New York ISO
Independent System Operator

Grid in Transition: Real Time Learning Session & Forecast Latency Discussion

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ICAPWG/MIWG/PRLWG

April 6, 2021 - Webex

Agenda

- Background
- Real-Time Commitment (RTC) & Real-Time Dispatch (RTD)
- RTC/RTD Inputs
- Discussion & Observations
- Summary & Next Steps

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Background

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Background

- At MIWG/ICAPWG meetings throughout 2020 and early 2021, the NYISO reviewed the recommendations from the Gap Analysis included in the Grid in Transition report.
- At the February 9, 2021 MIWG/ICAPWG meeting, NYISO reviewed and evaluated the list of recommendations and proposed to work on a subset of the list to inform the 2021 Master Plan and the 2022 Project Prioritization Process.

Proposed Approach for Considering Grid In Transition Recommendations in 2021, February 9, 2021 ICAPWG: https://www.nyiso.com/documents/20142/19060533/20210209%20NYISO%20-%20Proposed%20Approach%20for%20Considering%20Grid%20in%20Transition%20Recommendations%20in%202021%20(002).pdf/b986ba50-817a-2da2-e373-b977afe603b0

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New York's Clean Energy Policies

Policy Timeline

2019 — CLCPA Passed

2025
- CLCPA Solar: 6,000 MW mandate (distributed)
- NO_X Rule: In full effect
- Energy Storage : 1500MW target

2030
- CLCPA: 70% renewable electricity
- CLCPA Storage: 3,000 MW mandate

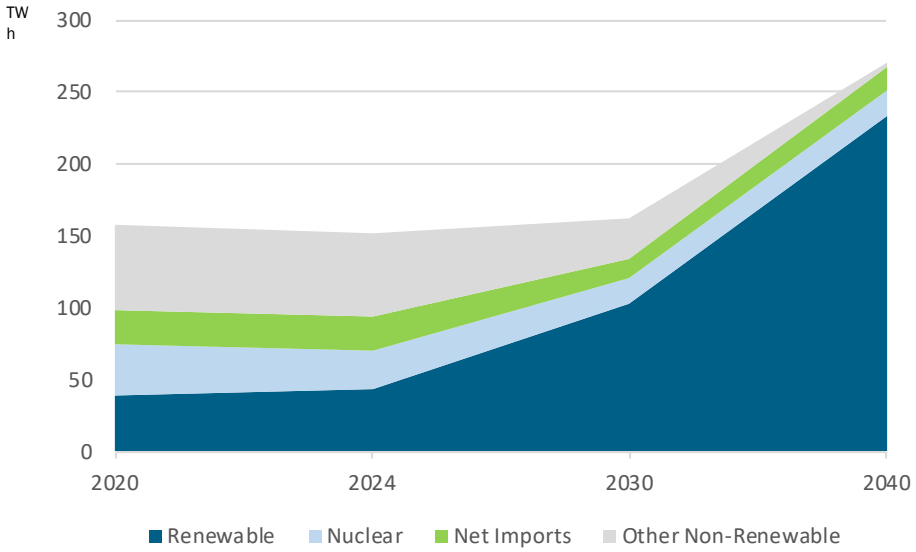
2035 — CLCPA OSW: 9,000 MW mandate

2040 — CLCPA: 100% zero emissions electricity

2050 — CLCPA: 85% NY economy-wide decarbonization

Annual Generation

A possible decarbonization path assuming a capacity addition model with "high electrification" load forecast, NYS policies and current wholesale market rules.



Sources and Notes: RGGI Auction Allowance Price and Volumes Results, New York Public Service Commission Order Adopting a Clean Energy Standard. August 1, 2016, New York DEC Adopted Subpart 227-3, New York Senate Bill S6599, Chart adapted from New York's Evolutions to a Zero Emission Power System, Modeling Operations and Investment Through 2040 Including Alternative Scenarios, ICAP/MIWG, June 22.

Grid in Transition – Key Takeaways

- **Climate Change Study[1]**
  - This study simulates the potential impacts of climate change and climate policy on the reliable operation of the New York power system
- **Grid In Transition Report[2]**
  - Describes emerging reliability and economic challenges facing New York's electricity sector
  - Proposes a path forward
- **Gap Analysis[3]**
  - Identifies gaps and new challenges to meet NYISO's mission to support a reliable and economically efficient electric system that are created by New York's decarbonization policies

[1]The Climate Change Impact and Resilience Study – Phase II: An Assessment of Climate Change Impacts on Power System Reliability in New York State was published October 15, 2020 and can be found under Climate Change Study at https://www.nyiso.com/ny-power-system-information-outlook

[2]The Reliability and Market Considerations for a Grid in Transition report ("Grid in Transition Report") was published on December 20, 2019, and can be viewed here: https://www.nyiso.com/documents/20142/2224547/Reliability-and-Market-Considerations-for-a-Grid-in-Transition-20191220%20Final.pdf/61a69b2e-0ca3-f18c-cc39-88a793469d50

[3]The Reliability Gap Assessment can be found in Appendix B of the Reliability and Market Considerations for a Grid in Transition report published December 20, 2019 https://www.nyiso.com/documents/20142/2224547/Reliability-and-Market-Considerations-for-a-Grid-in-Transition-20191220%20Final.pdf/61a69b2e-0ca3-f18c-cc39-88a793469d50

A Path Forward in 2021

- **The NYISO's wholesale markets can serve as an effective platform for achieving New York State environmental objectives.**
  - Through active engagement with stakeholders and policymakers, the NYISO is developing design improvements to meet the future challenges expected to arise with high levels of intermittent renewable and distributed energy resources.
- **The plan includes a set of enhancements that work together coherently and efficiently to satisfy New York's changing grid reliability needs.**
  - These opportunities are organized across three main points of focus (discussed on the next slide).
  - Some opportunities will require immediate attention while others might be something to consider as more information and experience becomes available.

A Grid in Transition – A Multifaceted Approach

- **Aligning Market Incentives**
  - Carbon Pricing
  - Comprehensive Mitigation Review
- **Prepare for New Technologies**
  - DER Participation Model
  - Energy Storage Participation Model
  - Hybrid Co-Located Model
  - Hybrid Aggregation Model
- And more….

Aligning Competitive Markets and New York State Clean Energy Objectives

- **Review Energy & Ancillary Services Design for Incenting Flexibility**
  - More Granular Operating Reserves
  - Regulation Up & Down Services
  - Ramping Services
- **Evolve the Day Ahead and Real-Time Markets to improve managing Forecast Uncertainty**
- **Track certain market metrics to evaluate incentives for flexible resources**
- And more…

Valuing Resource & Grid Flexibility

- **Enhancements to Resource Adequacy Modeling**
- **Improving Installed Capacity Market Incentives**
- **Review Capacity Market Resource Ratings to Reflect Reliability Contribution**
  - Expanding Capacity Eligibility
  - Tailored Availability Metric

Improving Capacity Market Valuation

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Potential Energy Market Design Improvements

Slide from February 9 Presentation

- **Improve managing resource variability and forecast uncertainty**
  - Reduce load forecast latency
  - Reduce intermittent resource forecast latency
  - Account for increased RT load forecast uncertainty
  - Potential gains from partnering with neighboring ISOs to participate in the regional NPCC ACE diversity program
  - Evaluate more frequent and/or 5-minute interchange scheduling protocols with neighbors
  - Revisit broader regional markets (BRM) and regional dispatch to improve regional coordination and enable external resources to support NYCA's flexibility needs
  - Real-Time Dispatch (RTD)
    - Consider enhancements to the Real-Time Dispatch Corrective Action Mode (RTD-CAM) that would allow for periodic quick dispatches to address high system volatility
    - Consider adjusting look-ahead evaluations of RTD and RTC to be more consistent with the timing of external transaction ramp and gas turbine commitment. (SOM-2012-13)
    - Consider if commitment of quick start units should be in RTD (less impacted by RTC forecast latency)
      - Determine whether all real-time interchange scheduling move to RTD

