New York ISO
Independent System Operator

5 – Minute Transaction Scheduling Market Design Concept

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Project Overview

Project Scope

- The 5-Minute Transaction Scheduling Project seeks to enable RTD scheduling of LBMP Import/Export transactions with Hydro-Quebec
- This project is a continuation of the 5-Minute Transaction Scheduling Project undertaken by the NYISO in 2020, which culminated in the publishing of a 5-Minute Transaction Scheduling Report that evaluated potential implementation options for 5-minute transaction scheduling

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Project Terminology

- **Non-Competitive Proxy Generator Bus:**
  - A Proxy Generator Bus for an area outside of the New York Control Area that has been identified by the ISO as characterized by non-competitive Import or Export prices, and that has been approved by the Commission for designation as a Non-Competitive Proxy Generator Bus. Non-Competitive Proxy Generator Buses are identified in Section 4.4.4 of the Services Tariff.
- **Variably Scheduled Proxy Generator Bus:**
  - A Proxy Generator Bus for which the ISO may schedule Transactions at 15 minute intervals in real time. Variably Scheduled Proxy Generator Buses are identified in Section 4.4.4 of the Services Tariff.
- **Dynamically Scheduled Proxy Generator Bus:**
  - A Proxy Generator Bus for which the ISO may schedule Transactions at 5 minute intervals in real time.

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15 – Minute Transaction Scheduling

15-Minute Transaction Scheduling

- **The HQ_Gen_Import and HQ_Load_Export Proxy Gen Buses currently support both hourly and 15-minute LBMP Import/Export transaction scheduling**
  - These Proxies do not support CTS scheduling
- **Making simultaneously available hourly, 15-minute, and 5-minute transaction scheduling at the same Proxy Gen Bus(es) would further complicate the 5-minute transaction scheduling design**
  - Supporting all three products simultaneously complicates the scheduling logic that would be required to support 5-minute transactions and would require the development of additional Special Pricing Rules for Non-Competitive Proxy Gen Buses
- **As such, NYISO proposes to sunset the 15-minute transaction scheduling product at HQ's Proxy Gen Bus(es) and replace it with the new 5-minute transaction scheduling product**
  - As a result, only hourly and 5-minute transaction scheduling would be available at the HQ Proxies for LBMP Export/Import transactions

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Bidding

5-Minute Transaction Bidding

- **NYISO proposes that 5-Minute Transactions follow the same bidding rules as 15-Minute Transactions**
  - 5-Minute Transaction bids will be submitted to the NYISO via the Joint Energy Scheduling System (JESS), and must be associated with a valid NERC E-Tag
  - 5-Minute Transactions can be bid hourly into the DAM
    - NYISO will convert an MP's hourly Import/Export DAM bid to a quarter-hourly RTM Import/Export bid during the bid copy process that occurs after DAM schedules have been published
    - DAM bids will be converted to RTM bids using the MP-nominated RTM Bid Price, consistent with existing rules governing Import/Export LBMP transactions
  - Real-Time 5-Minute Transaction bids must be submitted to the NYISO before HAM close
    - I.e. 75 minutes prior to Real-Time
  - MPs may specify up to 4 different 5-minute transaction RTM bid curves per hour of the dispatch day
    - Each bid curve would correspond to one 15-minute interval within the dispatch hour
    - MPs would need to nominate one of these four bid curves to serve as their default bid curve in the event that Real-Time scheduling becomes unavailable – this default nominated bid curve would be evaluated at the hourly level until Real-Time scheduling is re-enabled
  - 5-Minute Transactions will be subject to the same default RTM pricing rules as other types of Import/Export LBMP transactions
    - These rules apply when an MP does not nominate a RTM price on their DAM transaction bids

