Enhanced Interregional Transaction Coordination: Concept Update

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Agenda

◆ Bidding Rules

◆ Day Ahead Market Scheduling Rules

◆ NERC e-Tag Requirements

◆ Real-Time Market Scheduling Rules

◆ Real-Time Market Pricing Rule Update

◆ Real-Time Market Settlement Rules

◆ Neighboring ISO Specifics & Status

General Concept – Bidding

Bidding

- Intra-hour import/export transactions will be bid into the MIS similarly to the way hourly import/export transactions are bid
  - Transactions bids will still be bid and evaluated for a full hour
  - MPs shall indicate on each bid whether the transaction should be scheduled as an hourly or intra-hour transaction in the Real-Time Market
  - Wheel-through transaction offers will <u>not</u> have the option to be scheduled as an intra-hour transaction
  - All proxy buses will continue to be authorized for hourly scheduling, even those that are authorized for intra-hour scheduling
- The Real-Time Market bidding window will remain the same for hourly and intra-hour transactions
  - All transaction bids are still required to be submitted for evaluation by RTC and/or RTD no later than 75 minutes before each hour

General Concept – Bidding

Bidding (cont.)

- All external transaction bids will support an 11 point incremental/decremental cost curve and energy MW offer
  - Today, transaction bids only support a single incremental/decremental cost and energy MW
  - The energy MW will be treated as the maximum allowable schedule for the transaction
  - The cost curves will be allowed to extend beyond the energy MW offered for the transaction
  - Cost curves associated with export transactions will be treated as price capped cost curves, which is similar to the way virtual load bids are treated

General Concept – Bidding

HAM Bid Curve Logic

- Today, we allow MPs to provide an optional HAM price on the DAM Bid or we use a default price when we convert an accepted DAM schedule into a HAM bid

- With an 11 point curve there can be times when the curve copied from the DAM bid will need to be modified when creating the HAM bid

- The NYISO proposes using the following rules for creating the HAM bid:
  - If a HAM bid already exists, the existing HAM bid will <u>not</u> be modified
  - When carrying the DAM schedule forward onto the HAM bid, merge the bid curve on the DAM bid with either the optional HAM price (as provided on the DAM bid) or to the HAM default price for DAM scheduled transactions (-$0.01 for imports/wheels, $999.70 for exports)
  - Create a new point on the HAM bid curve with the DAM schedule and opted price (optional HAM price/default price)
  - When inserting the new point on the bid curve there the new bid curve may no longer be monotonically increasing
  - To address the above issue, points above or below the inserted point will be removed to maintain a monotonically increasing bid curve
  - If necessary, a 12th point can be added to the HAM bid curve
  - Set the Energy Profile MW on the HAM bid to the DAM schedule
  - There is still an opportunity to adjust the HAM bid curve up to 75 minutes prior to the hour

Enhanced Interregional Transaction Coordination

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General Concept – Bidding

Bidding Import/Wheel Example 1

DAM Energy Profile MW = 100

Confirmed DAM Sched = 20

Optional HAM $ = $20

DAM Curve Pt 1 = 10MW, $10

DAM Curve Pt 2 = 30MW, $30

DAM Curve Pt 3 = 50MW, $50

DAM Curve Pt 4 = 100MW, $100

HAM Energy Profile MW = 20

HAM Curve Pt 1 = 10MW, $10

HAM Curve Pt 2 = 20MW, $20

HAM Curve Pt 3 = 30MW, $30

HAM Curve Pt 3 = 50MW, $50

HAM Curve Pt 4 = 100MW, $100

General Concept – Bidding

Bidding Import/Wheel Example 2

DAM Energy Profile MW = 100

Confirmed DAM Sched = 20

Optional HAM $ = $40

DAM Curve Pt 1 = 10MW, $10

DAM Curve Pt 2 = 30MW, $30

DAM Curve Pt 3 = 50MW, $50

DAM Curve Pt 4 = 100MW, $100

HAM Energy Profile MW = 20

HAM Curve Pt 1 = 10MW, $10

HAM Curve Pt 2 = 20MW, $40

~~HAM Curve Pt 3 = 30MW, $30~~

HAM Curve Pt 3 = 50MW, $50

HAM Curve Pt 4 = 100MW, $100

General Concept – DAM Scheduling

Day-Ahead Market (DAM) Scheduling

- No changes expected to the treatment of transactions in the Day Ahead Market

- Continue to allow external DAM Market transaction bids to be evaluated by SCUC on an hourly basis

- The evaluation of all transactions will continue to be based on the NYISO ex-ante LBMPs

- External DAM LBMP Market transactions will continue to be settled based on DAM LBMPs and DAM Schedules

General Concept – NERC e-Tag Requirements

- The NERC e-Tag duration must be at least one hour
- The NERC e-Tag start/stop time must be the beginning of an hour
  - For example, the start time must be XX:00
  - This means a start or stop time of anything other than XX:00 will not be approved
- For intra-hour transactions submitted at those Proxy Generator Buses where intra-hour transactions are authorized to be scheduled on a 15 minute basis:
  - The NERC e-Tag should have its Transaction Type set to 'Normal'
    - This is no different than today
  - The NERC e-Tag Energy Profile MW may be updated on a 15 minute basis, where the NERC Security Coordinators must approve the NERC e-Tag prior to implementation of the interchange
    - This will be accomplished through a Transaction Checkout process that occurs on a 15 minute basis
- For intra-hour transactions submitted at those Proxy Generator Buses where intra-hour transactions are authorized to be scheduled on a 5 minute basis:
  - The NERC e-Tag should have its Transaction Type set to 'Dynamic'
  - The maximum expected energy should be set equal to the Energy Request (MW) bid into the MIS
  - The actual interchange value will be updated as soon as possible after the dispatch hour is complete
- Hourly transactions shall have its NERC e-Tag Transaction Type set to 'Normal'
  - This is no different than today

