

# Internal Controllable Lines: Market Design Concept Proposal

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# Agenda

- **Background**
- **Energy Market Design Concept**
- **Capacity Market Design Concept**
- **Next Steps**
- **Appendix: Previous Project Presentations**

# Background

# Background

- **There are currently no internal controllable lines (ICL) in operation within the NYCA**
- **NYSERDA's Tier 4 REC initiative has driven the prioritization of this project to develop market participation rules for ICL**
- **The NYISO's proposed design is intended to accommodate ICL with a range of different project structures**
- **Today's presentation comprises the 2022 milestone for this project of a Market Design Concept Proposed (MDCP)**

# Energy Market Design Concept

# Energy Market Scheduling

- **The NYISO will optimize ICL flows based on economic dispatch, meeting New York State load at least as-bid cost, taking account of the incremental bids and incremental losses of ICL operation**
  - Scheduling of the line would occur simultaneously with the scheduling of resources
  - Revisions to NYISO Tariffs and Manuals will be necessary to incorporate rules for scheduling and pricing of ICL

# Energy Market Participation

- **The ICL will buy power at the source LBMP and sell the power it delivers at the sink LBMP**
  - Offers from an ICL will represent incremental O&M costs as a spread bid between the sink and source prices
    - Schedules will reflect both the cost of losses and incremental O&M
    - ICL withdrawals and injections priced at source/sink nodes
  - The ICL owner retains the LBMP differential created by the operation of the line, which could include congestion rents and losses
  - The amount of power delivered at the sink will be less than the amount of power withdrawn at the source due to line losses

# Energy Market Participation (cont'd)

- **Internal controllable lines (ICL) will be able to reflect operating characteristics and costs in the NYISO's Day-Ahead (DAM) and Real-Time (RT) Markets**
  - Relevant costs could include, but are not limited to, variable O&M
- **No Transmission Service Charges (TSC) will be collected on withdrawals at the ICL source**
- **Any Renewable Energy Credit (REC) payments will occur outside of the NYISO settlement system**
- **The NYISO design is intended to apply to ICL flows in either direction**



# Energy Market Participation (cont'd)

- **ICL will need to provide certain information in order to participate in energy market**
  - Resource characteristics typically provided during registration, including Ramp Rate, Loss Percentage, and Physical Limits
    - The NYISO anticipates it will need to limit an ICL's permitted ramp rate to mitigate impacts on the parallel AC system, including voltage impacts
  - Bid information provided in MIS, such as Hourly Bid Curves
  - Commitment Parameters, such as Upper and Lower Operating Limits

# Ancillary Services Eligibility

- **Consistent with other transmission facilities, ICL may be eligible to provide Voltage Support Service based on technology chosen for the ICL**
- **Eligibility for other ancillary services will be evaluated based on the physical and operating characteristics of ICL**

# Energy Market Mitigation

- **ICL will be subject to energy market mitigation rules**
  - The NYISO and stakeholders will need to assess what Tariff and procedure changes will be necessary to incorporate ICL
  - Treatment expected to be similar to Energy Storage Resources, as ICL will have both withdrawal and injection energy (Attachment H)

# Operator Actions and Cost Guarantees

- **ICL will be required to operate consistent with operator out-of-merit (OOM) instructions to protect system or local reliability**
  - ICL will be eligible for certain cost guarantee payments when NYISO instructs the line to operate OOM in a manner that is not consistent with the economics of its offers (or mitigated offers)
    - These could include DAM and RT Bid Production Cost Guarantees (BPCG), provided existing criteria are satisfied
  - An ICL may also be eligible for Day-Ahead Margin Assurance Payments (DAMAP)
    - DAMAP protects a resource's Day-Ahead margin in the event it is scheduled out of economic merit order in real-time in response to a NYISO or Transmission Owner system security need

# Outage Scheduling

- **ICL will be required to comply with NYISO outage scheduling requirements**
  - Additional outage scheduling requirements apply if the ICL is an ICAP supplier
  - The NYISO has authority to defer, postpone, or cancel scheduled transmission outages of facilities under NYISO operational control

Additional information about the NYISO's outagescheduling rules can be found in the Outage Scheduling Manual:  
[https://www.nyiso.com/documents/20142/2923301/outage\\_sched\\_mnl.pdf/1c2cc085-0fce-6540-fded-c95d0c662568](https://www.nyiso.com/documents/20142/2923301/outage_sched_mnl.pdf/1c2cc085-0fce-6540-fded-c95d0c662568).