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Scheduling

5-Minute Transaction Scheduling

- **5-Minute Transaction Scheduling will be jointly supported by RTC and RTD**
  - RTC will evaluate RTM bids for 5-minute transactions and use them in determining 15-minute advisory schedules for 5-minute transactions
  - RTD will evaluate RTM bids for 5-minute transactions and use them in determining both binding 5-minute transaction schedules and advisory 5-minute transaction schedules
- **RTD will be provided with any fixed interchange from the RTC15 post to ensure accurate scheduling outcomes**
- **The Desired Net Interchange will be exchanged with HQ every 5 minutes to facilitate RT scheduling**
  - This would be similar to providing a Generator a 5-minute basepoint

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RTD External Interface Congestion

RTD External Interface Congestion

- **Today, RTC calculates External Interface Congestion when:**
  - Proposed economic transactions over an Interface would exceed Available Transfer Capability of that Interface
  - Proposed economic interchange schedule changes pertaining to the NYCA as a whole would exceed Ramp Capacity limits in place for the NYCA
  - Proposed economic interchange schedule changes pertaining to the Interface between NYCA and a neighboring Control Area would exceed any Ramp Capacity limits imposed by NYISO at that interface
- **RTD will determine its own measure of Proxy Gen Bus Congestion in these same situations to inform 5-minute transaction settlement**
  - RTD External Congestion will be used in the special pricing rules for Non-Competitive Dynamically Scheduled Proxy Gen Buses

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Special Pricing Rules for Non-Competitive Dynamically Scheduled Proxy Gen Buses

Uniform Proxy Gen Bus Pricing Rules

- **All transactions scheduled across external ties are subject to the NYISO's existing Uniform Pricing Rules as defined in MST 17.1.6**
  - NYISO applies a different set of Uniform Pricing Rules to each type of Proxy Gen Bus
    - For example: Variably Scheduled Proxy Gen Buses, Proxy Gen Buses That Are Not Variably Scheduled, Non-Competitive Variably Scheduled Proxy Gen Buses, Non-Competitive Proxy Gen Buses That Are Not Variably Scheduled, and Designated Scheduled Lines
- **Most of the Uniform Pricing Rules exist to disincentivize uncompetitive behavior associated with the pricing of External Transactions**
  - These rules also limit the financial impact resulting from these uncompetitive behaviors to the NYISO and the wholesale power market
- **New Uniform Pricing Rules will be required to disincentive these same behaviors at Non-Competitive Dynamically Scheduled Proxy Gen Buses**
  - Terms used in the existing Uniform Pricing Rules for hourly and quarter-hourly transactions are not wholly applicable to 5-minute transactions, as the former are scheduled by RTC according to RTC LBMPs, and the latter are scheduled by RTD according to RTD LBMPs

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Special Pricing Rules for Non-Competitive Dynamically Scheduled Proxy Gen Buses

Rule No.	Proxy Generator Bus Constraint affecting External Schedules at location *a*	Direction of Generator Bus Constraint	Real-Time Pricing Rule (for location *a)*
1****	Unconstrained in RTC15, Rolling RTC, and RTD	N/A	Real-Time LBMPa = RTD LBMPa*
8	RTD used to schedule External Transactions is subject to Interface ATC, NYCA Ramp, and/or Interface Ramp Constraint within a given interval, but RTC15 is not	Into NYCA (Import)	Real-Time LBMPa = Max (RTD LBMPa, Min (Unconstrained RTD LBMPa***, 0))
9	RTC 15 and RTD are subject to the same Interface ATC, Interface Ramp, or NYCA Ramp Constraint	Into NYCA (Import)	If RTC15 Proxy Generator Bus LBMPa** > 0: Real-Time LBMPa = Max(Unconstrained RTD LBMPa + RTC15 External Interface Congestion_a, RTD LBMPa) Otherwise: Real-Time LBMPa = Min(Unconstrained RTD LBMPa, 0)
10	RTD used to schedule External Transactions is subject to Interface ATC, NYCA Ramp, and/or Interface Ramp Constraint within a given interval while RTC15 is not	Out of NYCA (Export)	Real-Time LBMPa = min (RTD LBMPa, Unconstrained RTD LBMPa)
11	RTC15 and RTD are subject to the same Interface ATC, Interface Ramp, or NYCA Ramp Constraint	Out of NYCA (Export)	If RTC15 Proxy Generator Bus LBMPa < 0: Real-Time LBMPa = min(Unconstrained RTD LBMPa + RTC15 External Interface Congestion_a, RTD LBMPa) Otherwise: Real-Time LBMPa = Unconstrained RTD LBMPa

