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Independent System Operator

Winter Reliability Capacity Enhancements:

Review of System Changes and Capacity Market

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Agenda

- Review of Grid in Transition
- Overview of Capacity Market
- Recent Demand Curve Enhancements
- MMU SOM Recommendations
- Next Steps

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Today's Objective

- To begin identifying existing processes and market design features that could potentially be impacted by movement towards a winter risk/winter peaking system

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Project Objective

- **This is an Issue Discovery project with the objective of identifying potential market impacts associated with a change to a winter-peaking system**
  - The deliverable for this project will be a report and presentation delivered at a Q4 ICAPWG
- **This project will not be assessing models that are used to determine the ICAP requirement**
  - The NYSRC has a separate initiative to enhance the resource adequacy model to better account for winter reliability risks

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Grid in Transition

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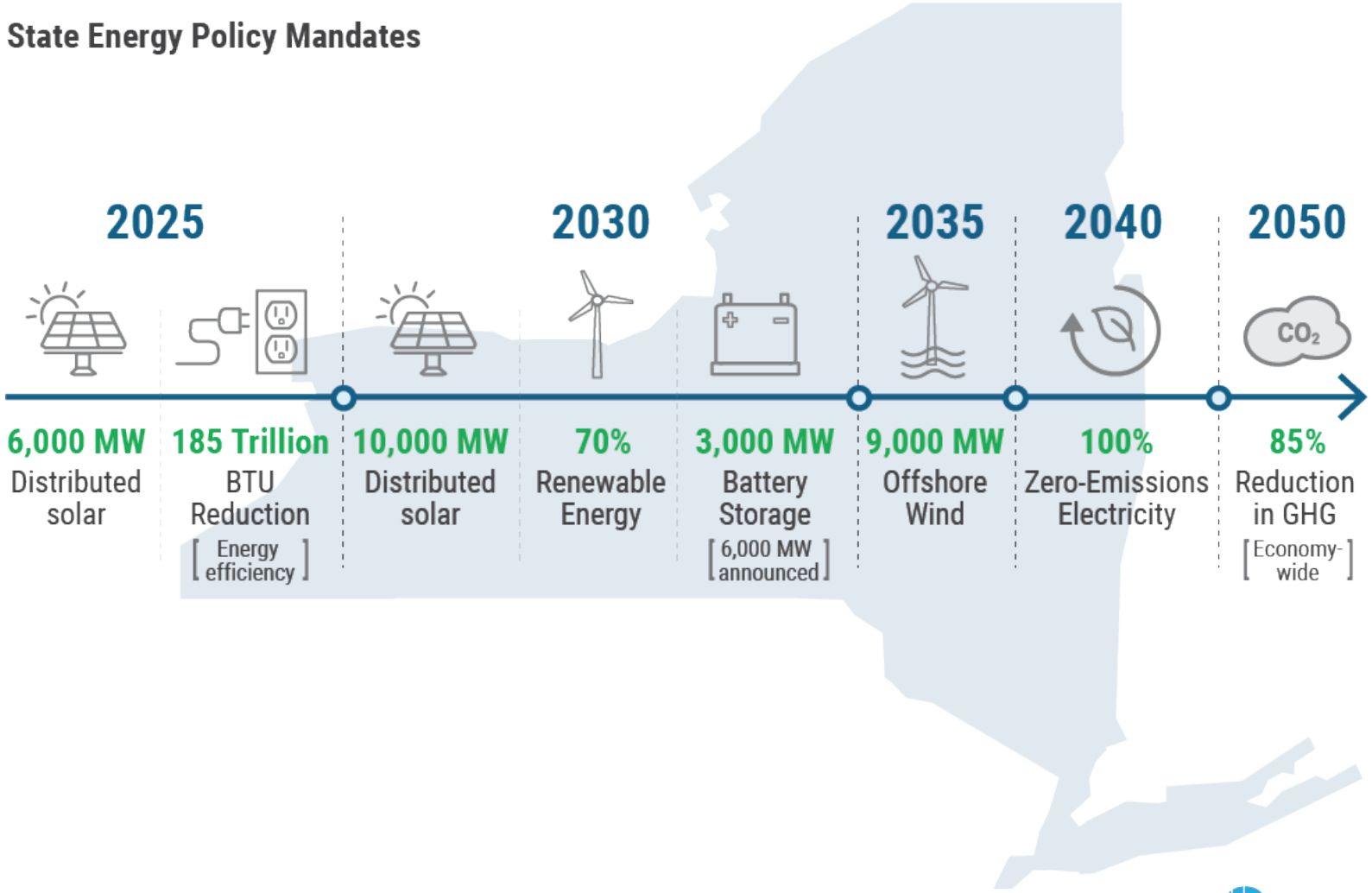
Public Policy Influence on Resource Mix