•Short-Term or Underway
•Medium Term
•Long Term

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Potential Energy & Ancillary Service Market Improvements

- **Improve monitoring and investigate resource variability and forecast uncertainty**
  - Understand and consider ways to reduce load forecast data and process latency
  - Understand and consider ways to reduce intermittent resource forecast data and process latency
- **This presentation will review the RTC and RTD processes and will then focus on observations and areas for potential further investigation**

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Real-Time Commitment & Real-Time Dispatch

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Real-time Commitment & Real-time Dispatch

- **Real-Time Commitment (RTC) and Real-Time Dispatch (RTD) are the two main processes used by the NYISO real-time Energy and Ancillary Services (AS) markets to meet Load, Operating Reserves, and Regulation Service on a least-bid cost basis**
  - This portion of the presentation will review how RTC/RTD function and interact, along with a discussion of the inputs that inform commitment and dispatch decisions
    - We will first review RTC and RTD functionality
    - Then we will discuss how External Transactions are handled by RTC and RTD and the limited interactions between RTC and RTD
    - Last, we will discuss the various inputs used by RTC and RTD, such as the Load forecast
  - We will then discuss the latency and accuracy associated with the various forecast inputs
  - The goal is to share information about potential issues that could arise when system conditions change rapidly

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Real-Time Commitment Overview

- **RTC is a forward-looking unit commitment and dispatch process that co-optimizes Load, Operating Reserves, and Regulation Service simultaneously on a least as-bid cost basis over a 2 ½ hour optimization period**
  - RTC runs every 15 minutes and optimizes over a 2 ½ hour period divided into 10, 15-minute timesteps
  - Depending on the Resource or Transaction type, certain timesteps are binding and others are advisory
- **Over the course of its optimization horizon, RTC will solve for both commitment and dispatch**
  - RTC makes binding commitment and de-commitment decisions for Fast Start Resources and produces advisory dispatch for all Resources
    - Other Resources receive commitment decisions from the Day-Ahead Market's Security Constrained Unit Commitment (SCUC) optimization; RTC will fulfill SCUC's Day-Ahead commitments and only reevaluate Fast Start Resources (10- & 30- minute)
    - For this reason, we typically refer to RTC as providing "additional commitment"
    - RTC will not commit dispatch-only Resources, such as ESR, DER, wind, and solar, but these Resources are considered available over its optimization period when evaluating Fast Start Resource commitments and Transaction schedules
  - RTC also reevaluates Transactions in real time and produces binding Transaction schedules (commitment and dispatch) every fifteen minutes

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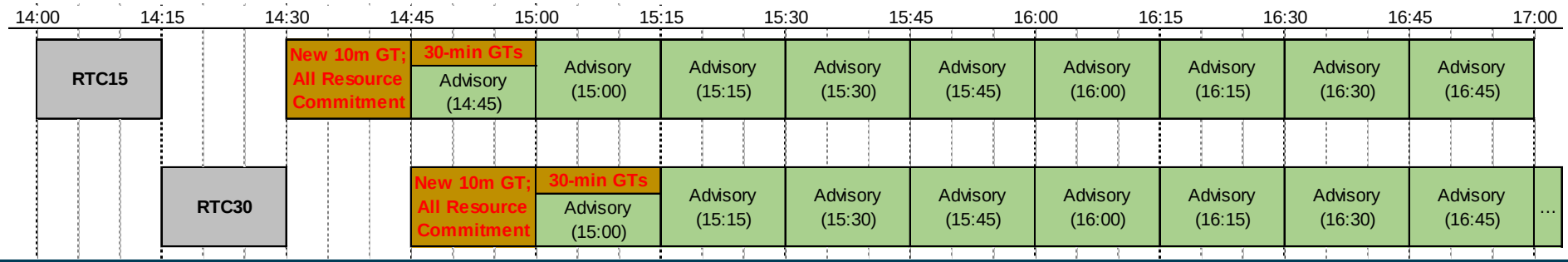
Real-time Commitment Overview

- **RTC runs initialize every 15 minutes on the quarter hour and post 15 minutes after initialization**
  - RTC runs are labeled by when they post; *e.g.*, RTC15 initializes at XX:00, and posts at XX:15
    - When RTC initializes, input data (such as load forecast and telemetry) is locked for the duration of the run
  - For each RTC run, the first timestep begins 15 minutes after RTC posts; *e.g.*, for RTC15, that is XX:30
    - Commitment, schedules, basepoints and advisories in RTC and RTD are labeled by the timestep
  - Newly committed Fast Start Resources will receive their start-up notification when RTC posts
    - For 10-min Fast Start Resources, that can include a start-up notification to be at min gen by the first timestep
    - For 30-min Fast Start Resources, that start-up notification would be for the second timestep
  - For all other Resources, RTC will make available to subsequent RTCs/RTDs the unit commitment status over the optimization period
  - External Transaction scheduling will be discussed on a later slide



Real-Time Dispatch Overview

- **RTD is a forward-looking dispatch model that co-optimizes Load, Operating Reserves, and Regulation Service simultaneously on a least-cost basis over a ~75 minute time horizon**
  - Notice that commitment is not included in RTD's definition
    - When RTD initializes, it pulls the most recent Resource commitment from the previous RTC run to determine which Resources it can dispatch
    - RTD can depend on dispatch-only ("on-dispatch") Resources that do not receive commitment from RTC
- **RTD runs every 5 minutes and the ~75 minute time horizon is divided into one five-minute timestep referred to as a "basepoint" and four 15-minute advisory timesteps**
  - RTD basepoints are typically generated every five minutes to inform Resources of their target MW output
  - Basepoints are used by AGC to ramp units up or down within their dispatchable range
    - Resources that are Regulation providers may be sent points from AGC that deviate from their RTD Energy schedule to manage immediate generation-load imbalances
  - Transactions scheduled by RTC are considered fixed by RTD and not reevaluated
- **Key concept: RTC = commitment and advisory dispatch, RTD = Energy schedules based on ramp of committed units**

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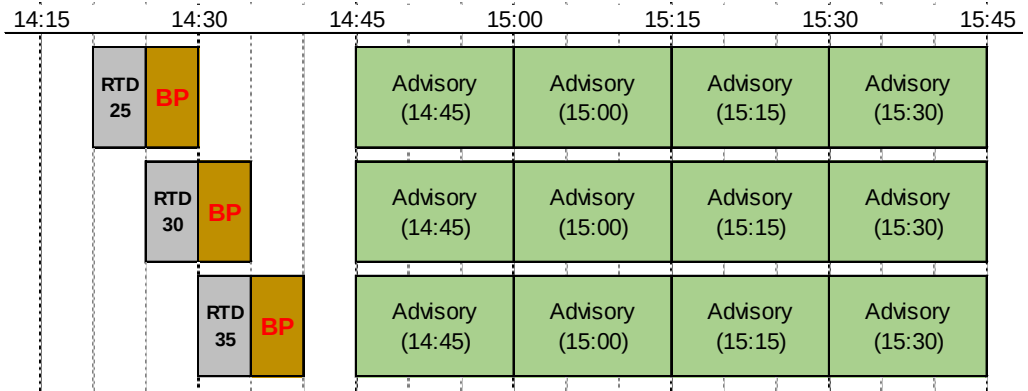
Real-time Dispatch Overview

