

More Granular Operating Reserves: Reserve Provider Performance

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Agenda

- **Background**
- **Illustrative Examples**
- **Supplemental Performance Data**
- **Reserve Provider Audit Process**
- **Next Steps**

Background

Note: Presentations with content related to reserve provider performance are highlighted in light blue font

Date	Working Group	Discussion Points and Links to Materials
01-08-19	ICAPWG/MIWG	<u>Proposed schedule for accelerating implementation of Zone J operating reserves</u>
01-15-19	ICAPWG/MIWG	<u>Establishing a new Zone J reserve region with a 500 MW 10-minute and 1,000 MW 30-minute reserve requirement</u>
01-24-19	ICAPWG/MIWG	<u>Proposed operating reserve demand curve prices for the Zone J reserve products and the proposed tariff revisions for this initiative</u> <u>Operating Reserve Background</u>
03-04-19	ICAPWG/MIWG	<u>Analysis of potential impact</u>
03-13-19	BIC	<u>Stakeholder vote: Establishing Zone J Operating Reserves</u>
03-27-19	MC	<u>Stakeholder vote: Establishing Zone J Operating Reserves</u>
04-30-19	ICAPWG/MIWG	<u>More Granular Operating Reserves</u>
07-10-19	ICAPWG/MIWG	<u>More Granular Operating Reserves</u>
09-24-19	ICAPWG/MIWG	<u>More Granular Operating Reserves</u>
10-28-19	ICAPWG/MIWG	<u>More Granular Operating Reserves</u>
11-05-19	ICAPWG/MIWG	<u>Review of GT Start-Up Performance & NYISO Auditing Process (Presentation by Potomac Economics)</u>
11-06-19	BIC	<u>More Granular Operating Reserves: Overall Design</u>
02-06-20	ICAPWG/MIWG	<u>Consumer Impact Methodology</u>
02-10-20	ICAPWG/MIWG	<u>More Granular Operating Reserves: Reserve Provider Performance and Load Pocket Reserves Tariff Language</u>

Background: Reserve Provider Performance

- **Throughout the stakeholder process in 2019 and early 2020, the NYISO presented the following:**
 - Review of reserve provider audit process
 - Historic reserve audit data
 - Enhancements to the reserve audit process
 - Enhancements to NYISO's reporting on reserve provider performance
- **In response to stakeholder requests, the NYISO committed to provide data regarding historic reserve pickup (RPU) event performance**
 - The NYISO initially presented such information at the February 10, 2020 MIWG/ICAPWG meeting
 - In response to stakeholder feedback on the February 10 presentation, the NYISO is providing additional information regarding the historic RPU event data previously presented

Background: Reserve Provider Performance Analysis

- **Historic performance evaluations demonstrate the following:**
 - Actual RPU performance pass rate between November 2018 and November 2019:
 - Gas turbines (GTs): 87%
 - All units (including GTs): 85%
 - Average reserve performance audit pass rate from last 5 years (all units):
 - 10-minute units: 85%
 - 30-minute units: 90%
 - MMU's analysis in 2018 SOM - Average output after receiving an economic start-up signal in RTC:
 - 10-minute GTs: 82% of the MW offered
 - 30-minute GTs: 87% of the MW offered
- **These results demonstrate the same range of performance across the three methods of evaluation and indicate that suppliers are able to provide reliable reserve capability when called upon**

Illustrative Reserve Provider Performance Examples

Examples of Reserve Provider Performance

- **In response to stakeholder questions regarding the thresholds for categorizing performance as “pass” or “fail”, the NYISO developed illustrative examples of hypothetical results**
 - This is not actual data, but is an accurate representation of results from observed performance
 - The intent of the examples is to show that while the data may indicate that unit “failed”, the magnitude of underperformance may be very small (compared to both the tolerance and the expected energy)
- **Four examples are provided for 10-minute reserve providers:**
 - Example 1: 10-minute GT unit with successful performance (“pass”)
 - Example 2: 10-minute GT unit with unsuccessful performance (“fail”)
 - Example 3: Spinning reserve provider with successful performance (“pass”)
 - Example 4: Spinning reserve provider with unsuccessful performance (“fail”)

