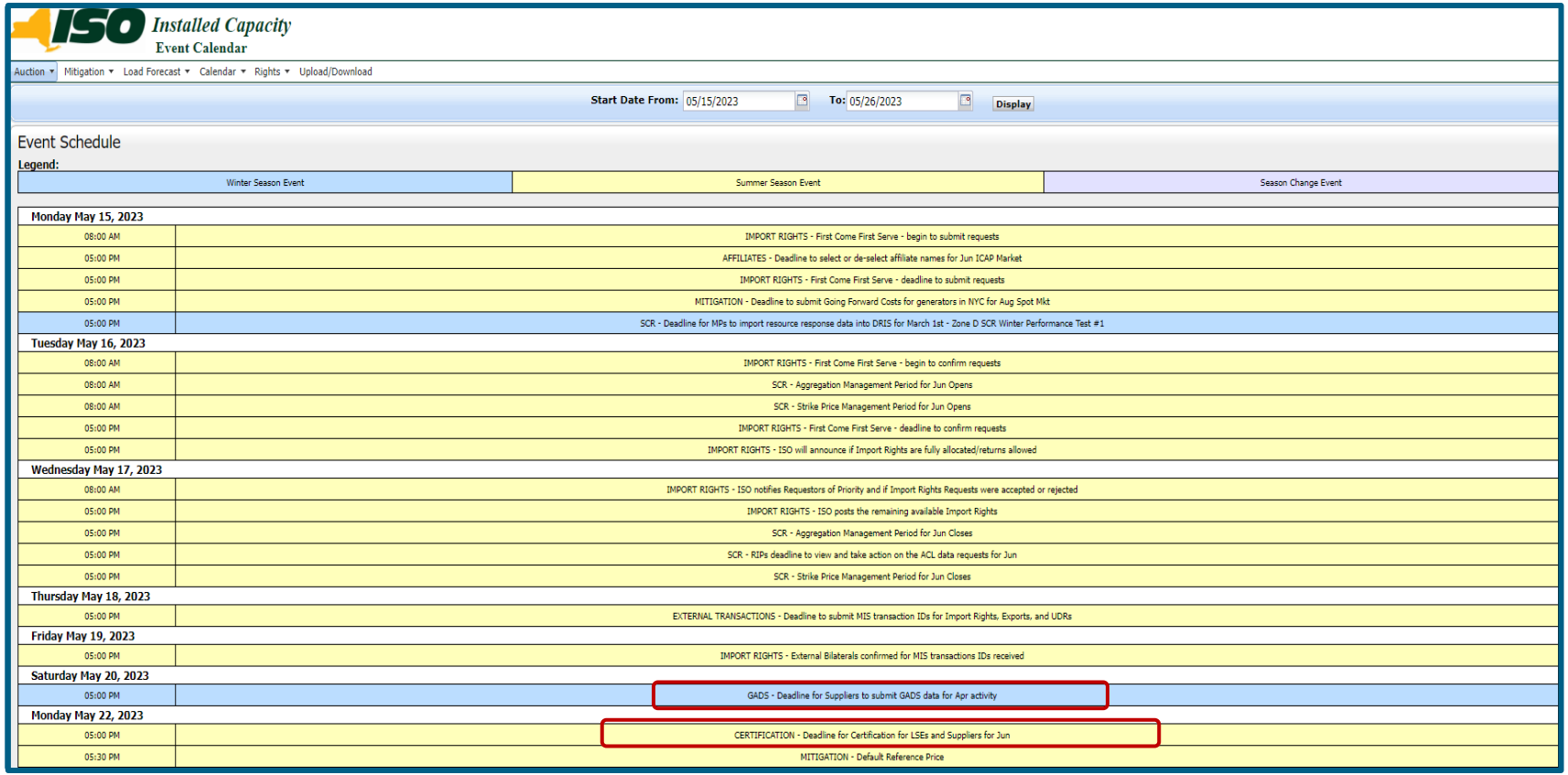
  2018/2019 ICAP Based Prices ($/kW-Month)

- **Maximum Clearing Price: Equal to 1.5 times the estimated localized levelized cost of new peaking unit**
  - NYCA: $16.33
  - G-J Locality: $22.51
  - NYC: $26.93
  - LI: $25.11

  2018/2019 ICAP Based Prices ($/kW-Month)