- **RTD runs initialize every 5 minutes and post 5 minutes after initialization**
  - RTD runs are labeled by when they post; *e.g.*, RTD25 initializes at XX:20, and posts at XX:25
    - When RTD initializes, input data is locked until the next RTD initializes (similar to RTC)
  - For each RTD run, the first timestep (basepoint) occurs 5 minutes after RTD posts
    - AGC will ramp units on a 6-second basis from the time that RTD posts until the basepoint
      - *E.g.*, at 14:25, RTD25 posts the basepoint for 14:30; AGC will ramp the unit from 14:25 to 14:30 to meet basepoint
    - Advisories in RTD are split into fifteen minute timesteps using the committed and available units from the same RTC
      - RTD cannot commit new units; it will solve for Load over its optimization period using the units it has available



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External Transactions

- **External Transactions with neighboring balancing areas receive schedules (commitment and dispatch) from RTC**
  - This differs from internal Resources which receive dispatch signals from RTD
  - 15-minute Transactions are evaluated during each RTC run for the first 15-minute timestep
  - Hourly transactions are evaluated during each RTC15 run for the next hour-beginning (e.g., RTC 14:15 will evaluate and schedule HB15 Hourly Transactions)
  - Part of the reason that Transactions are scheduled in RTC is because they must go through operator checkout to be confirmed
    - Operator Checkout is primarily a manual process where the Transaction desk will call neighboring balancing areas that received Transaction schedules to confirm the Transaction
    - For 15-minute transactions, operator checkout occurs after RTC has posted, before the first timestep when the Transaction is scheduled to flow
    - For Hourly Transactions, operator checkout will occur thirty minutes before the Hourly Transaction will flow
    - Scheduling transactions on a 5-minute basis in RTD might not allow enough time for the current manual checkout process to occur (would need to use dynamic checkout process)

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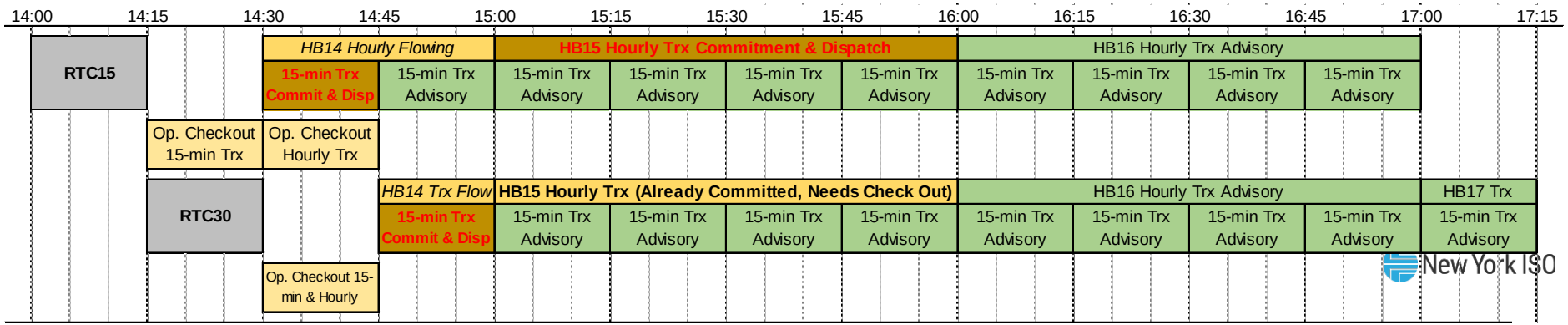
External Transactions

- **For the RTC that posts at 14:15:**
  - 15-min Transactions will receive binding schedules for the first RTC timestep
    - All other timesteps for 15-min Transactions are advisory
    - After RTC15 posts, operator checkout begins for 15-min Transactions beginning at 14:30
  - Hourly transactions will receive binding schedules for HB15
    - After the next hour-beginning, RTC will solve for subsequent hourly transaction advisories
  - CTS and LBMP Forecast prices are updated after each RTC run
- **Note: RTC will co-optimize transactions and internal Resources at the same time**
  - Below, we show only the Transaction piece because it is slightly different than how internal Resources are handled; however, this is not a separate process



Interactions between RTC and RTD

- **For each RTC run, there are three associated RTD runs**
  - When each RTD initializes, it will pull unit commitments from the most recent RTC
    - This includes SCUC commitments fulfilled by RTC as well as additional RTC commitments
    - Commitment decisions from RTC include the timestep that the unit will be at min gen
  - RTD will also pull External Transactions scheduled by RTC
    - As a reminder, these schedules are fixed and not reevaluated by RTD
- **There is no other information shared between RTD and RTC**
  - Apart from Desired Net Interchange, no information about advisories is shared between the two systems
  - RTD will use the same population of committed and on-dispatch Resources to solve for Load over its optimization horizon

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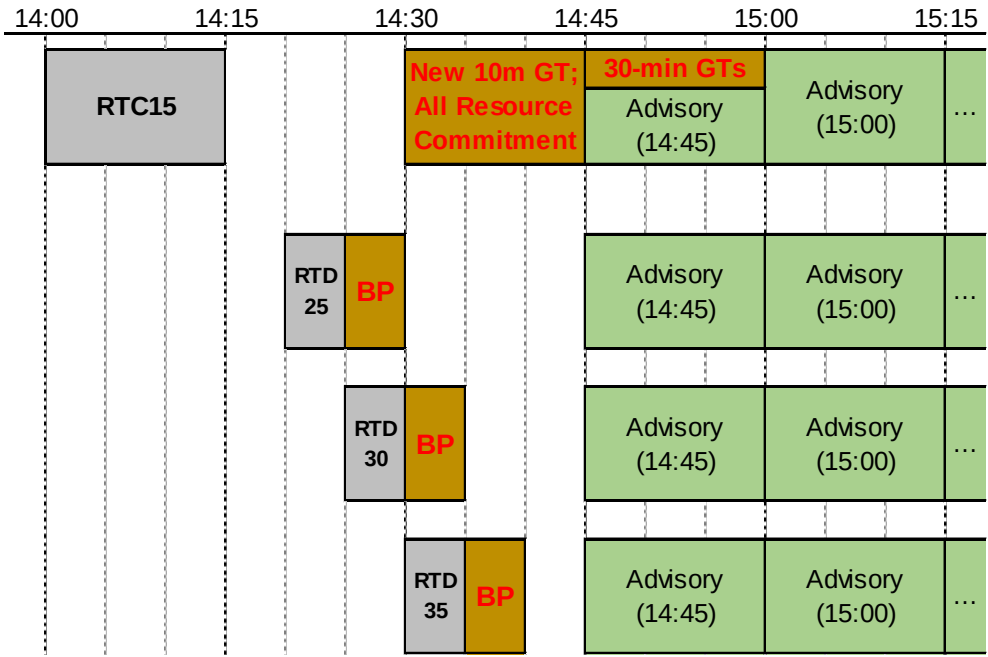
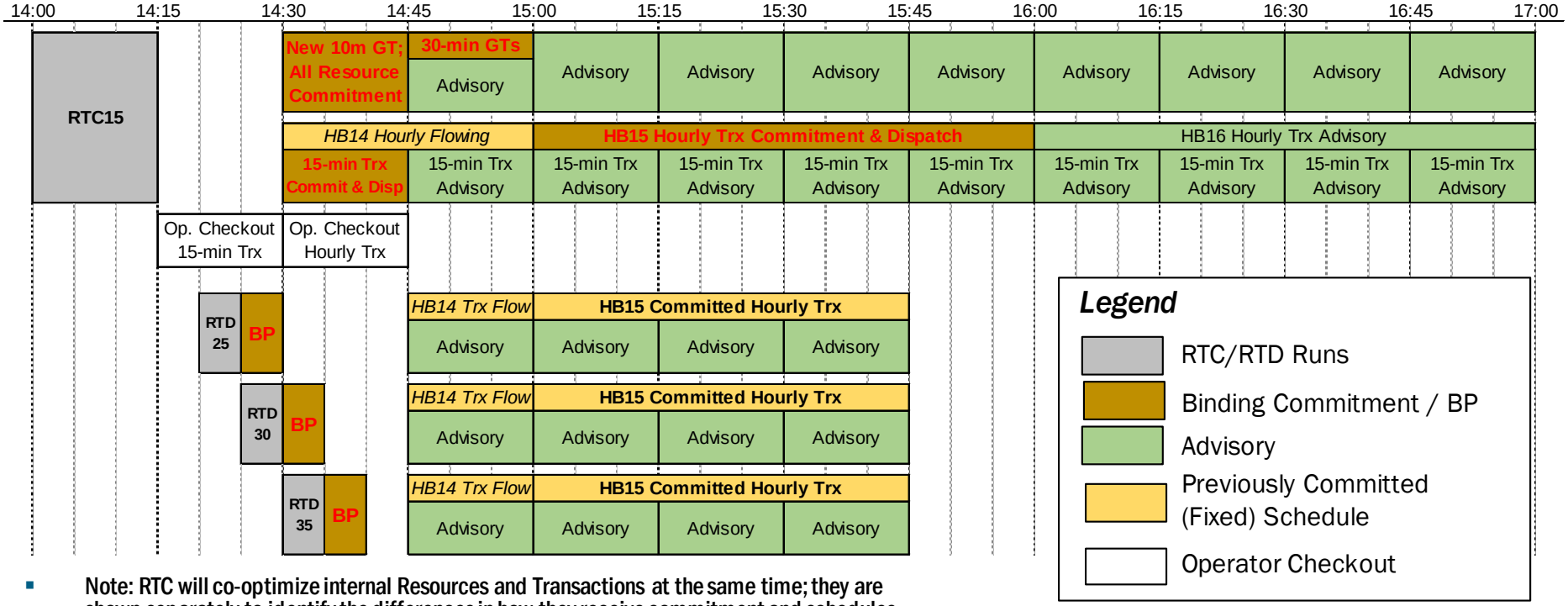
Interactions between RTC and RTD