Reserve Provider Performance Parameters

- **Technical Bulletin 142 defines the following tolerances that are allowed in the evaluation of an acceptable demonstration during a reserve audit to better reflect limitations of generator controls:**
 - A variation of 2% of the required pickup, or 1 MW (whichever is greater)
 - A one-minute tolerance
- **To provide consistency in its analysis, NYISO used the same parameters to evaluate performance during actual RPU events between November 2018 and November 2019**
 - For GTs, performance is measured 11 minutes after the start time of the RPU to reflect the operating characteristics of GTs
 - For all other reserve providers, if the duration of the RPU is less than 10 minutes, a one-minute tolerance is added to the end time of the RPU. If the duration of the RPU is greater than 10 minutes, performance was measured after 11 minutes
- **The following examples reflect the application of these parameters on the event performance**

Example 1: GT Unit Successful Event

■ Resource characteristics:

- Type: 10-minute GT
- Upper Operating Limit (UOL): 39.9 MW

■ Event parameters:

- Event start time: 9:00
- Expected output: 39.9 MW
- Actual output at 9:10: 39 MW
- Actual output at 9:11: 41.1 MW

■ Event results:

- Tolerance: $39.9 - \max(2\% * 39.9, 1) = 38.9$ MW
- Actual output at 9:11 is greater than the tolerance, so unit passes

Example 2: GT Unit **Unsuccessful Event**

- **Resource characteristics:**

- Type: 10-minute GT
- UOL: 37 MW

- **Event parameters:**

- Event start time: 10:00
- Expected output: 37 MW
- Actual output at 10:10: 30 MW
- Actual output at 10:11: 34 MW

- **Event results:**

- Tolerance: $37 - \max(2\% * 37, 1) = 36$ MW
- Actual output at 10:11 is less than the tolerance, so unit fails

Example 3: Spinning Reserve Provider

Successful Event

■ Resource characteristics:

- Type: Spinning reserve provider
- Emergency ramp rate: 7 MW/min
- Current loading: 158 MW

■ Event parameters:

- Event start time: 11:00
- Expected output: 205 MW
- Actual output at 11:10: 204 MW
- Actual output at 11:11: 207 MW

■ Event results:

- Tolerance: $205 - \max(2\% * (205 - 158), 1) = 204$ MW
- Actual output at 11:11 is greater than the tolerance, so unit passes

Example 4: Spinning Reserve Provider

Unsuccessful Event

■ Resource characteristics:

- Type: Spinning reserve provider
- Emergency ramp rate: 7 MW/min
- Current loading: 223 MW

■ Event parameters:

- Event start time: 12:00
- Expected output: 281 MW
- Actual output at 12:10: 274 MW
- Actual output at 12:11: 275 MW

■ Event results:

- Tolerance: $281 - \max(2\% * (281 - 223.4)) = 279.84$ MW
- Actual output at 12:11 is less than the tolerance, so unit fails

Results of Example Performance

- **The reserve providers in Examples 1 and 3 passed because the output 11 minutes after the event was initiated was greater than the tolerance**
 - Resource in Example 1 exceeded the tolerance by the 10th minute, and exceeded the expected output by the 11th minute
 - Resource in Example 3 met the tolerance by the 10th minute, and exceeded the expected output by the 11th minute
- **The reserve providers in Examples 2 and 4 failed because the output 11 minutes after the event was initiated was less than the tolerance**
 - Resource in Example 2 was 2 MW short of the tolerance and 3 MW short of the expected output at the 11th minute
 - Resource in Example 4 was less than 5 MW short of the tolerance and approximately 6 MW short of the expected output at the 11th minute
- **A review of performance data indicates that unit performance categorized as “fail” often represents a small magnitude of under performance (see slides 17 through 20)**
 - Small degrees of underperformance do not necessarily indicate that units are not capable of providing reserves when called upon in real time
 - The NYISO does not believe that minimal underperformance is an indication of general “poor” performance