- Public policies are shaping investment on the grid, particularly the CLCPA
- Competitive markets will channel investment to achieve these goals while maintaining reliability at the lowest possible cost



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Changing Resource Mix

- **Retirement of fossil-fired generators**
  - Thermal generators are typically able to perform at least as well in the winter season as compared with summer
- **Installation of variable, renewable generators**
  - Solar generators typically have lower winter capability as compared to summer
  - Wind generators typically have higher winter capability as compared to summer
- **External ICAP/UDRs**
  - Increasing electrification and changing resource mix are expected to change seasonal import and export dynamics

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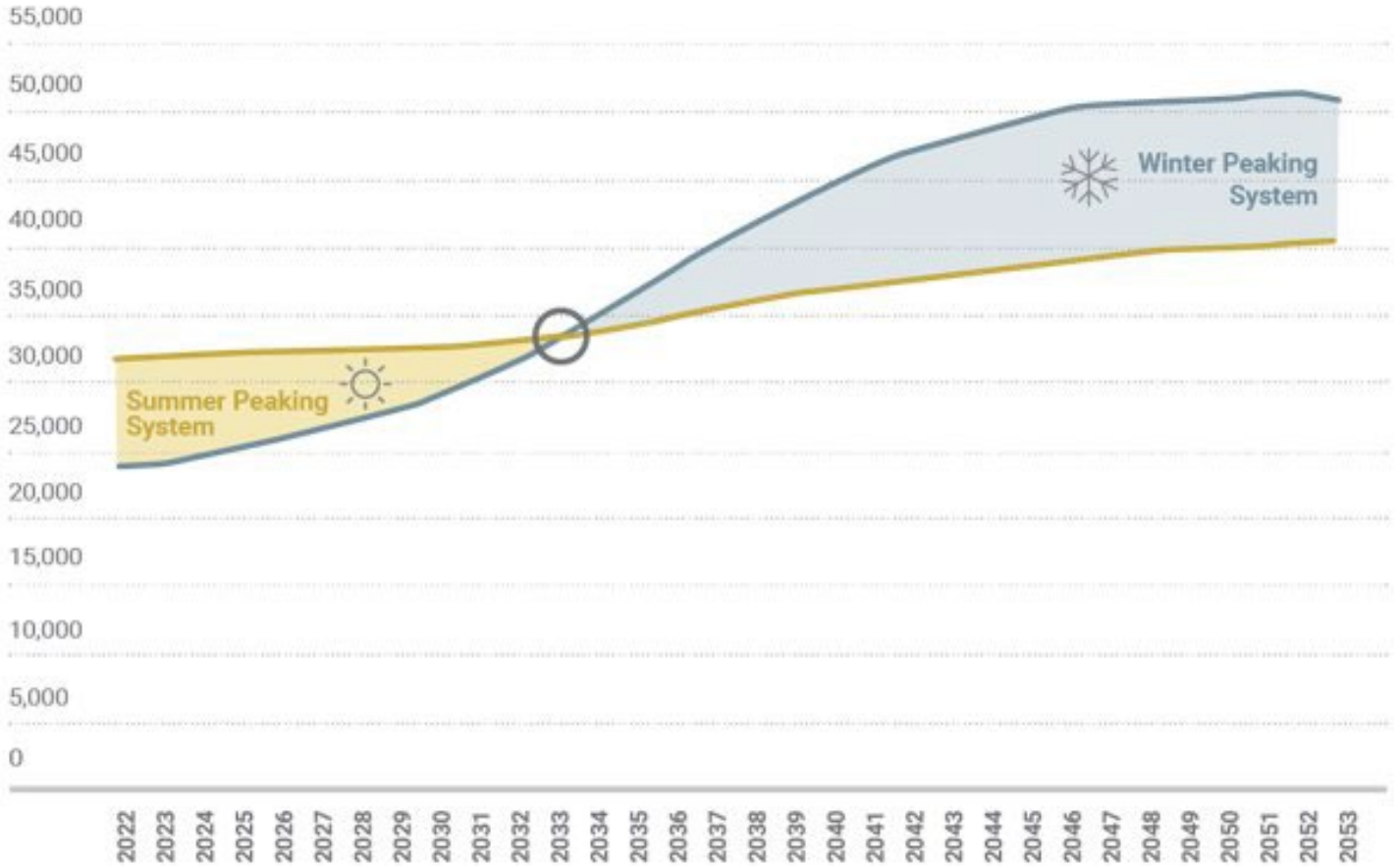
Demand Trends: Peak Demand Forecast