- **Example: RTC15 posts at 14:15**
  - Units committed by RTC15 are moved by RTD25, RTD30, and RTD35
- **RTD25 initializes at 14:20**
  - RTD25 can then move committed Resources (and any on-dispatch units) within their dispatchable range for the basepoint at 14:30
    - RTD's look-ahead is based solely on what RTC has *already committed*; RTC/RTD do not exchange any information about advisories



Full RTC/RTD Optimization Horizon



- Note: RTC will co-optimize internal Resources and Transactions at the same time; they are shown separately to identify the differences in how they receive commitment and schedules, not to imply separate processes
- RTD-Corrective Action Mode (CAM) functions to override the normal RTD executions, as determined by the NYISO Operators, to deal with "off-normal" power system conditions; for more information on RTD-CAM, see Section 7.2 of the Transmission & Dispatch Manual

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RTC/RTD Inputs

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Inputs to RTC/RTD

- **RTC and RTD use a number of different inputs that all have their own process and refresh rate, including:**
  - Load Forecast: accounts for meteorological (weather and temperature) data as well as behind-the-meter (BTM) solar
  - Bid Data: internal Resource and Transaction Bids (CTS & LBMP)
  - Resource Telemetry: real-time unit statuses and output levels on a 6-second basis
  - Wind Energy Forecast: specific forecasting tools used for wind and front-of-the-meter solar plants provided by third party vendors
  - Mitigation: we will not be discussing mitigation as part of this presentation
  - As you get further from real-time, RTC/RTD have more flexibility to use different resources to meet load, but the accuracy of the inputs is reduced.

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Load Forecast

- **The Load Forecast (LF) uses several different inputs to forecast Load, including:**
  - Meteorological (weather) data that is updated hourly
    - Weather data includes a three day historic lookback and a 14-day forecast
  - Historical Load forecasts of similar weather-days
  - Actual Load for the current day and time
  - BTM Solar forecasts, provided by a third party vendor
- **The LF tool will solve for total Load before considering BTM solar, and separately layering in the BTM solar forecast to arrive at net Load**
  - The current BTM solar forecast is updated hourly and has 15-minute granularity
    - MW values are provided at the zonal level
    - After accounting for processing into the Load Forecaster, additional delays have been observed between when the BTM solar forecast is refreshed and when it is reflected in RTC/RTD
    - More discussion of the timing impact of BTM solar forecast updates on a later slide

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Load Forecast

- **There are two types of Load Forecasts – (1) an hourly, Day-Ahead load forecast; and (2) a 5-minute, real-time Load forecast**
  - The hourly load forecast updates every hour, uses advanced statistical regressions, considers several different weather impacts and dependent variables, and models a more complex relationship between weather and Load
    - The Day-Ahead model will also use recent actual weather and Load data to calibrate the model forward, adjusting for peaks and correcting for bias
  - The 5-minute real-time forecast updates every 5 minutes and relies heavily on the Load levels of the previous 15 minutes; it is designed to run fast, and executes within about 30 seconds
- **Both the hourly and 5-minute Load forecasts offer a 7-day look ahead**
  - Depending on the timestep, RTC/RTD will either use just the 5-minute LF, a blend of the 5-minute and hourly LFs, or just the hourly LF