# Transfer Limit Determination and Contingency Modeling

- The NYISO operates a multi-step co-optimization of energy and reserves with network constraints
- ICLs will be included in the network model with a transfer limit and become an additional contingency in the Network Security Analysis
  - The ICL contingency may become a binding contingency in the market solution
  - The ICL may also be limited by pre- or post-contingency constraints on the parallel transmission elements

# Capacity Market Design Concept

# Aligning the Capacity Market Design with the Energy Market Design

- **Consistent with the proposed Energy Market design for an ICL, the Capacity Market Design will not tie supply to specific generators**
  - This structure aims to enable the market design to work for any ICL that may seek to enter NYISO markets
  - Enabling UDRs (Unforced Capacity Deliverability Rights) to participate in the NYISO capacity market is appropriate so long as they are not regulated transmission facilities that recover their costs via the Transmission Service Charge (TSC)
- **For purposes of this Capacity Market discussion, an ICL is also referred to as an “Internal UDR”**



# Capacity Market Proposal Overview

- **Internal UDRs will participate in the Capacity market as Installed Capacity (ICAP) Suppliers via an updated and revised market construct, under which they will transmit pooled capacity, sourcing in NYCA and sinking in a Locality**
  - For example, an ICL connecting Zone E and Zone J and selling Unforced Capacity (UCAP) into Zone J will be required to purchase pooled NYCA Capacity to fulfill its ICAP Supply obligation in Zone J
    - The purchase of pooled capacity at the source (Zone E) will be contingent upon the ICAP required to be delivered at the sink (Zone J) as determined by the ICAP Equivalent of the UCAP Sold and will be linked automatically in NYISO Spot auctions such that one will not occur without the other
      - This supports reliability by ensuring sufficient source UCAP to cover UCAP sales at the line sink
      - An ICL can procure its capacity requirement through certified bilateral contracts and forward auctions
      - There will be an automatic procurement in the NYISO Spot auctions from the source region if needed to cover the ICAP Supply Obligation in the Locality (accounting for line losses)
      - An example illustrating this concept is provided on a subsequent slide
  - Note that while capacity auctions clear in NYCA (as opposed to ROS), the source of an ICL must physically locate in ROS, and the sink of an ICL must physically locate in a Locality

# “Pooled Capacity” Rationale

- **Since the NYISO will control the line’s operation and dispatch of resources at both ends of the line, the NYISO can direct energy to be moved across the line to meet reliability needs**
  - The NYISO does not need to identify specific ICAP Suppliers as backing the line, as all the capacity transferred by the line in the auction will be sourced from ICAP Suppliers in NYCA
  - Any bilateral contracts with specific ICAP Suppliers will be required to be fully certified in order to meet the Internal UDR’s ICAP purchase obligation
    - Both the purchaser and the seller in the bilateral contract need to confirm the bilateral transaction each month in accordance with the Spot Auction certification process timeline