- The NYISO winter and summer peak load forecasts suggest that electrification will drive a shift in NY from a summer-peaking system to a winter-peaking system.
- The timing and degree of this shift will be influenced by EV and heat pump technology adoption.

Electric Summer & Winter Peak Demand: 2022-2053



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Changing Load

- **NYCA load forecast indicates the system will become winter peaking within the next decade**
  - 2023 Gold Book
  - Rest-of-State (Zones A – F) forecast to be winter peaking by 2030
- **Winter load expected to increase largely due to electrification of space heating and transportation**
  - Electrification of space heating will also change the peak load shape, as peak heating demand is in winter early morning hours

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Overview of NYISO Capacity Market

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Installed Capacity Requirement

- **The NYISO forecasts an annual peak demand, and the NY State Reliability Council determines an annual Installed Reserve Margin (IRM) required to meet a "no more than 0.1 Event-Days/year" loss of load expectation (LOLE)**
  - The IRM study uses a probabilistic method that considers generator forced outages, load forecast uncertainty, transmission interface forced outages, uncertainty of renewable output and other factors
  - The loss of load risk is currently concentrated around the summer peak load days

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Capacity Market Fundamentals

- The IRM is an input to the Installed Capacity (ICAP) requirement for Load Serving Entities (LSEs)
- ICAP is translated into Unforced Capacity (UCAP), which represents a resource's expected capability
- UCAP may be bought and sold in seasonal "strip" auctions, monthly auctions, and the ICAP Spot Market Auction
- LSEs must certify or purchase UCAP prior to ICAP Spot Market Auctions
- ICAP Spot Market Auctions clear at a point on the UCAP demand curve
  - The ICAP Spot Market Auction prices and quantities are a function of supply, a reference point price, and demand curve slope
  - With thermal generators in the resource mix, supply is typically greater in the Winter Capacity Period due to thermodynamics

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Reference Price and Demand Curve

- **To determine ICAP Demand Curves the NYISO establishes a Cost of New Entry (CONE) value for a hypothetical resource for the NYCA and each Locality**
  - The annual reference value represents the ICAP revenue required to recover the cost of the hypothetical resource when the system is at criteria (applicable minimum capacity requirement) plus a tariff-prescribed level of excess (LOE) equal to the capacity of hypothetical resource
  - Gross and net CONE are initially determined as annual values, then translated to monthly values that reflect differences in seasonal capacity and seasonal reliability risks
  - A comprehensive review occurs every 4 years to assess the inputs and methodologies used to establish the ICAP Demand Curves (commonly referred to as the ICAP Demand Curve reset or DCR)
- **The demand curve parameters are initially determined in ICAP terms and then translated to UCAP values for use in the monthly spot auctions**
  - See Section 5.5 of the ICAP Manual [link (nyiso.com)]
- **The demand curves are constructed such that the hypothetical peaking plant recovers its annual reference value when the system is at the tariff-prescribed LOE**