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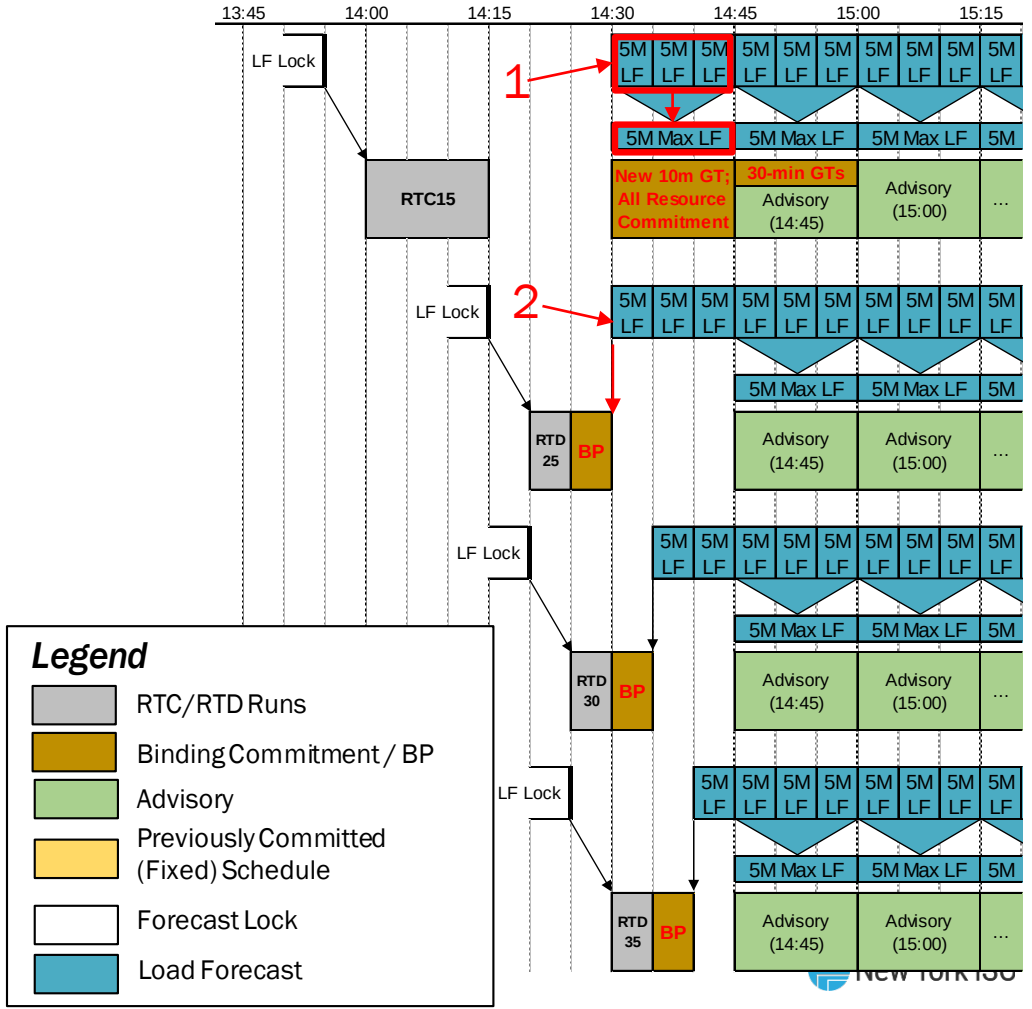
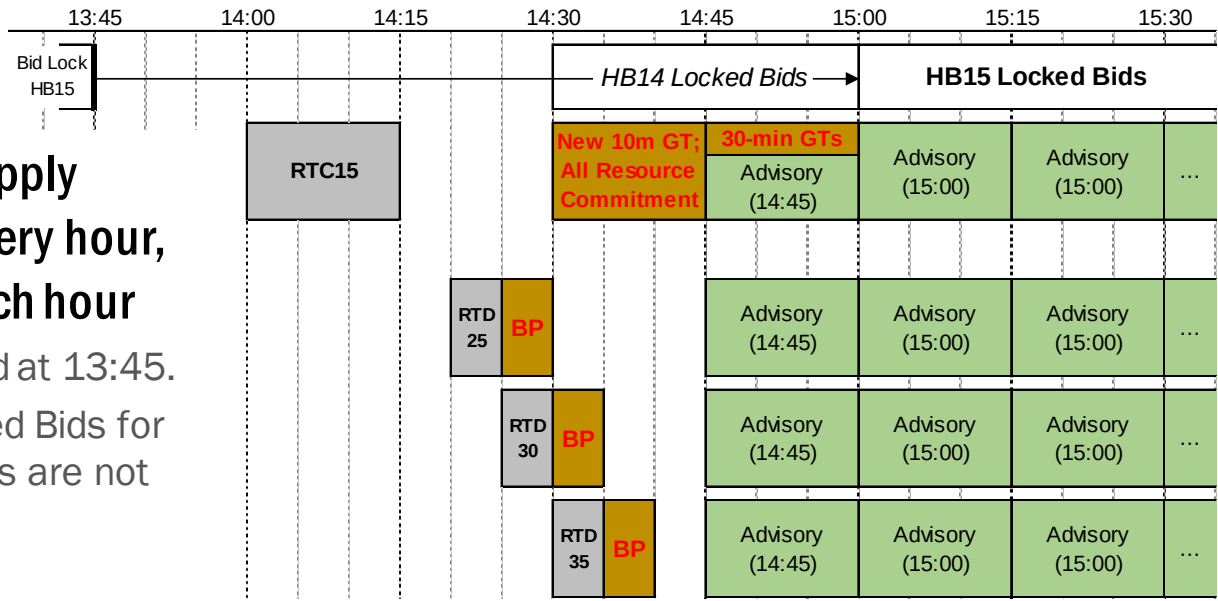
Load Forecast

- **While the 5-minute LF executes and posts every 5 minutes, there are additional delays that occur before the information is available to RTC/RTD**
  - The LF that posts at 00 is generally not used by RTC/RTD runs that initialize at 00
  - This will be discussed further on a later slide
- **For simplicity in our diagrams, we will show the LF input as being five minutes old before an RTC or RTD run initializes**
  1. For timesteps that use 15-min intervals, RTC/RTD will use the highest MW value from the three corresponding 5-minute LF values
  2. For RTD timesteps that use 5-min intervals, only the specific 5-minute LF MW value that corresponds to the basepoint is used



Resource Bids

- **Resource-provided Bids to supply Energy (and AS) are locked every hour, 75 minutes before the dispatch hour**
  - *E.g.*, Bids for HB15 are locked at 13:45.
  - RTC and RTD will use unlocked Bids for advisory timesteps where Bids are not yet locked
  - Bids associated with External Transactions (CTS and LBMP) are updated after each RTC run



Telemetry

- **Telemetry provides real-time unit-specific on/off and MW output status**
  - Telemetry is updated on a 6 second basis
  - RTC and RTD use telemetry to understand actual generator statuses and current actual output (for ramping purposes)
- **RTC and RTD will pull the most recent available telemetry from EMS as each new run initializes**
  - Once initialized, RTC/RTD will not take in new telemetry
  - As a first step, RTC/RTD will compare the telemetry for each unit to the previous RTD BP, allowing RTC/RTD to react in real-time to resource under- or overperformance