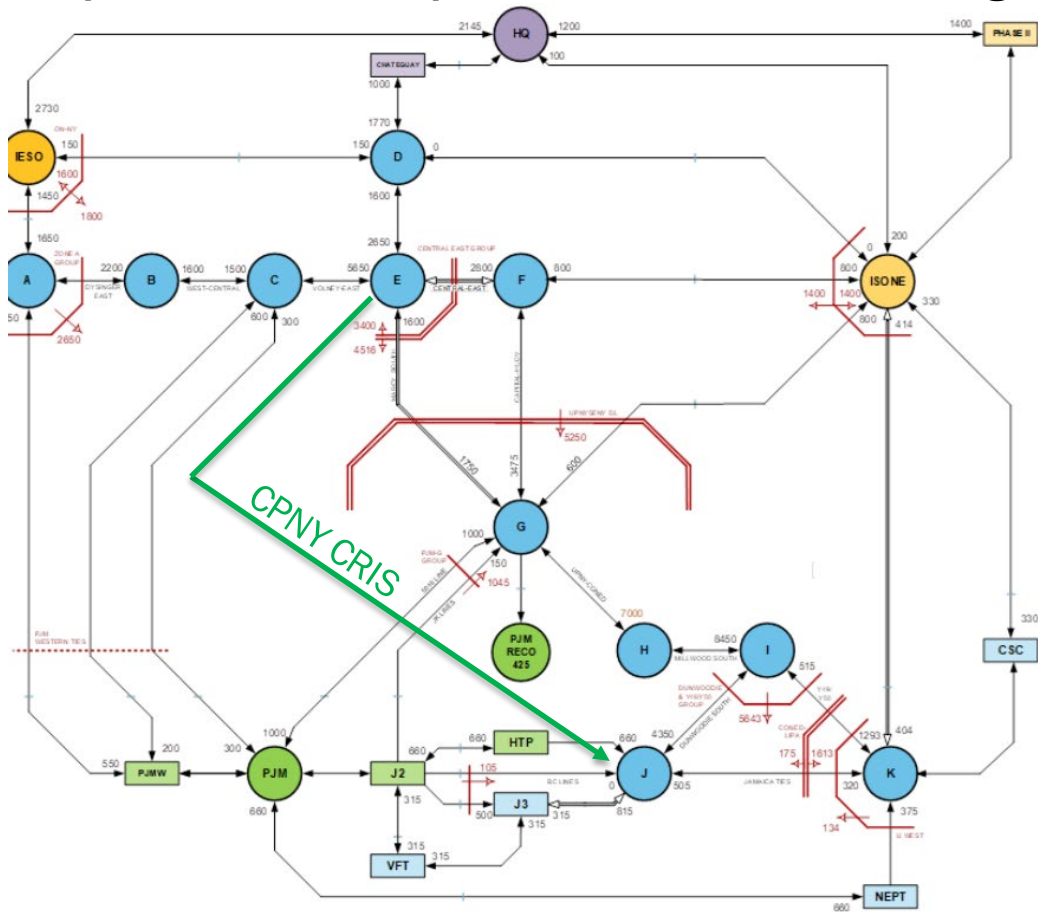
# Internal UDR Elections

- **Consistent with external UDRs, Internal UDRs must complete the annual election process**
  - By August 1st of each year, Internal UDRs must indicate to the NYISO how much of their capability they would like to elect as supply for capacity market participation
    - Annual election is capped at the CRIS value of the Internal UDR
    - The amount of elected capacity will set the ICAP value of the line for that Capability Year

# IRM/LCR Modeling

- **Consistent with other controllable lines, the NYISO expects that an Internal UDR transmission facility would be modeled in the IRM/LCR model as a separate interface between the source and sink zones**
  - i.e., not included in the existing interfaces between zones
- **An illustrative example, using the 2022 IRM/LCR Topology and the proposed Clean Path New York project, is included in the following slide**
- **The NYISO will need to discuss with NYSRC and/or ICS regarding how an Internal UDR should be modeled in the IRM process**

# NYISO Perspective on Conceptual Internal UDR Modeling in the IRM/LCR Topology



## Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC CP-B WG

## Legend

- ↔ Interface
  - ↔↔ Unidirectional Interface
  - ↔↔↔ Interface w/ Dynamic Ratings
  - Interface Group
  - Interface Group w/ Dynamic Ratings
  - Monitoring Interface Group
  - NYCA EA Interface Group Marker
  - XX "Dummy Bubble" i.e. no load
- NOTE: An interface is considered to not have a MW limitation if no number is specified

Diagram Source: NYSRC IRM Study Appendices, Figure A.10 Final Final 2022 IRM Study technical Report Appendices 12\_10\_21 Clean 12\_13\_21.pdf (nysrc.org).



# IRM/LCR Calculations

- **For purposes of calculating the IRM and LCRs, Internal UDRs will be counted as supply resources up to the level they elect to be considered ICAP**
  - The amount of MW counted as supply from an Internal UDR will not be modeled as LCR reduction
    - Any remaining MW not counted as supply will be modeled as LCR impact
  - For example, an ICL with 1,300 MW of UDR might elect 1,000 MW of ICAP, and therefore the remaining 300 MW will not be available to participate in the ICAP market for the upcoming Capability Year and may impact LCRs

# Capacity Accreditation

- **The NYISO recognizes the need to establish a Capacity Accreditation Factor (CAF) for Internal UDRs**
  - The CAF for Internal UDRs may be less than 100%, as this value reflects the contribution of Internal UDRs towards maintaining reliability, which, like other resource types, may vary based on the overall generation mix of the pool
  - Consistent with other resource types, the CAF for Internal UDRs will be recalculated annually, which will enable the CAF to reflect shifts in reliability value based on the changing generation fleet
- **The NYISO will need to incorporate Internal UDRs as part of the ongoing work to evaluate the CAF for the different Capacity Accreditation Resource Classes (CARC)**

The most recent ICAPWG presentation on the Capacity Accreditation effort, as well as links to previous presentations, can be found at the following location:

<https://www.nyiso.com/documents/20142/30276257/04-28-22%20Capacity%20Accreditation%20-%20Preliminary%20CARCs.pdf/c82c47c5-28c2-cf19-c602-16bf3cfc4aca>

# Approximate Annual ICL Capacity Market Participation Timeline

- **August 1st**
  - UDR election deadline (static election for the upcoming Capability Year)
- **December**
  - NYSRC publishes IRM report
- **January**
  - NYISO publishes LCRs
- **March 1st**
  - Deadline for NYISO to post Capacity Accreditation Factors

See the ICAP Event Calendar for additional information on capacity market timeline:  
[http://icap.nyiso.com/ucap/public/evt\\_calendar\\_display.do](http://icap.nyiso.com/ucap/public/evt_calendar_display.do).



# Capacity Market Participation

- **Internal UDRs that have elected to maintain some amount of capacity will have UCAP available at the sink location and a corresponding procurement obligation at the source location**
  - The amount of capacity an Internal UDR will be eligible to sell in NYISO auctions will be calculated based on its availability, as discussed in subsequent slides
  - The amount of capacity an Internal UDR will be obligated to procure in NYCA will be based on the amount of UCAP sold
  - Similar to LSE obligations, if the procurement obligation is not satisfied via bilateral contracts or Strip/Monthly auctions, it will automatically be satisfied in NYISO Spot auctions
- **Internal UDRs will be included in the ICAP to UCAP translation factor for their sink location**
  - Benefits of this approach:
    - Captures the impact of increased NYC supply from Internal UDRs on capacity requirements
    - Captures the impact of Internal UDRs on NYC capacity market clearing prices

# ICAP/UCAP Translation Example

(approximate values for illustrative purposes)

	Without ICL	With ICL
ICL ICAP (MW)	-	1,300
ICL Capacity Accreditation (MW) = ICAP * CAF = 1,300 MW * 0.95		1,235
ICL UCAP Available (MW) = ICL Capacity Accreditation * AF = 1,235 * 0.98	-	1,210
NYCA ICAP Supply (MW)	40,000	40,000
NYCA Derating Factor (%)	30	30.06
NYCA UCAP Supply (MW)	28,000	27,976 (24 MW reduction due to losses)
Locality ICAP Supply (MW)	10,100	11,400
Locality Derating Factor (%)	10	9.66
Locality UCAP Supply (MW)	9,090	10,300.3

# Capacity Market Participation Example

## Assumptions

ICL Max Capability = 1,300 MW; ICL CRIS = 1,300 MW; UDR Election = 1,300 MW; CAF = 95%; AF = 98%; Losses = 2%<sup>1</sup>

- **ICL ICAP supply available in Locality**
  - = annually elected UDR amount, which is  $\leq$  ICL CRIS
  - = 1,300 MW
- **ICL UCAP supply available in Locality**
  - =  $\text{ICAP} * \text{CAF} * (1 - \text{Internal UDR unavailability})$
  - =  $1,300 \text{ MW} * 0.95 * 0.98$
  - = 1,210 MW
- **ICL UCAP procurement obligation in NYCA**
  - =  $\text{UCAP sales} + (\text{UCAP supply sales} * \text{Losses } \%)$
  - = 1,234 MW
- **ICL DAM Bidding Obligation in sink Locality (ICAP equivalent of UCAP sold)**
  - =  $\text{UCAP sales} / ((1 - \text{Internal UDR unavailability}) * \text{CAF})$
  - = 1,300 MW

<sup>1</sup> For purposes of discussion, losses are assumed to be a static percentage.

# Spot Auction Example

- **NYCA Spot Clearing Price (\$/kW-month): 4**
- **Locality Spot Clearing Price (\$/kW-month): 10**
- **ICL Locality Capacity Sale (MW): 1,210 (1,210,000 kW)**
- **ICL NYCA Capacity Purchase Obligation:**
  - = UCAP sales + (UCAP supply sales \* Losses %)
  - = 1,234 MW (1,234,000 kW)
- **ICL Capacity Settlement**
  - = (1,210,000 kW \* \$10/kW-month) – (1,234,000 kW \* \$4/kW-month)
  - = \$7,164,000

# Bid/Schedule/Notify Obligations

- **Bid/Schedule/Notify rules and penalties will apply to Internal UDRs**

- Consistent with all capacity suppliers, Internal UDRs will be required to:
  - Bid into the DAM the ICAP Equivalent (ICE) of UCAP sold
    - $ICE = UCAP \text{ supply sales} / (1 - \text{Internal UDR unavailability})$
  - Schedule planned outages with the NYISO
  - Notify the NYISO of unplanned outages