General Concept – RTM Scheduling

Transaction Scheduling

- Allow external hourly transaction bids to be economically evaluated by RTC_{15} on an hourly basis, as is currently done
  - Wheel-through transactions will only be evaluated by RTC_{15} on an hourly basis

- At those Proxy Generator Buses where intra-hour transactions are authorized, external intra-hour transaction bids will be economically evaluated by RTC on a rolling 15 minute basis

- At those Proxy Generator Buses where intra-hour transactions are authorized to be scheduled on a 5 minute basis, external intra-hour transaction bids will be economically evaluated by RTD on a rolling 5 minute basis
  - RTD-CAMs could also evaluate intra-hour transaction bids when a CAM is requested

General Concept – RTM Scheduling

Transaction Checkout & Curtailments

- At those Proxy Generator Buses where intra-hour transactions are authorized to be scheduled on a 5 minute basis, intra-hour transactions will be subject to an hourly checkout
  - This Checkout (from xx:30 – xx:40) will (1) adjust hourly transactions and commit the schedule for the hour, and (2) confirm the max energy profile for intra-hour transactions for use by subsequent RTC and RTD evaluations
- At those Proxy Generator Buses where intra-hour transactions are authorized to be scheduled on a 15 minute basis, intra-hour transactions will be subject to a 15 minute checkout
  - The 15 minute checkout would occur at least 20 minutes before the quarter hour in which schedule is implemented
  - The RT Checkout from xx:30 – xx:40 will (1) adjust hourly transactions and commit for the hour, and (2) adjust the intra-hour transactions and commit for the next 15 minute period
  - The RT Checkout from xx:45 – xx:55, xx:00 – xx:10, xx:15 – xx:25 will only adjust the intra-hour transactions and commit for the next 15 minute period
- All Real-Time Market transactions are subject to reliability curtailments

General Concept – RTM Scheduling
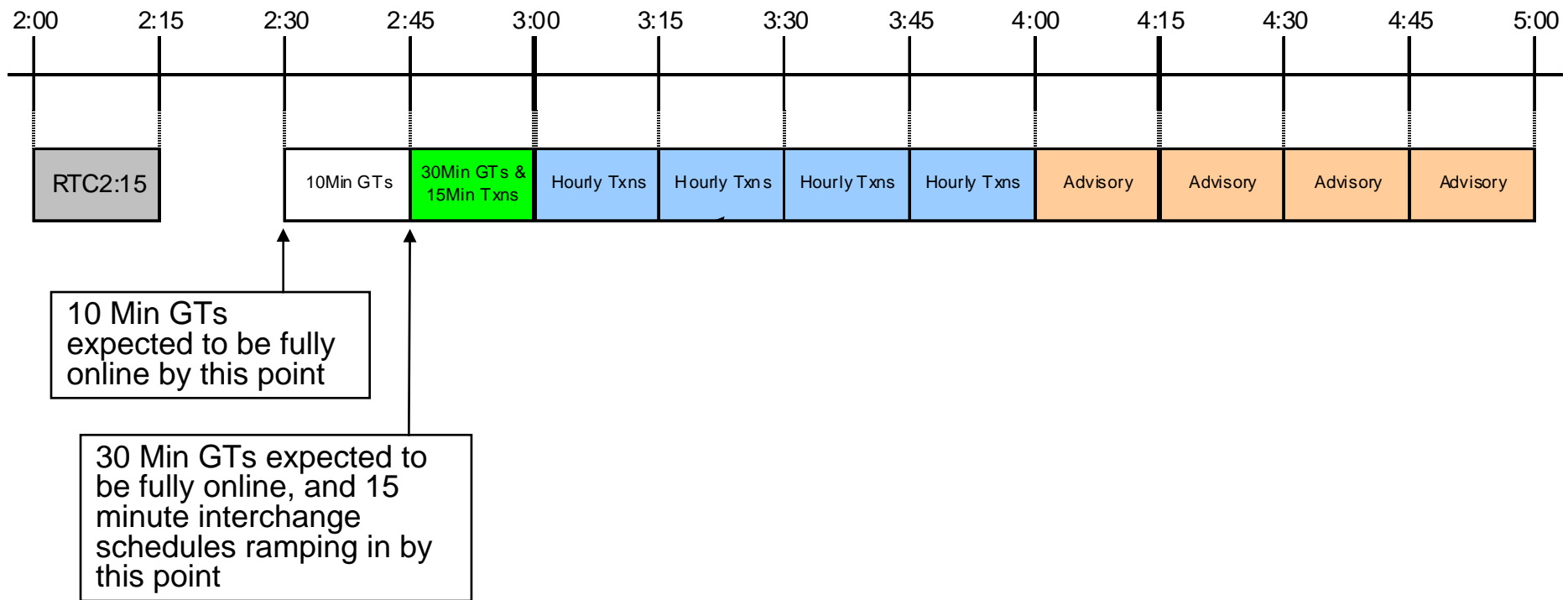
EVALUATION OF EXTERNAL TRANSACTIONS