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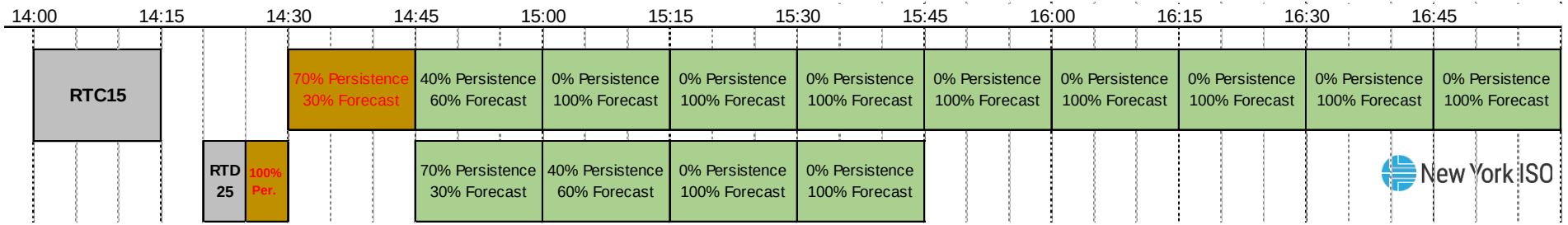
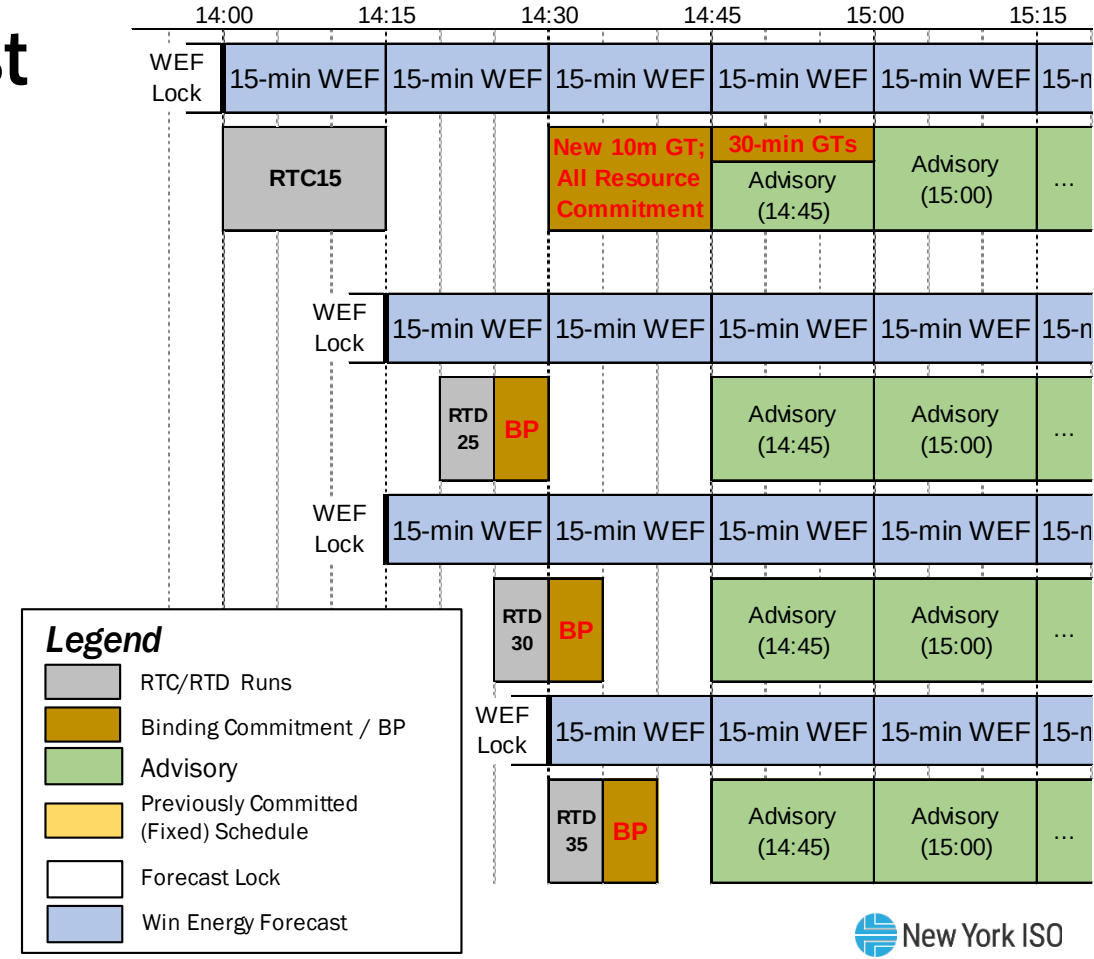
Wind Energy Forecast

- **The Wind Energy Forecast (WEF) used by the NYISO is provided by a third party, Underwriters Laboratories (UL) (formerly AWS Truepower)**
  - The WEF is a plant-specific 15-minute, MW output forecast with an 8-hour look ahead
    - UL sends the NYISO an update every 15 minutes
    - Updates are synced up with the start of RTC runs – *e.g.*, a new forecast delivered at XX:00 will be used by RTC15, which initializes at the same time
  - Forecast values provided in the WEF used by RTC/RTD are blended with persistence power values over the optimization period at different blending percentages
    - Specific blending percent depends on length of time between initialization and timestep
    - Blending percentages range from 100% persistence to 100% forecast
    - This helps to capture the impact of real time conditions and mitigate forecast uncertainty



Wind Energy Forecast

- **The Wind Energy Forecast input is "refreshed" every 15 minutes for the NYISO**
  - As a reminder, RTD30, 35, 40 will use commitment decisions set by RTC15
  - Those commitment decisions are based on a WEF set at least 30 mins prior to the RTD run (first RTC/RTD timestep at 14:30, WEF used for commitment locked at 14:00)
  - RTD can use a more recent WEF over its optimization horizon, but it cannot commit new units
  - Additionally, RTD currently uses 100% persistence for the basepoint
- **In June 2021, the NYISO anticipates adding FTM Solar to this forecast process**
  - FTM Solar forecasting will be provided by UL and rolled into the existing WEF process



Full RTC/RTD Timeline and Forecasts

- **The next slide shows the full picture of all forecasts and the full RTC/RTD timeline**
  - The graphic is very busy but contains no new information
  - The graphic demonstrates the complexities and interconnected aspects of the processes, and informs the discussion on forecast lag
    - Forecast lags can impact the commitment and dispatch decisions

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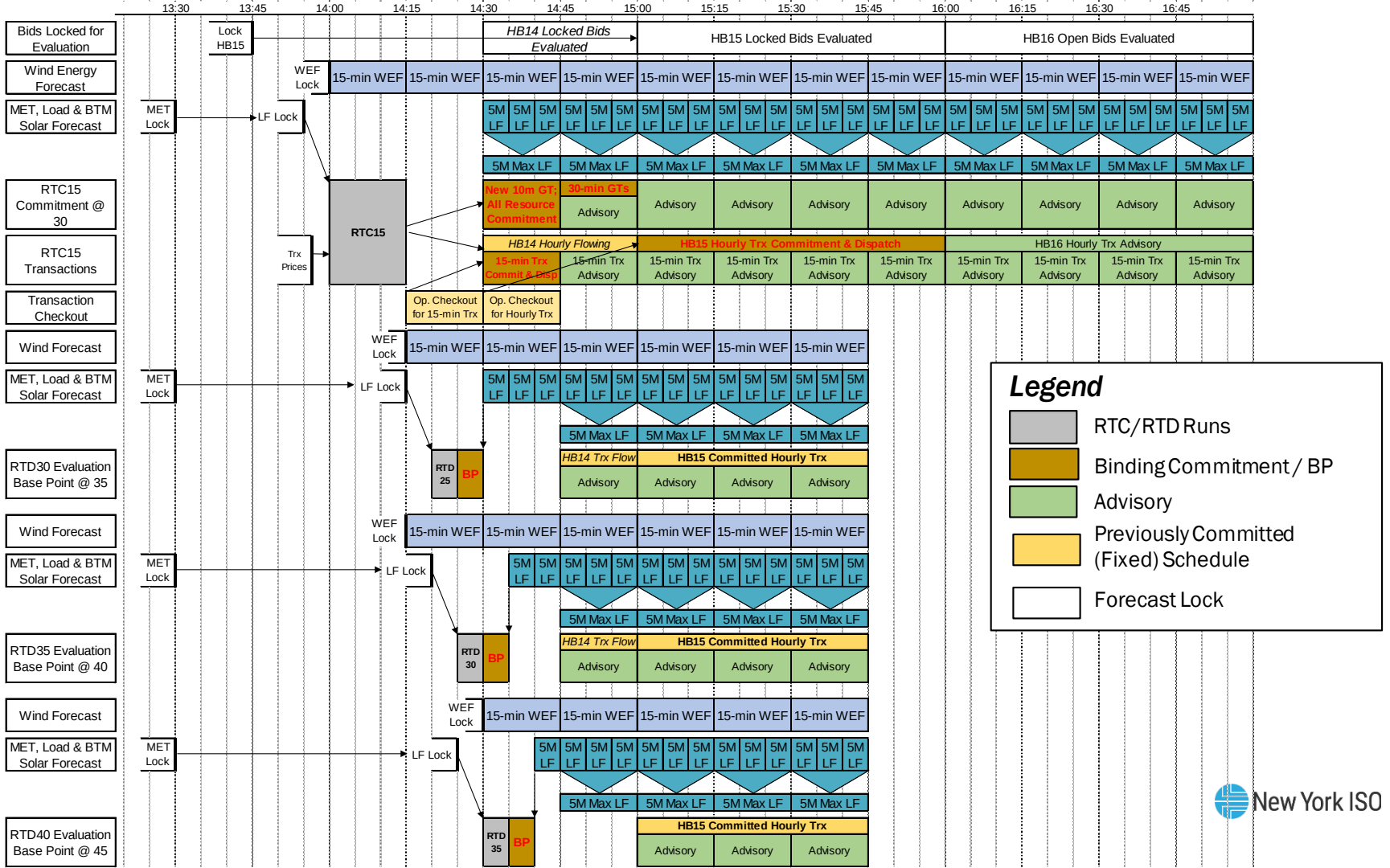
13:30
13:45
14:00
14:15
14:30
14:45
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
Bids Locked for Evaluation
Lock HB15
HB14 Locked Bids Evaluated
HB15 Locked Bids Evaluated
HB16 Open Bids Evaluated
Wind Energy Forecast
WEF Lock
15-min WEF
MET, Load & BTM Solar Forecast
MET Lock
LF Lock
5M LF
5M Max LF
RTC15 Commitment @ 30
RTC15
New 10m GT; All Resource Commitment
30-min GTs
Advisory
RTC15 Transactions
Trx Prices
HB14 Hourly Flowing
HB15 Hourly Trx Commitment & Dispatch
HB16 Hourly Trx Advisory
15-min Trx Commit & Disp
15-min Trx Advisory
Transaction Checkout
Op. Checkout for 15-min Trx
Op. Checkout for Hourly Trx
Wind Forecast
MET, Load & BTM Solar Forecast
RTD30 Evaluation Base Point @ 35
RTD 25
BP
HB14 Trx Flow
HB15 Committed Hourly Trx
Wind Forecast
MET, Load & BTM Solar Forecast
RTD35 Evaluation Base Point @ 40
RTD 30
BP
HB14 Trx Flow
HB15 Committed Hourly Trx
Wind Forecast
MET, Load & BTM Solar Forecast
RTD40 Evaluation Base Point @ 45
RTD 35
BP
HB15 Committed Hourly Trx
Legend
RTC/RTD Runs
Binding Commitment / BP
Advisory
Previously Committed (Fixed) Schedule
Forecast Lock
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Discussion & Observations