- **Zero Crossing Point: Percentage of requirement where price is $0**
  - NYCA Demand Curve: 112%
  - G-J Locality Demand Curve: 115%
  - LI & NYC Locational Demand Curves: 118%

ICAP Event Calendar



ISO Installed Capacity
Event Calendar

Auction ▾ Mitigation ▾ Load Forecast ▾ Calendar ▾ Rights ▾ Upload/Download

Start Date From: 05/15/2023 To: 05/26/2023 Display

Event Schedule

Legend:

Winter Season Event	Summer Season Event	Season Change Event

Monday May 15, 2023	
08:00 AM	IMPORT RIGHTS - First Come First Serve - begin to submit requests
05:00 PM	AFFILIATES - Deadline to select or de-select affiliate names for Jun ICAP Market
05:00 PM	IMPORT RIGHTS - First Come First Serve - deadline to submit requests
05:00 PM	MITIGATION - Deadline to submit Going Forward Costs for generators in NYC for Aug Spot Mkt
05:00 PM	SCR - Deadline for MPs to import resource response data into DRIS for March 1st - Zone D SCR Winter Performance Test #1
Tuesday May 16, 2023	
08:00 AM	IMPORT RIGHTS - First Come First Serve - begin to confirm requests
08:00 AM	SCR - Aggregation Management Period for Jun Opens
08:00 AM	SCR - Strike Price Management Period for Jun Opens
05:00 PM	IMPORT RIGHTS - First Come First Serve - deadline to confirm requests
05:00 PM	IMPORT RIGHTS - ISO will announce if Import Rights are fully allocated/returns allowed
Wednesday May 17, 2023	
08:00 AM	IMPORT RIGHTS - ISO notifies Requestors of Priority and if Import Rights Requests were accepted or rejected
05:00 PM	IMPORT RIGHTS - ISO posts the remaining available Import Rights
05:00 PM	SCR - Aggregation Management Period for Jun Closes
05:00 PM	SCR - RIPs deadline to view and take action on the ACL data requests for Jun
05:00 PM	SCR - Strike Price Management Period for Jun Closes
Thursday May 18, 2023	
05:00 PM	EXTERNAL TRANSACTIONS - Deadline to submit MIS transaction IDs for Import Rights, Exports, and UDRs
Friday May 19, 2023	
05:00 PM	IMPORT RIGHTS - External Bilaterals confirmed for MIS transactions IDs received
Saturday May 20, 2023	
05:00 PM	GADS - Deadline for Suppliers to submit GADS data for Apr activity
Monday May 22, 2023	
05:00 PM	CERTIFICATION - Deadline for Certification for LSEs and Suppliers for Jun
05:30 PM	MITIGATION - Default Reference Price

Let's Review

Which auction allows market participants to purchase capacity for an entire 6 month period all at once?

a) Capacity Auction

b) Spot Market Auction

c) Monthly Auction

d) Strip Auction

Let's Review

TRUE or FALSE: The purpose of the spot market is to cover any shortfall or deficiency and allows an opportunity to sell excess capacity.

TRUE

FALSE

Let's Review

New York ISO

The Demand Curve is applicable to which auction(s)?

a) Capability Auction

b) Spot Market Auction

c) Monthly Auction

d) All of the above

Auction Settlements

- **Award amount x Auction Clearing Price**
  - 100 MW x $2.67/kW-month
    - Convert 100 MW to kW: (100 MW x 1,000kW/MW)
    - 100,000 kW x $2.67/kW = $267,000 for the month
- **Auction Awards appear in following weekly invoice**
  - Monthly amount is prorated by the number of days on the weekly invoice divided by the number of days in the month
- **Bilateral Transactions are settled between parties outside of NYISO**

Activities /Responsibilities

- Submission of GADS Data, monthly
- Certification prior to applicable auction
  - LSE must certify the amount of UCAP it has or has obtained
  - Suppliers certify UCAP has not been sold for use in an External Control Area
  - UDR & EDR holders certify that their capacity is not already accounted for elsewhere
- Secure UCAP
  - Bilateral contract (includes self-supply) or NYISO Auction
- Bid, Schedule, Notify in DAM Energy Market***

Bid, Schedule or Notify

- **ICAP Suppliers must either:**
  - "Bid" [Offer] Energy in the DAM
  - Schedule a Bilateral Transaction