	DAY AHEAD	REAL-TIME	
	SCUC	RTC	RTD
MULTI-HOUR BLOCK TRANSACTIONS* (IMPORT/EXPORT/WHEEL-THROUGH)	Block Schedule for a Minimum Run Time	Treated as hourly or intra-hour depending on MP preference	Treated as hourly or intra-hour depending on MP preference
HOURLY TRANSACTIONS* (IMPORT/EXPORT/WHEEL-THROUGH)	Schedule does not vary within the hour, and may change from hour to hour	Schedule does not vary within the hour, and may change from hour to hour	Schedule does not vary within the hour, and may change from hour to hour**
INTRA-HOUR TRANSACTIONS* (IMPORT/EXPORT ONLY)	Not Applicable	Schedule may change every fifteen minutes	Schedule may change every five minutes**

*Schedules based on economic evaualtion
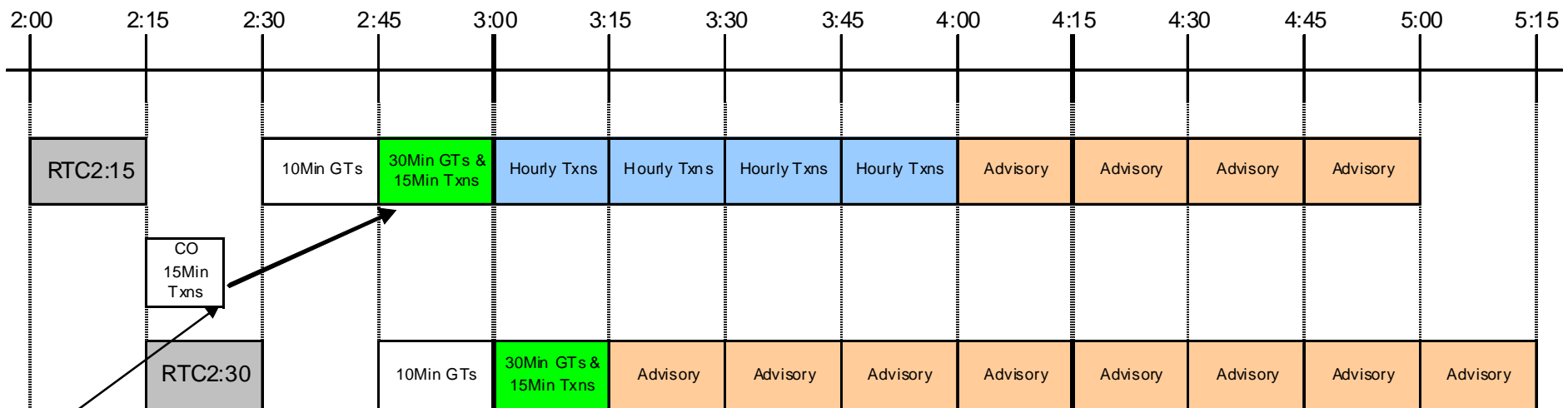**Subject to reliability curtailments in real-time

General Concept – RTM Scheduling

Starting with RTC that posts at 2:15

| 2:00 | 2:15 | 2:30 | 2:45 | 3:00 | 3:15 | 3:30 | 3:45 | 4:00 | 4:15 | 4:30 | 4:45 | 5:00 |

| RTC2:15 | | 10Min GTs | 30Min GTs & 15Min Txns | Hourly Txns | Hourly Txns | Hourly Txns | Hourly Txns | Advisory | Advisory | Advisory | Advisory |

10 Min GTs expected to be fully online by this point

30 Min GTs expected to be fully online, and 15 minute interchange schedules ramping in by this point

General Concept – RTM Scheduling

Moving to RT Checkout & RTC that posts at 2:30

| | 2:00 | 2:15 | 2:30 | 2:45 | 3:00 | 3:15 | 3:30 | 3:45 | 4:00 | 4:15 | 4:30 | 4:45 | 5:00 | 5:15 |

| RTC2:15 | 10Min GTs | 30Min GTs & 15Min Txns | Hourly Txns | Hourly Txns | Hourly Txns | Hourly Txns | Advisory | Advisory | Advisory | Advisory |

CO 15Min Txns

| RTC2:30 | 10Min GTs | 30Min GTs & 15Min Txns | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory |

15 minute interchange transaction schedules for the 2:45 to 3:00 quarter hour to be confirmed with external Control Areas by this point
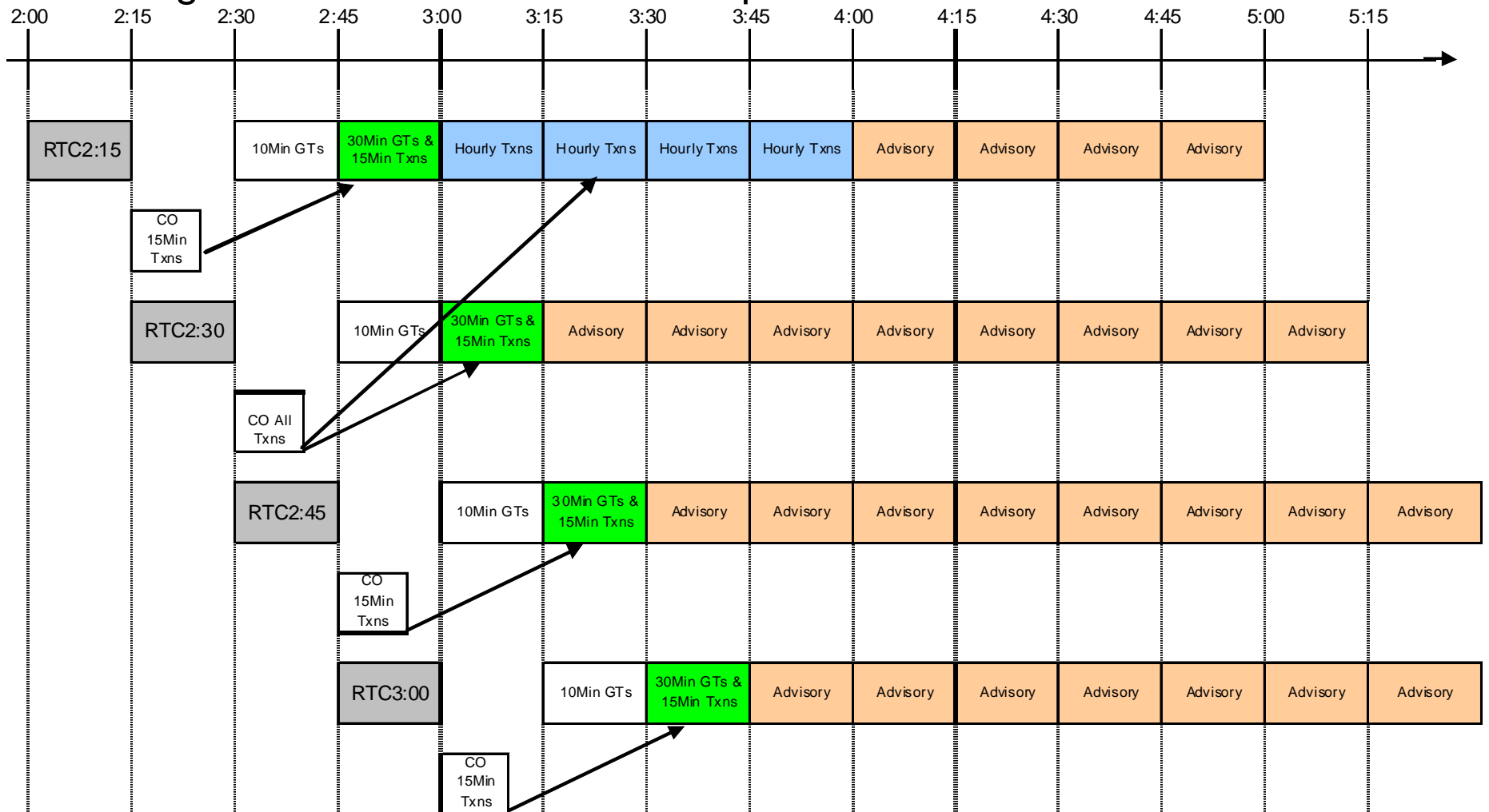
General Concept – RTM Scheduling

Moving to RT Checkout & RTC that post at 2:45

| | 2:00 | 2:15 | 2:30 | 2:45 | 3:00 | 3:15 | 3:30 | 3:45 | 4:00 | 4:15 | 4:30 | 4:45 | 5:00 | 5:15 |

RTC 2:15 row:
10Min GTs | 30Min GTs & 15Min Txns | Hourly Txns | Hourly Txns | Hourly Txns | Hourly Txns | Advisory | Advisory | Advisory | Advisory

CO 15Min Txns

RTC 2:30 row:
10Min GTs | 30Min GTs & 15Min Txns | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory

CO All Txns

RTC 2:45 row:
10Min GTs | 30Min GTs & 15Min Txns | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory | Advisory

Hourly interchange transaction schedules and 5 minute interchange transactions for the 3:00 hour, and 15 minute interchange transaction schedules for the 3:00 to 3:15 quarter hour to be confirmed with external Control Areas by this point