*RTD LBMP = Unconstrained RTD LBMP + RTD External Interface Congestion

**RTC15 Proxy Generator Bus LBMP = Unconstrained RTC15 LBMP + RTC External Interface Congestion

***Unconstrained RTD LBMP = RTD LBMP less any RTD Congestion associated with a Proxy Gen Bus

**** This is an existing Uniform Pricing Rule that will be extended to Non-Competitive Dynamically Scheduled Proxy Gen Buses

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Settlements

5-Minute Transaction Settlement

- 5-Minute Transaction Balancing Energy settlements will be performed in a manner that is consistent with other types of LBMP transactions
- 5-Minute Transactions will be subject to the same eligibility requirements for Import Curtailment Guarantee Payments as other types of Import transactions
  - Energy Imports are eligible for an Import Curtailment Guarantee Payment if:
    - An import is curtailed at the request of the NYISO,
    - The RT Energy Profile MW is equal to or greater than the DAM schedule for that interval (HAM bid >= DAM Schedule), AND
    - The RT Decremental Bid is less than or equal to the Default RT Decremental Bid Amount as established by ISO Procedures (Default RTM Bid Price = $-.01)
- External Transactions will continue to be exempt from BPCG consideration

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Financial Impact Charge

- A FIC is assessed to a Market Participant when one of their proposed transactions fails to clear the NYISO's Operator Checkout process due to something that is within the Market Participant's control
- RTD Schedules for 5-Minute Transactions will need to be added as a possible value for the TH_RTC term found in the FIC formula

If Transaction Check -out Failure under MP Control,

$$\sum_{i=1}^{N}\{[(TH_{ti}^{RTC} - TH_{ti}^{RT}) \times (s_i^{RT} \div \mathbf{3600\ seconds})] \times max[LBMPc_{porti}^{RT}, 0]\}$$

Otherwise $0.

Where:

N: Number of RTD intervals i in the day;

s_i^{RT}: Length of RTD interval i, expressed in hours;

TH_{ti}^{RTC}: LBMP Energy Import Transaction megawatts scheduled by RTC_{15} for hourly transactions and Rolling RTC for intra-hourly transactions containing RTD interval i to be imported through Transaction t, expressed in terms of MW;

TH_{ti}^{RT}: LBMP Energy Import Transaction megawatts scheduled in RTD interval i to be imported through Transaction t, expressed in terms of MW;

$LBMPc_{porti}^{RT}$: Congestion component of the Real-Time LBMP at Proxy Generator Bus *por*, scheduled as the Point of Receipt for LBMP Energy Import Transaction t, in RTD interval i, expressed in $/MW;

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Dynamic E-Tagging

5-Minute Transaction E-Tagging Proposal

- **E-Tags serve as a centrally accessible 'database' for common information pertaining to a proposed External Transaction**
  - Relevant Market Participants, the NYISO, neighboring Balancing Authorities, and other involved parties can all access information contained within an E-Tag simultaneously
  - The structure and implementation of E-Tags are guided/mandated by NERC and NAESB rules dictating interchange scheduling between Balancing Authorities – NERC/NAESB support several E-Tagging configurations that can be utilized for different interchange scheduling products
- **NYISO proposes to use 'Dynamic' E-Tags and E-Tagging functionality to track 5-minute transactions with HQ**
- **'Dynamic' E-Tags are subject to a different set of NAESB/NERC requirements than 'Normal' E-Tags used for 15-Minute and Hourly transaction scheduling**
  - Dynamic Tags are intended to be used in conjunction with Dynamically Scheduled Proxy Gen Buses
  - Dynamic Tagging requirements are less restrictive, to account for the variable and dynamic nature of 5-minute transactions
    - For example, NAESB allows ISOs to use estimates of average expected hourly flows in place of actual transaction schedules to communicate information to MPs regarding expected transaction performance on a Dynamic E-Tag