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Periodicity

- **The inputs, assumptions, and methodologies used in establishing the ICAP Demand Curves, including the hypothetical resource used as the basis for each curve, are reviewed every four (4) years**
- **The ICAP market utilizes a Capability Year construct that begins May 1, and continues through April 30th of the following year**
  - The Capability Year consists of a Summer Capability Period (May 1 - October 31) and a Winter Capability Period (November 1 - April 30)
- **The ICAP calendar includes both annual and seasonal requirements**
  - Seasonal requirements include: DMNC testing, UCAP translation, derating factors and EFORd, ambient adjustments, seasonal demand curves, and seasonal Peak Load Windows

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Annual Processes

- Peak load forecast
- IRM and LCRs
- Load ICAP obligations fixed
- CARC and CAF assignments
- UDR and EDR elections, availability and losses
- Interface Limits
- Deliverability of External ICAP
- Import rights
- Adjusted Host Load
- *Future: Firm Fuel Elections*

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Seasonal Demand Curve Enhancements

Seasonal Demand Curves

- The NYISO determines reference prices for demand curves based on the net CONE for a hypothetical new supply resource
- Historically, the NYISO has established annual demand curves that apply for the duration of each Capability Year. Beginning with the 2025/2026 Capability Year, the NYISO will establish seasonal demand curves that will apply for each Capability Period encompassed by a Capability Year
- The recent enhancements for the annual net CONE values to monthly values explicitly account for the differences in reliability risk in the summer and winter periods
    - The translation of annual values to monthly values also accounts for seasonal differences in the amount of capacity available to the market based on a ratio of the average historical value of capacity available during each season

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Seasonal Demand Curves (Cont.)

- **Beginning with the demand curves applicable for the 2025/2026 Capability Year the translation of the annual values to monthly values in establishing the parameters of the demand curves will explicitly account for seasonal reliability risks**
  - Seasonal reliability risk quantified as the percentage of loss of load risk attributed to each Capability Period as identified from the results of the preliminary base case model approved by the New York State Reliability Council, L.L.C. (NYSRC) for determining the NYCA Installed Reserve Margin for the Capability Year to which the demand curves apply
- **Enhancements also establish limits on the portion of the annual gross and net CONE values that can be allocated to each Capability Period as part of determining seasonal demand curves**
  - For the 2025-2029 period, the maximum allowable apportionment to one Capability Period is limited to no greater than 65% with a corresponding minimum allowable apportionment of 35%
  - The maximum and minimum allowable allocations to each Capability Period will be reviewed as part of each quadrennial review beginning with the 2029-2033 DCR
- **Changes approved by FERC in February 2024**
  - FERC Order (ER24-701-000)

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2022 SOM Recommendations

2022 State of the Market (SOM)

- **The 2022 SOM analyzed the efficiency of the capacity market design, including the correlation of monthly spot prices for capacity with reliability value over the year**
- **Issues identified include:**
  - NYISO reliance on a single capacity requirement that is applied year-round
  - Units that plan to operate only outside the ozone season may receive insufficient revenues as winter-only resources if winter reliability is not properly valued
  - Reliability risks due to winter fuel constraints
  - Demand curves may become volatile and inefficient under some conditions due to winter/summer differential
  - Setting of the Reference Point using the winter-summer ratio, which sets prices based on the seasonal ICAP supply relative to the annual requirement, does not adequately reflect reliability risk in each season

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SOM Recommendations

- Establish seasonal requirements that reflect the amount of capacity needed to satisfy the targeted level of reliability in each season, considering generator availability and load;
- Set demand curves such that annual compensation to the demand curve technology approaches its Net CONE as surplus supply approaches the LOE in any season; and
- Consider establishing or updating the winter capacity requirements closer to the winter season so that any changes in resource status and fuel procurements can be accurately incorporated in requirements and resource accreditation values
- Transition to a seasonal capacity market in which requirements and demand curves are determined for each season (recommendation #2022-2)

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Next Steps

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Next Steps

- Return to an April or May ICAPWG to continue discussions on ICAP process periodicity
- For any questions or comments please email mswider@nyiso.com

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Project Timeline

- **Q1-Q2**
  - Stakeholder education on existing practices and market structure
- **Q2-Q3**
  - Identify and research issues
  - Discuss issues with stakeholders
- **Q3-Q4**
  - Assess stakeholder feedback and finalize Issue Discovery report/presentation

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Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

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