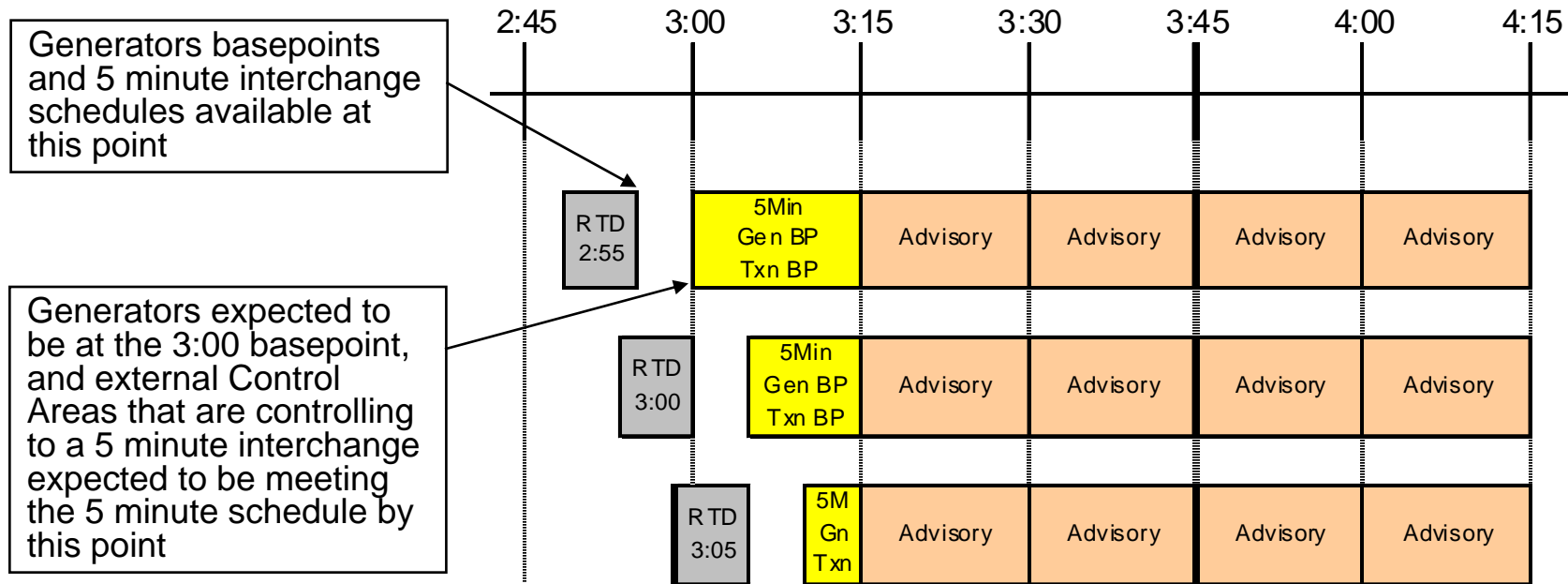# General Concept – RTM Scheduling

Moving to RT Checkout & RTC that posts at 3:00

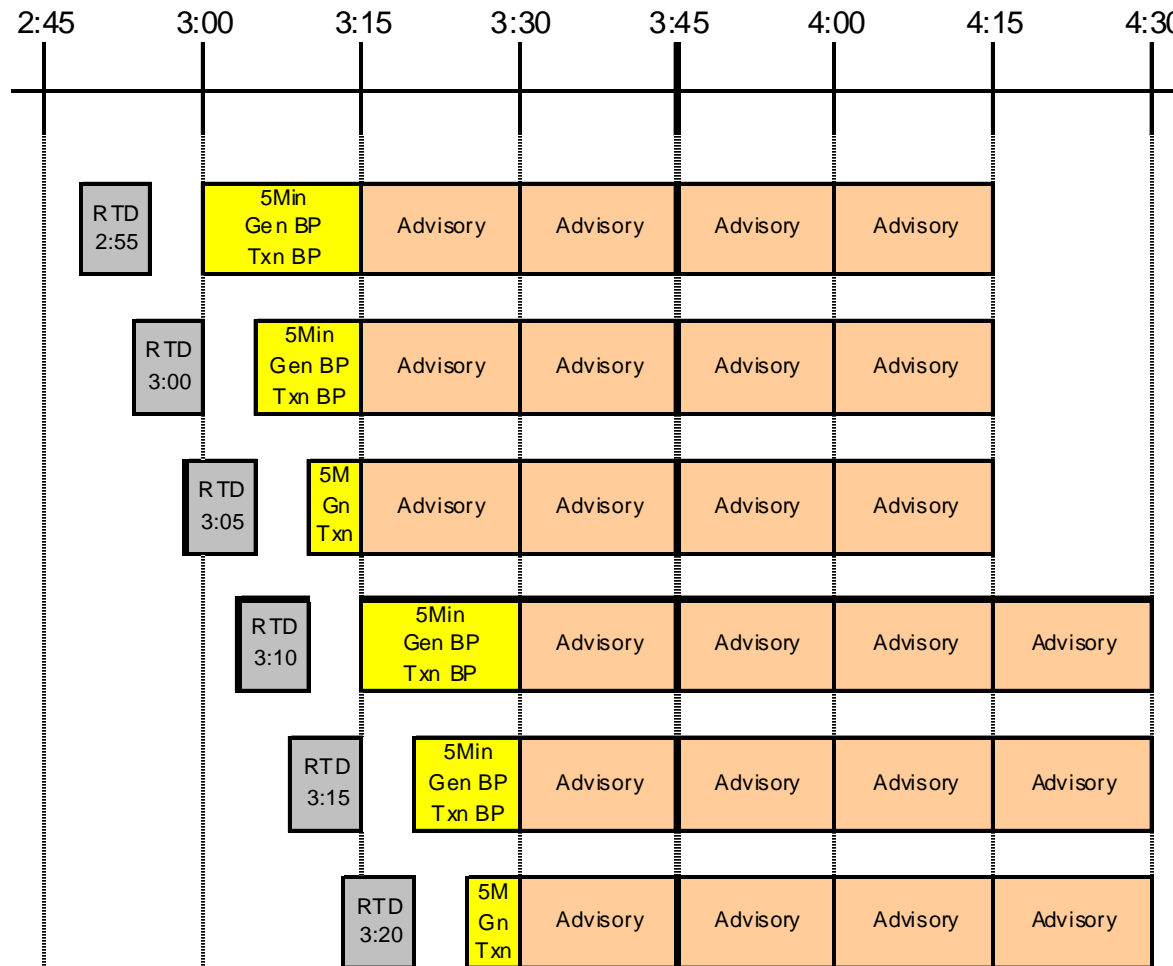Enhanced Interregional Transaction Coordination