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Grid In Transition Discussion & Objectives

- **Grid In Transition – Potential Energy Market Design Improvement: "Improve managing resource variability and forecast uncertainty"**
- **The remainder of this presentation will:**
  - Describe latency and accuracy with respect to each forecast input to the RTC/RTD process.
    - Understand load forecast data accuracy and process latency
    - Understand intermittent resource forecast data accuracy and process latency
  - Discuss next steps and seek feedback.

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Grid in Transition: System Conditions & Real-Time Operations

- The Reliability Gap Analysis identifies "short-term variations in output during the operating day as a result of changes in wind speed and cloud cover" as an increasingly impactful condition in the future "with a resource and output mix that includes much more intermittent resource output than today."

The Reliability and Market Considerations for a Grid in Transition report was published on December 20, 2019, and can be viewed here: https://www.nyiso.com/documents/20142/2224547/Reliability-and-Market-Considerations-for-a-Grid-in-Transition-20191220%20Final.pdf/61a69b2e-0ca3-f18c-cc39-88a793469d50

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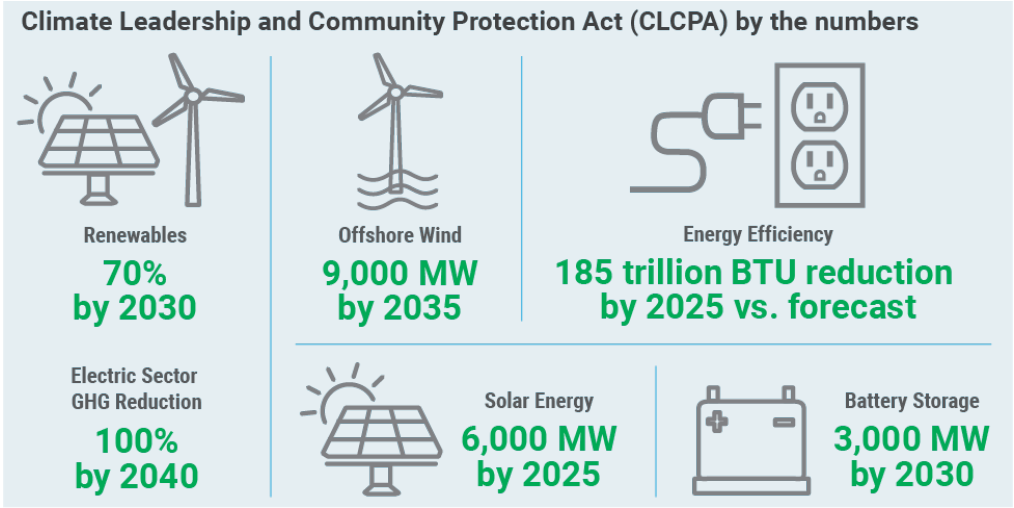
Grid in Transition: System Conditions & Real Time

- Anticipated integration of intermittent power resources must be considered for the future reliable operation of the NYCA.



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Latency

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Load Forecast

- **While the 5-minute Load forecast executes and posts every 5 minutes, there can be additional delays that occur before the information is consumed by RTC/RTD.**
  - System processing time can result in a Load forecast posting at XX:00 being incorporated into RTD initializations occurring at XX:05 or XX:10.
    - 'Processing time' includes storage & data retention and transfer among systems between modulation and consumption in real-time.
- **NYISO continues to investigate implications of observed latency and scope possible improvements.**

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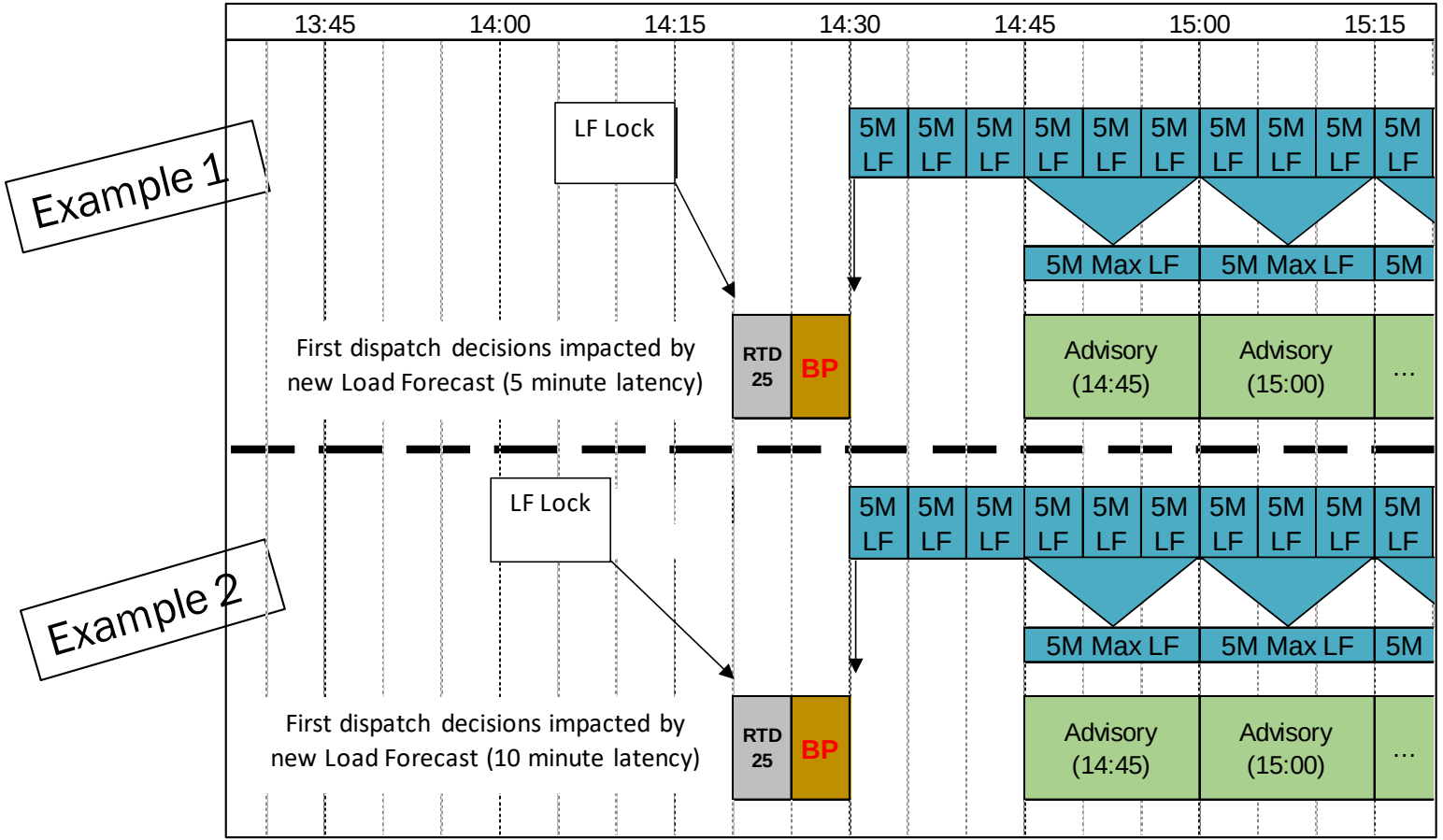