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NAESB Dynamic Tagging Requirements

- **Pre-Dispatch Hour**
  - NAESB requires that the E-Tag's hourly Energy Profile reflect the average expected hourly Energy flows for a given dispatch hour
  - NAESB requires that the E-Tag's Transmission Allocation reflect the maximum possible Energy flows for a given hour
- **Post-Dispatch Hour**
  - NAESB requires that an E-Tag's hourly Energy Profile be updated to reflect actual flows after the conclusion of the Dispatch Hour if:
    - Confirmed Interchange was greater than 250 MW for the last hour, and the actual hourly integrated energy deviates from the Confirmed Interchange by more than 10% for that hour and that deviation is expected to persist.
    - Confirmed Interchange was less than or equal to 250 MW for the last hour, the actual hourly integrated energy deviates from the Confirmed Interchange by more than 25 MW for that hour and that deviation is expected to persist.
    - The PSE (MP) receives notification from a Reliability Coordinator (NYISO) or Transmission Operator to update the Confirmed Interchanges

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NYISO Dynamic E-Tagging Proposal

- **Pre-HAM Close (T-75+ minutes before Real-Time)**
  - NYISO will perform existing Bid:Tag validations that occur at time of bid submission
    - NYISO verifies that 'Dynamic' E-Tags are only associated with transaction bids submitted at an HQ Proxy, and vice versa
    - NYISO validates Bid MWs against the E-Tag's Energy Profile MWs to ensure that Bid MWs do not exceed the Energy Profile MWs for any hour in which the transaction bid is to apply
- **Post-HAM Close, but Pre-Dispatch Hour (<T-75 minutes before Real-Time)**
  - NYISO must adjust the value of a Dynamic E-Tag's hourly Energy Profile MW field to reflect average expected flows over the course of the following hour
    - NYISO will create a composite hourly average of expected flows using RTC advisory schedules generated for 5-minute transactions – Dynamic E-Tag Energy Profile MWs will be set equal to this average value
    - NYISO must adjust the value of a Dynamic E-Tag's Transmission Allocation profile field to reflect a transaction's maximum receivable schedule over the course of the hour
    - This be will be done by setting the hourly Transmission Allocation profile value equal to the highest Bid MW value for the hour
      - E.G. if an MP submits four quarter-hourly Dynamic Transaction bid curves for an hour with a Bid-in UOLs of 30MWs, 20MWs, 25MWs, and 45MWs, we would set the Transmission Allocation profile value to 45MWs
- **Post-Dispatch Hour**
  - NYISO must update an E-Tag's Energy Profile to reflect actual flows over the course of the past Dispatch Hour in accordance with the NAESB rules for Post-Dispatch Hour updates on slide 20
    - These updates will be made hourly after the conclusion of each dispatch hour

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Checkout

5-Minute Transaction Checkout

- **NYISO currently performs Operator Checkout w/ HQ once every hour, after RTC15 has run and posted hourly transaction schedules for HB +1**
  - The Operator Checkout process is required for compliance with NERC rules dictating interface scheduling
- **The current Operator Checkout process requires NYISO and HQ Operators to jointly confirm:**
  - Hourly Transaction Schedules, and
  - A MW scheduling range applicable to 15-Minute Transactions for the next hour
- **NYISO proposes to increase the frequency of Operator Checkout with HQ from once hourly to once every quarter hour to compensate for the potential scheduling variability of 5-Minute Transactions**
  - More frequent Checkout will give NYISO and HQ Grid Operators more control over resulting 5-minute transaction schedules, Ramp, and total MW movement across RTD intervals
  - However, it should be noted that this increases the level of effort associated with Operator Checkout for Grid Operators on both sides of the HQ/NY interface
- **The new Operator Checkout process would require NYISO and HQ Operators to jointly confirm:**
  - Hourly Transaction Schedules, and
  - A MW scheduling range applicable to 5-Minute Transactions for the relevant upcoming 15-minute interval

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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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Questions?