General Concept – RTM Scheduling

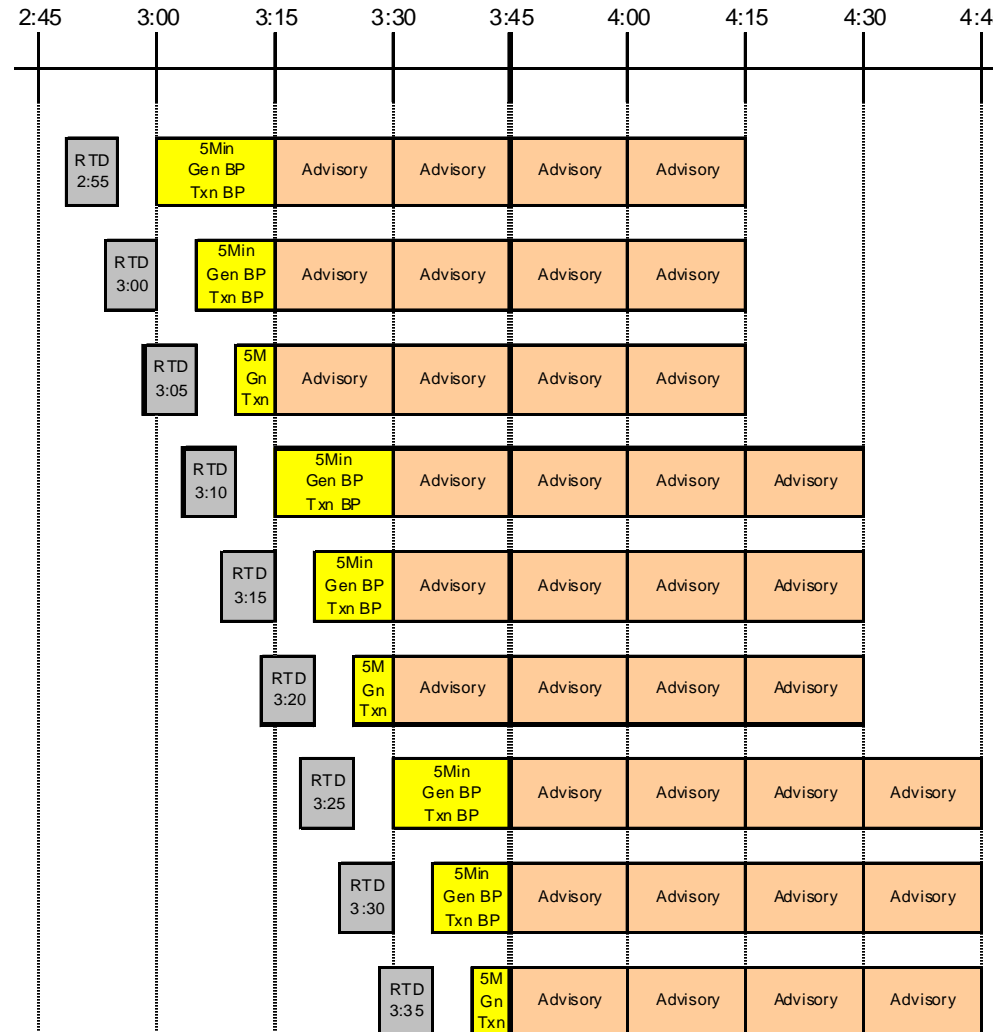Moving to RTD that posts at 2:55, 3:00, and 3:05

Generators basepoints and 5 minute interchange schedules available at this point

Generators expected to be at the 3:00 basepoint, and external Control Areas that are controlling to a 5 minute interchange expected to be meeting the 5 minute schedule by this point

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General Concept – RTM Scheduling

Moving to RTD that posts at 3:10, 3:15, and 3:20

| 2:45 | 3:00 | 3:15 | 3:30 | 3:45 | 4:00 | 4:15 | 4:30 |

RTD 2:55 | 5Min Gen BP Txn BP | Advisory | Advisory | Advisory | Advisory

RTD 3:00 | 5Min Gen BP Txn BP | Advisory | Advisory | Advisory | Advisory

RTD 3:05 | 5M Gn Txn | Advisory | Advisory | Advisory | Advisory

RTD 3:10 | 5Min Gen BP Txn BP | Advisory | Advisory | Advisory | Advisory

RTD 3:15 | 5Min Gen BP Txn BP | Advisory | Advisory | Advisory | Advisory

RTD 3:20 | 5M Gn Txn | Advisory | Advisory | Advisory | Advisory

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General Concept – RTM Scheduling

Moving to RTD that posts at 3:25, 3:30, and 3:35

General Concept – RTM Scheduling

Finally, moving to RTD that posts at 3:40, 3:45, and 3:50)