    OR
  - Notify the NYISO of any outage

Exceptions to this are outlined in Section 4.8 of the ICAP manual

- **The total amount of Energy that an ICAP supplier "bids," schedules or declares unavailable on a given day must equal or exceed the Installed Capacity Equivalent (ICE) amount of UCAP sold**
  - ICE value is a generator's capacity sold adjusted for availability

$$ICE = \frac{\text{UCAP Sold}}{(1 - \text{Derating Factor}) * \text{Capacity Accreditation Factor}}$$

Let's Review

How much must this ICAP supplier Offer, Schedule, or Notify in DAM if:

UCAP Sold = 50 MWs

Derating Factor = .05 (available 95% of the time)

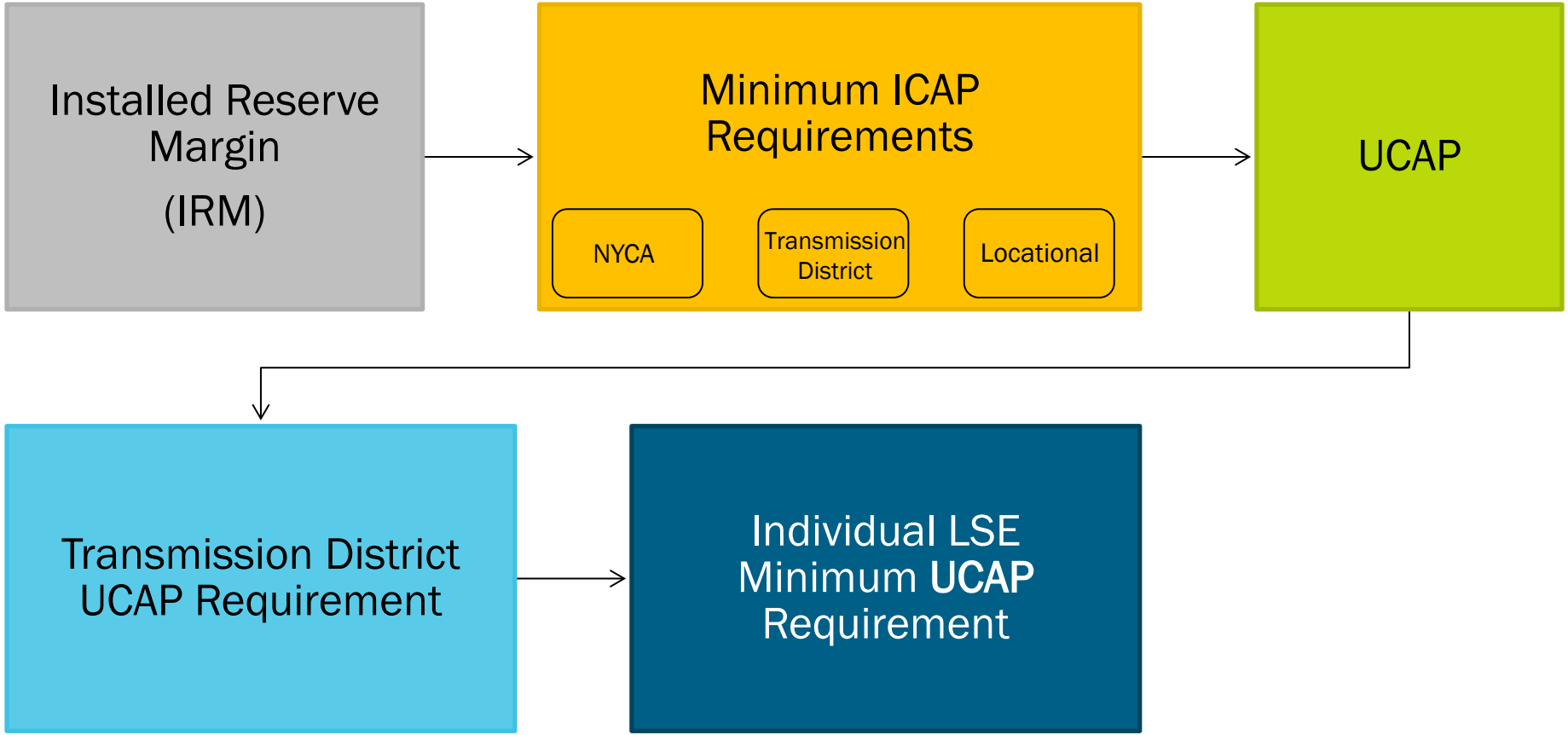
$$ICE = \frac{\text{UCAP Sold}}{(1 - \text{Derating Factor}) * \text{Capacity Accreditation Factor}}$$