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Behind the Meter (BTM) Solar Forecast

- **BTM forecast refresh consumption by RTC/RTD can exhibit latency.**
  - NYISO's BTM solar vendor provides forecast updates every hour by XX:15.
  - Forecast update provided by XX:15 is reflected in the Load forecast by XX:35.
  - Thus, the first RTC that will include forecast information reflected in the LF at XX:35 or after would be RTC00.
    - RTC00 initializes at XX:45, providing commitment at XX:15.
  - Total elapsed latency potential: 60 minutes.
- **NYISO continues to investigate implications of observed latency and scope possible improvements.**

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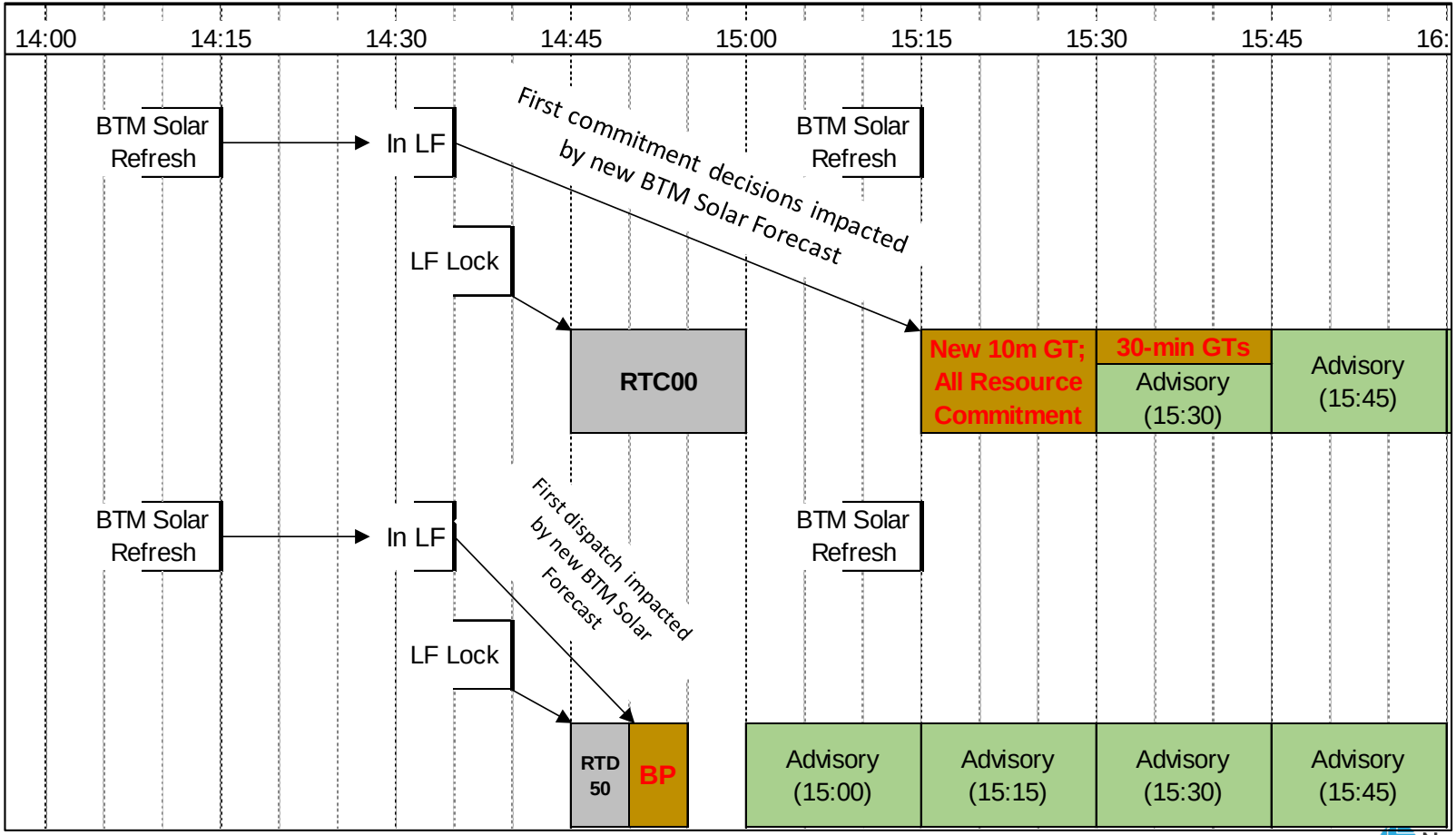

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Wind Energy Forecast

- Ongoing investigation has not revealed areas of latency in the forecast and consumption by RTC/RTD.
- For more information on Wind Energy Forecast, please refer to Slides 29-30 of this presentation.

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Accuracy

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Forecast Accuracy

- **NYISO continuously evaluates forecast accuracy, and provides publicly available results:**
  - Operations Performance Metrics Monthly Report: https://www.nyiso.com/documents/20142/19363807/Board-Monthly-Report-February-2021.pdf/c53cfe73-811f-995e-6426-d7e657f1736a
    - Load Forecast
    - BTM Solar Forecast
    - Wind Energy Forecast
- **An evolving resource mix will require continued maintenance of quality forecasts – forecasts should evolve to manage system conditions with higher penetrations of DER, ESR, and Intermittent Power Resources.**
- **NYISO will evaluate whether improvements can be made to BTM solar and Wind Energy Forecast accuracies, and discuss the scope of such an investigation at a future presentation.**

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Summary & Next Steps

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Summary & Next Steps

- NYISO RTC and RTD process overview, including inputs, time-steps, and architecture.
- NYISO will continue investigating latency and accuracy in Load forecasts, BTM solar forecasts, and Wind Energy Forecasts.
- In addition to feedback provided today, please provide any additional comments to Ryan Patterson (rpatterson@nyiso.com) & Harris Eisenhardt (heisenhardt@nyiso.com)

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Questions?

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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