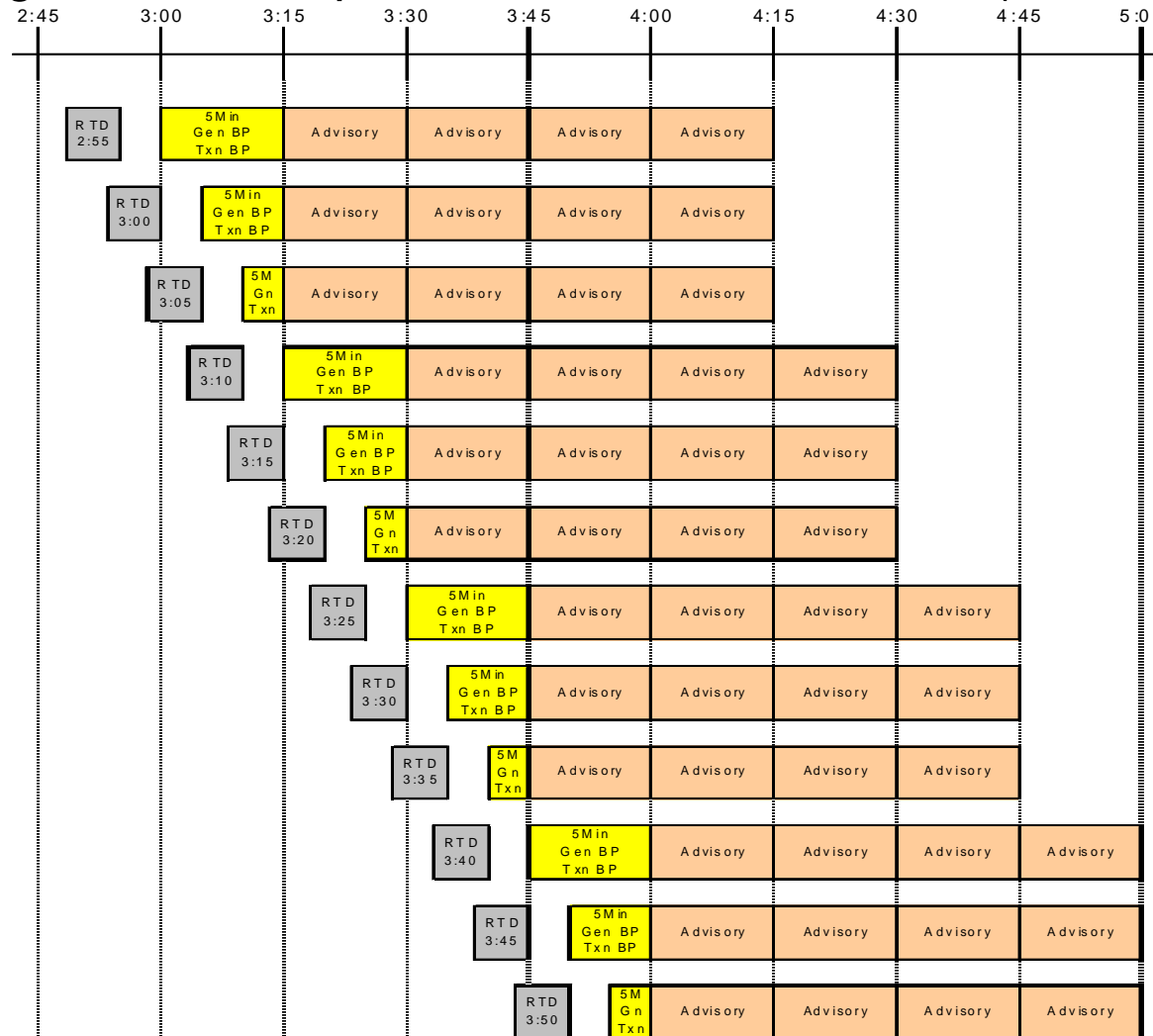Enhanced Interregional Transaction Coordination

General Concept – RTM Pricing

- All transactions will settle using the RTD LBMPs when RTC does not have binding 'Proxy Generator Bus Constraints'

- Existing price determination logic is predicated on only RTC_{15} being able to quantify congestion at the external proxy buses

- With more frequent transaction scheduling, the price determination logic needs to be expanded to reflect the capability of subsequent RTC and RTD evaluations to quantify congestion at the external proxy buses while scheduling intra-hour transactions

- The pricing rules that were presented on March 9, 2010 are being reviewed by NYISO staff to ensure that they create the correct real-time price signal

  - This review has highlighted some deficiencies with the proposed pricing rules

  - The NYISO anticipates coming forth with modifications to the proposed rules during the May 24, 2010 MIWG

General Concept – RTM Settlement

Real-Time Market (RTM) Settlement

- The Real-Time LBMPs for all Real-Time Market transactions will be based on the RTD LBMPs unless the Pricing Rules for Proxy Generator Buses, Rules for Non-Competitive Proxy Generator Buses or Special Pricing Rules for Scheduled Lines are invoked
- External transactions will be settled based on Real-Time Market LBMPs and Real-Time Schedules
- For external import bilateral transactions that choose to schedule energy via an intra-hour transaction, the LBMP settlement will be based on the Real-Time Market 5 or 15 minute intra-hour transaction scheduling outcome
  - The TUC settlement calculation will capture the Real-Time Market 5 or 15 minute transaction schedule changes for external import and export bilateral transactions
- All intra-hour import transactions (5 minute or 15 minute scheduled transactions) will be eligible for RT BPCG
  - Hourly import transactions bid at a Proxy Generator Bus **with** intra-hour transaction scheduling capability will no longer be eligible for RT BPCG
  - Hourly import transactions bid at a Proxy Generator Bus **without** intra-hour transaction scheduling capability will continue to be eligible for RT BPCG

General Concept – RTM Settlement

Import Curtailment Guarantees

◆ Propose to base the settlement on the DAM schedule

  ▪ Applied on an interval by interval basis, then rolled up to the hour

◆ All import transactions (hourly and intra-hour) will continue to be eligible for Import Curtailment Guarantees when:

  ▪ The HAM Transaction Offer MW remains equal to or greater than the DAM Schedule, and

  ▪ The HAM Transaction Energy Curve is set to or below the default economic priority (-$0.01) for the MWs scheduled in the DAM

  ▪ The HAM Transaction was curtailed for NYISO reliability outside of the market evaluation