****Assume that ICAP Supplier CAF = 1*

Sanctions

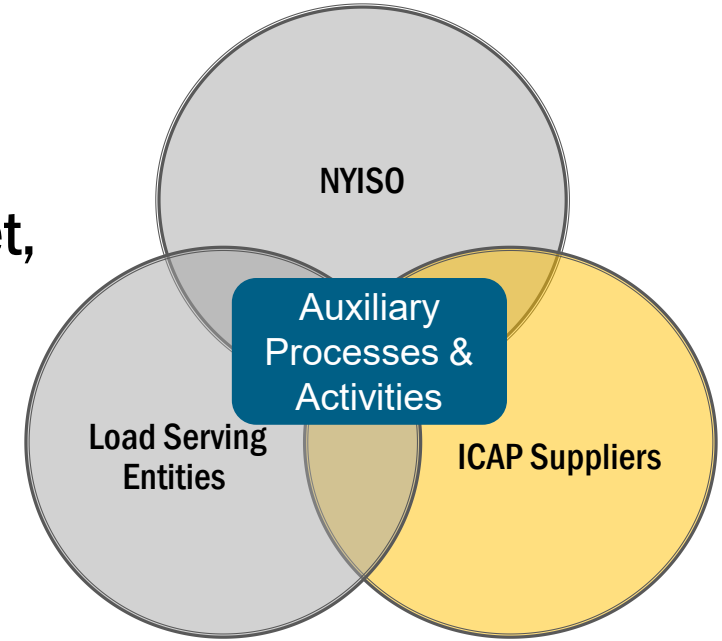
- Failure to comply with bidding, scheduling and notification requirements and procedures
- Failure to provide required information

ICAP Market Summary



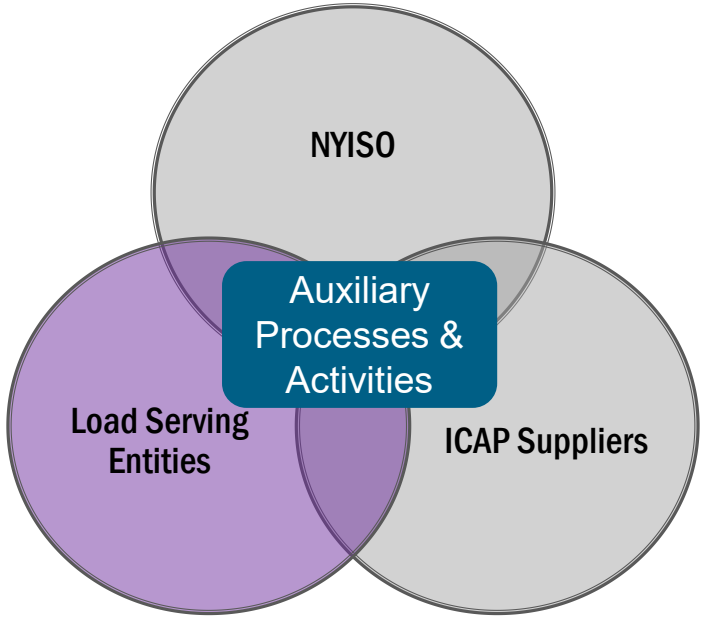
ICAP Summary - Supplier Activities

- Submit DMNC data each Capability Period
- Submit monthly GADS data, or equivalent
- Certify prior to ICAP Spot Market Auction
- Offer capacity in auction
- Bid, schedule or notify in Day-Ahead Market, if obligated to do so