# ICAP Mitigation Measures

- **Provided an Internal UDR meets the qualifications under the FERC-approved Comprehensive Mitigation Review rules, it will be exempt from Buyer's Side Mitigation evaluations**
- **The NYISO and stakeholders will need to assess what Tariff and procedure changes will be necessary to incorporate Internal UDRs into supply-side mitigation measures**

# Interconnection

- **The NYISO currently has rules for evaluating interconnection requests for proposed ICL, which include:**
  - The interconnection study process for evaluating ICL projects and identifying required reliability upgrades;
  - The process for evaluating ICL projects requesting CRIS (to obtain UDRs) and identifying deliverability upgrades required to make the projects deliverable at their requested CRIS level;
  - Transmission projects that seek UDRs, which must request CRIS and be evaluated through the Large Facility Interconnection Procedures in Attachment X (including evaluation in a Class Year Study)
    - If not requesting CRIS, a transmission project can be evaluated in the Transmission Interconnection Procedures in Attachment P
- **The NYISO will propose additional detail in the Transmission Expansion and Interconnection Manual regarding how ICLs will be evaluated vis-à-vis existing internal NYCA interface definitions and dispatch assumptions under the Minimum Interconnection Standard (targeted for October TPAS)**

# ICL Deliverability

- **The NYISO proposes to evaluate an ICL requesting CRIS (to obtain Internal UDR) for deliverability in both the ROS Capacity Region where the ICL withdraws and the Capacity Region in which the ICL injects**
  - The NYISO proposes to evaluate deliverability at both ends of the ICL in order to capture the deliverability impacts of the ICL project
- **The following slides discuss how the NYISO proposes to perform this deliverability evaluation and how to cost allocate any required System Deliverability Upgrades (SDUs)**



# Proposed ICL Deliverability Methodology

- **NYISO proposes to evaluate ICL withdrawals for deliverability, consistent with current procedures, as follows:**
  - Model internal line withdrawals similar to CRIS requested projects, but as negative generation
    - Model the sending end of the ICL as a proxy generator withdrawing power (negative output) from the system
  - Model the receiving end of the ICL as a proxy generator injecting power (positive output) to the system
  - Perform the applicable deliverability tests based on the location of ICL (e.g., Highways, Byways, Other Interface, etc.)
  - Follow existing deliverability methodology rules for the sink Capacity Region with respect to applicable tests (e.g., for Internal UDR from ROS to NYC, current rules would apply the Byways test and No Harms Other Interface test to evaluate the deliverability within the NYC Capacity Region)

# Proposed ICL SDU Cost Allocation Methodology

- **The NYISO proposes to utilize the existing cost allocation methodology to cost allocate to Internal UDRs any SDUs triggered by the impact of their withdrawal**
  - Cost Allocation Method 1: Generator Bus Dfax (distribution factor) Reporting
    - Dfax calculation will provide information about how a monitored facility/contingency pair is impacted by the newly added generator project – whether a project is a helper or harmer
      - Calculate project impact based on the dfax of a newly added project
  - Cost Allocation Method 2: Sensitivity Scenario for Project On and Off
    - If Method 1 is not viable, sensitivity cases will be created to reflect the in and out status of a newly added project
      - Additional tests will be performed using sensitivity cases
      - Project incremental impact is the delta in study results between Project Off case and Project On case

# Next Steps

# Next Steps

- **October:**
  - Consumer Impact Analysis results (ICAPWG/MIWG)

# Appendix

# Previous Project Presentations

- **2/03/22: Kick-Off presentation discussing project scope and timeline**
  - [2/3/22 MIWG Presentation](#)
- **3/16/22: Energy Market Real-Time Scheduling and Settlement Examples**
  - [3/16/22 MIWG Presentation](#)
- **4/19/22: Energy Market Two-Settlement Examples**
  - [4/19/22 MIWG Presentation](#)
- **6/07/22: Energy and Capacity Market Proposals**
  - [6/7/22 Energy Market MIWG Presentation](#)
  - [6/7/22 Capacity Market MIWG Presentation](#)
- **07/15/22: Energy and Capacity Market Proposal Updates**
  - [07/15/22 Energy Market MIWG Presentation](#)
  - [07/15/22 Capacity Market MIWG Presentation](#)

# 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