General Concept – RTM Settlement

Import Curtailment Guarantees

◆ Settlement Example

DAM Schedule = 50MW, DAM Bid = \$20/MWh, DAM LBMP = \$50/MWh

RT Schedule = 20MW, RT LBMP = \$80/MWh

DAM Settlement = DAM Revenues – DAM Costs

= DAM Schedule*(DAM LBMP - Max(DAM Costs,0))

= \$1,500

RT Settlement with DAM Schedule = (RT Schedule – DAM Schedule) * RT LBMP

= -\$2,400

Import Curtailment Guarantee = (DAM Schedule – RT Schedule) *

(RT LBMP – Max(DAM Costs,0))

= \$1,800

General Concept – RTM Settlement

Financial Impact Charges

- The Financial Impact Charge (FIC) will continue to apply to transactions scheduled at Proxy Generator Buses with intra-hour transaction scheduling capability
  - The FIC will only apply to transactions that receive a non-zero schedule from RTC for any part of the hour
  - The FIC will be assessed for external transactions on an interval by interval basis as:

    For Imports: (RTC Schedule – RT Schedule)*[Max((RT LBMP – RTC LBMP), 0)
    For Exports: (RTC Schedule – RT Schedule)*[Max((RTC LBMP – RT LBMP), 0)
    For Wheel-Throughs: Assessed as both a failed import and failed export

  - The RTC LBMP will be the LBMP that was used to schedule the transaction
    - For Hourly Transactions, the RTC LBMP will be the four LBMPs out of the RTC_{15} evaluation
    - For Intra-hour Transactions (evaluated either on a 15 minute and 5 minute basis), the RTC LBMP will be the LBMP from the rolling RTC that provided a schedule for the transaction.

HQ-NY Specifics

- Intra-hour transactions will be evaluated by the Real-Time Market on a 5 minute basis
- The 10 minute top of the hour (from xx:55 to x1:05) DNI ramp with HQ will continue to be 70MW/min (700MW total over 10 minutes)
- The rest of the hour DNI ramp with HQ (remaining 50 minutes from x1:05 to x1:55) would be limited to 20MW/min (100MW over 5 minutes) initially
- No other ramp requirements will be necessary in RTD
  - Instead RTD will be provided with the RTC look ahead DNI for external transaction scheduling purposes
- The Desired Net Interchange (DNI) with HQ would be exchanged using automated ICCP communication
  - Similar to providing a Generator a 5 minute base point

PJM-NY Specifics & Status

- **Specifics**
  - Intra-hour transactions will be evaluated by the Real-Time Market on a 15 minute basis
  - Expect to rollout 15 minute transaction scheduling to
    1. *The Linden VFT proxy bus*
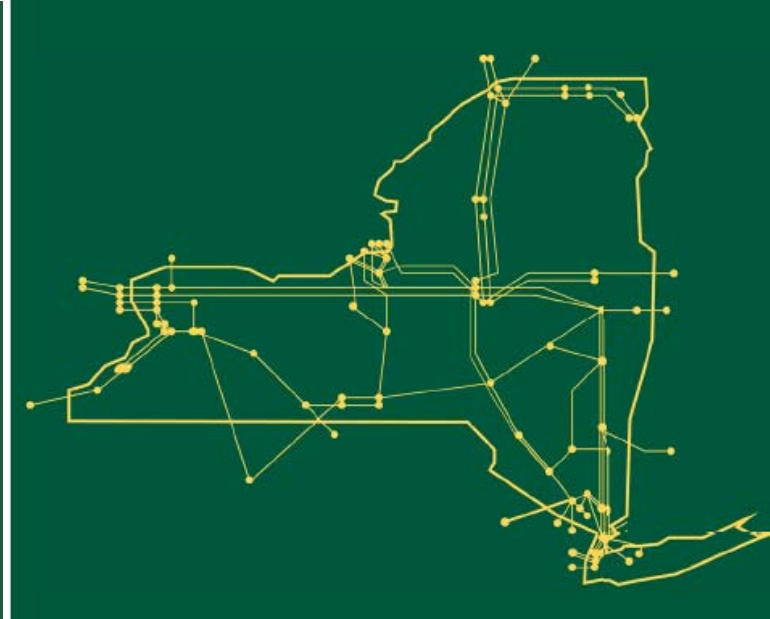   2. *The Neptune proxy bus*
    3. *The Keystone proxy bus*

- **Status**
  - PJM has a constraint that requires a transaction to flow for at least 45 minutes once it is selected
    - NYISO staff is still working with PJM staff in an effort to eliminate this constraint on the PJM-NY border

Enhanced Interregional Transaction Coordination

Next Steps

- June 26, 2009 – Introduced the concept to MIWG
- September 1, 2009 – Presented proposal to MIWG
- September 29, 2009 – Presented proposal to SOAS
- October 21, 2009 – Presented proposal to the BIC for discussion
- December 10, 2009 – Presented proposal to the OC for discussion
- December 17, 2009 – Introduced PJM-NY Concept at MIWG
- January 5, 2010 – Presented proposal at MIWG
- January 26, 2010 – Presented proposal to SOAS
- March 9, 2010 – Presented proposal at MIWG
- May 13, 2010 – Continue proposal discussions at MIWG
- May 24, 2010 – Present pricing proposal at MIWG
- 2010 – Stakeholder Approval Process, begin implementation of Phase 1
- Q1 2011 – Complete Implementation of Phase I

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and conducts comprehensive planning for the state's bulk electricity system.

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