ICAP Summary - Load Activities

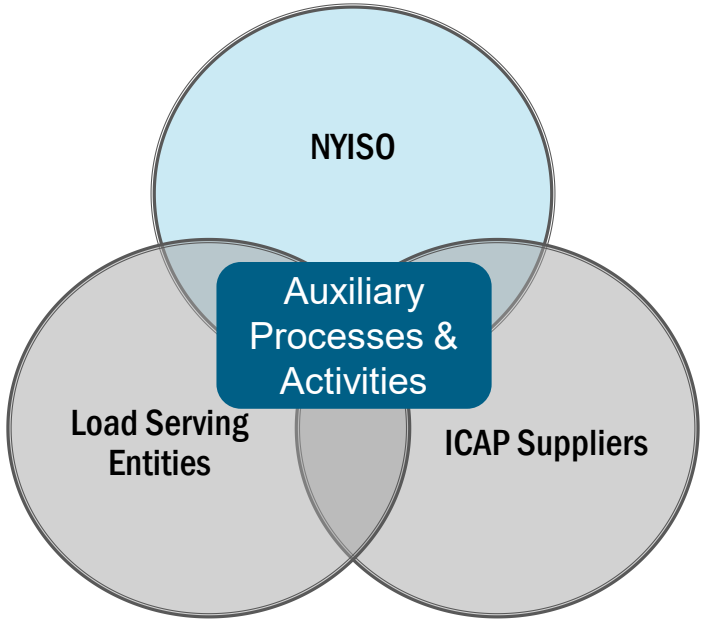
- **Purchase capacity in auction**
  - Minimum requirement
  - Locational Requirements
- **Certify prior to ICAP Spot Market Auction**



Note: Transmission Owners must submit Adjusted Load data coincident with NYCA peak

ICAP Summary – NYISO Activities

- Review and adjust Demand Curves every 4 years
  - Through the ICAP Working Group
- Provide Minimum ICAP Requirements
- Calculate UCAP
- Conduct Auctions
- Post award data to web
- Settlement mechanism



Let's Review

New York ISO

What is the primary purpose of the ICAP market?

a) Ensure sufficient load exists for NYCA generation

b) Ensure competitive pricing of new generation

c) Facilitate competitive procurement of generator fixed costs

d) Ensure sufficient resources exist to serve load

Let's Review

TRUE or FALSE: In addition to submitting data to support their actual output, suppliers also required to Bid, Schedule, Notify in the DAM as an ICAP supplier.

TRUE

FALSE

Let's Review

Which of the following statements are true regarding DMNC tests?

a) Test should be conducted only during test periods

b) An out-of-period test can be conducted with prior NYISO approval

c) In lieu of a test, a generator can submit actual operating data

d) All of the above are true

Let's Review

New York ISO

What does UCAP represent?

a) Unforced operating parameters

b) The average availability of a given generator

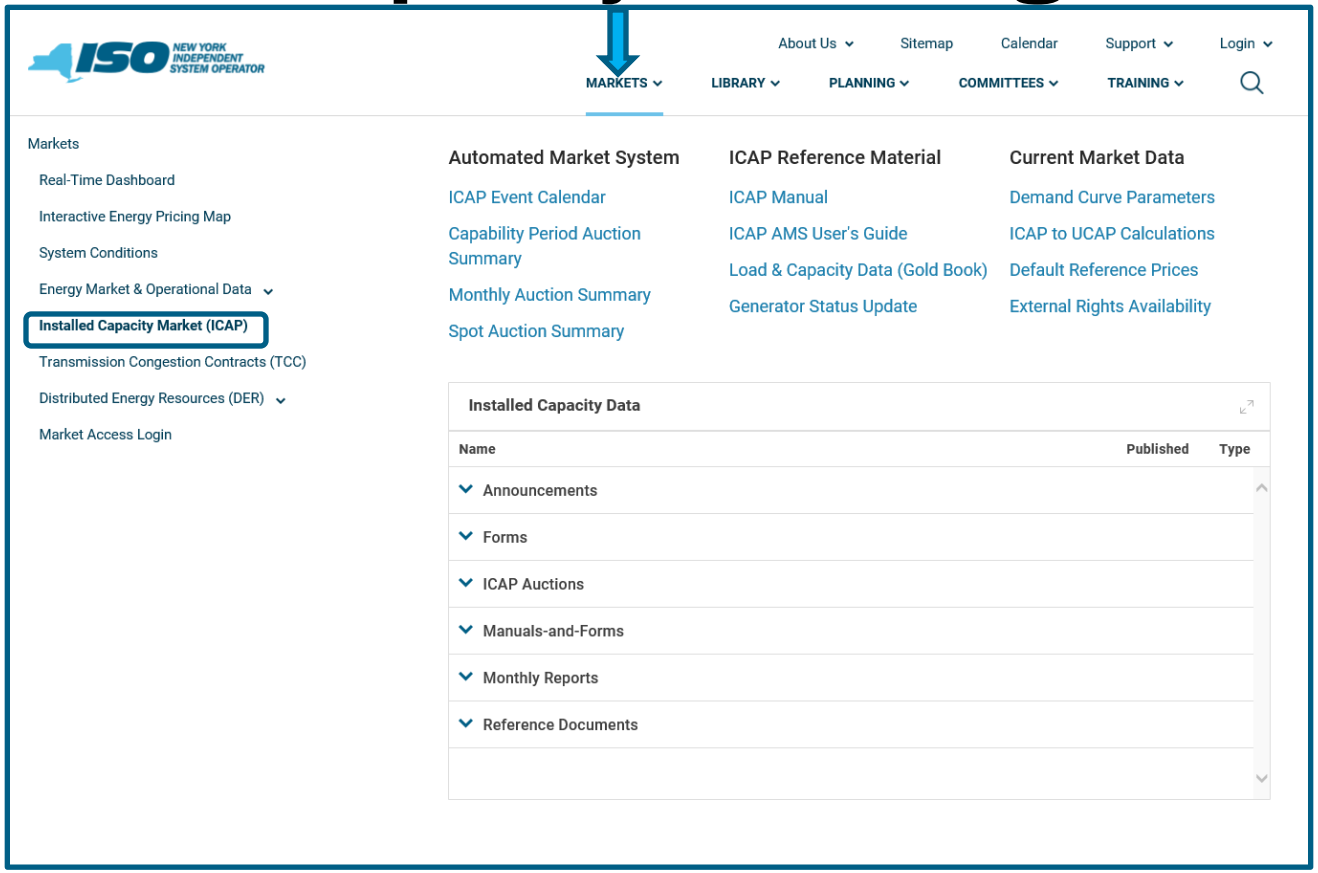
c) Demonstrated output adjusted for deliverability and availability and Capacity Accreditation Factor

d) ICAP adjusted for forecasted usage

Installed Capacity
NYISO Website Data

Installed Capacity Main Page

Installed Capacity Main Page



ICAP Event Calendar

Auction ▾ Mitigation ▾ Load Forecast ▾ Calendar ▾ Rights ▾ Upload/Download

Start Date From: 01/22/2019 **To:** 01/31/2019 **Display**

Event Schedule

Legend:

Winter Season Event	Summer Season Event	Season Change Event

Tuesday Jan 22, 2019	
05:00 PM	IMPORT RIGHTS - Deadline for Import Rights returns if ISO announced fully allocated
05:00 PM	IMPORT RIGHTS - External Bilaterals confirmed for MIS transactions IDs received
05:00 PM	IMPORT RIGHTS - ISO posts the remaining available Import Rights
Wednesday Jan 23, 2019	
05:00 PM	CERTIFICATION - Deadline for Certification for LSEs and Suppliers for Feb
05:30 PM	MITIGATION - Default Reference Price
Thursday Jan 24, 2019	
05:00 PM	LOAD SHIFT - Deadline for TOs to provide daily load shift (customer switching) for Jan
05:00 PM	TRUE UP - Deadline for TOs to provide true-up load shift (actual data) for LSE activity 3 months prior
Friday Jan 25, 2019	
08:00 AM	SPOT MARKET AUCTION - Offer period opens for Feb Spot Market Auction
05:00 PM	IMPORT RIGHTS - Allocated Import Rights w/o MIS transaction IDs entered into Spot Mkt Auction @ $0.00
Monday Jan 28, 2019	
05:00 PM	SPOT MARKET AUCTION - Offer period closes for Feb Spot Market Auction
Wednesday Jan 30, 2019	
08:00 AM	IMPORT RIGHTS - Import Rights First Come First Serve - begin to submit requests
05:00 PM	DMNC - Deadline to submit DMNC data for New Generators to ensure can be used for Mar
05:00 PM	IMPORT RIGHTS - ISO notifies Import Rights Requestors of Priority
05:00 PM	IMPORT RIGHTS - Import Rights First Come First Serve - deadline for requests
05:00 PM	SCR/EDRP - Deadline to update DRIS contacts to be used for event/test notifications for Feb
05:00 PM	SPOT MARKET AUCTION - ISO posts results of Feb Spot Market Auction
Thursday Jan 31, 2019	
08:00 AM	SCR - Performance Factors available in DRIS for Summer 2019
08:00 AM	SCR - RIPs may begin to report resources with partial PTID Sales for Feb in DRIS
05:00 PM	IMPORT RIGHTS - Deadline for ISO to receive Supporting Documents for Import Rights Requests

Additional Resources

- Tariffs – MST and OATT
- ICAP Manual
- ICAP Automated Market System (AMS) User's Guide
- Outage Scheduler User's Guide