Supplemental Reserve Pickup Event Performance Data

RPU Event Performance Results

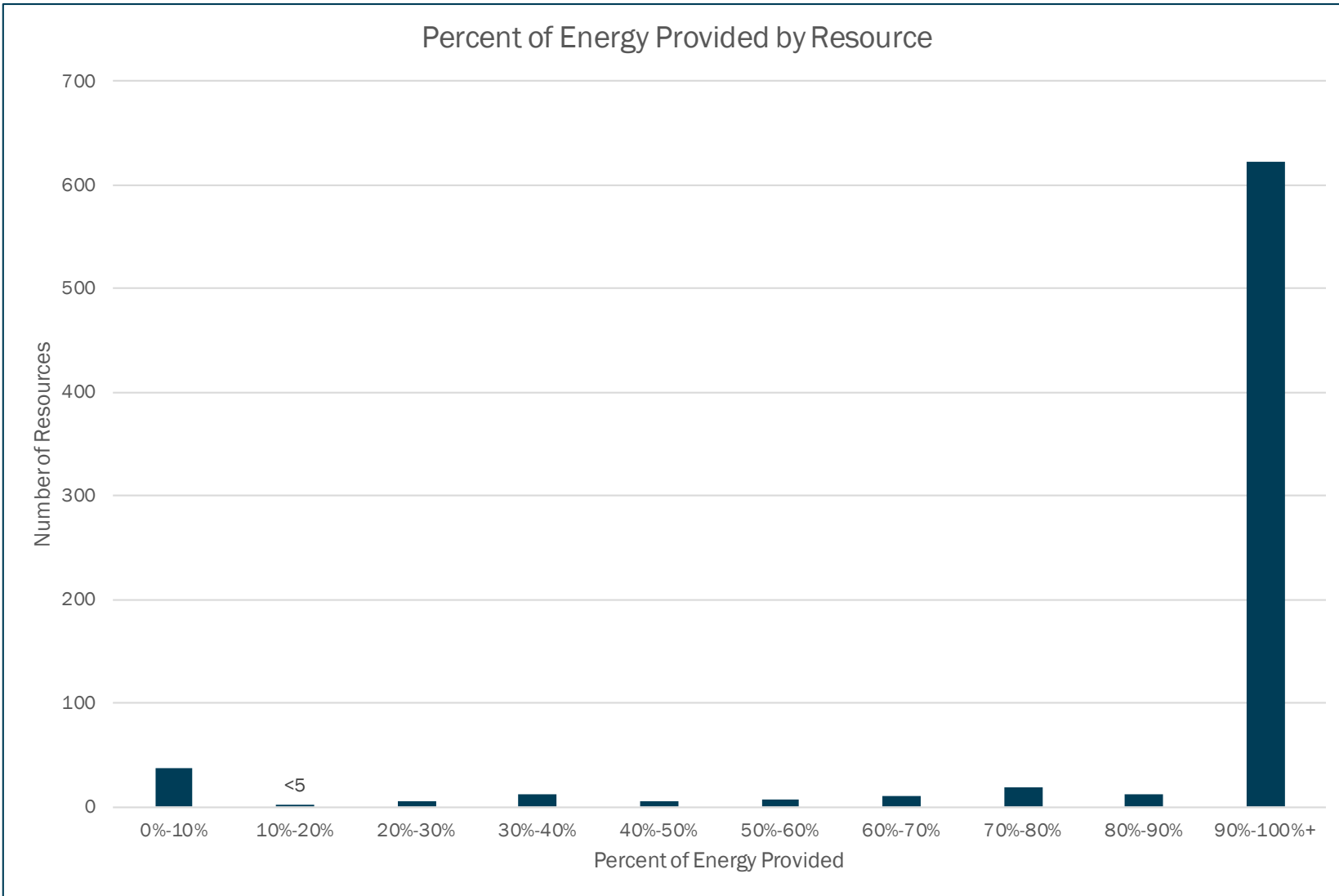
- The below tables summarize the results of NYISO's analysis
 - Time Period: November 2018 through November 2019
 - Of the 21 GTs with failed performance during a RPU event, 5 were due to a failed start

Pass and Fail Rates During a RPU				
	Pass	Fail	Total	Pass %
GTs	136	21	157	87%
All Resources	619	113	732	85%

Total Quantity of Energy Expected and Provided During a RPU			
	Total Energy Expected (MW)	Total Energy Provided (MW)	Percent of Energy Provided
GTs	5,122	5,031	98%
All Resources	17,678	21,319	121%

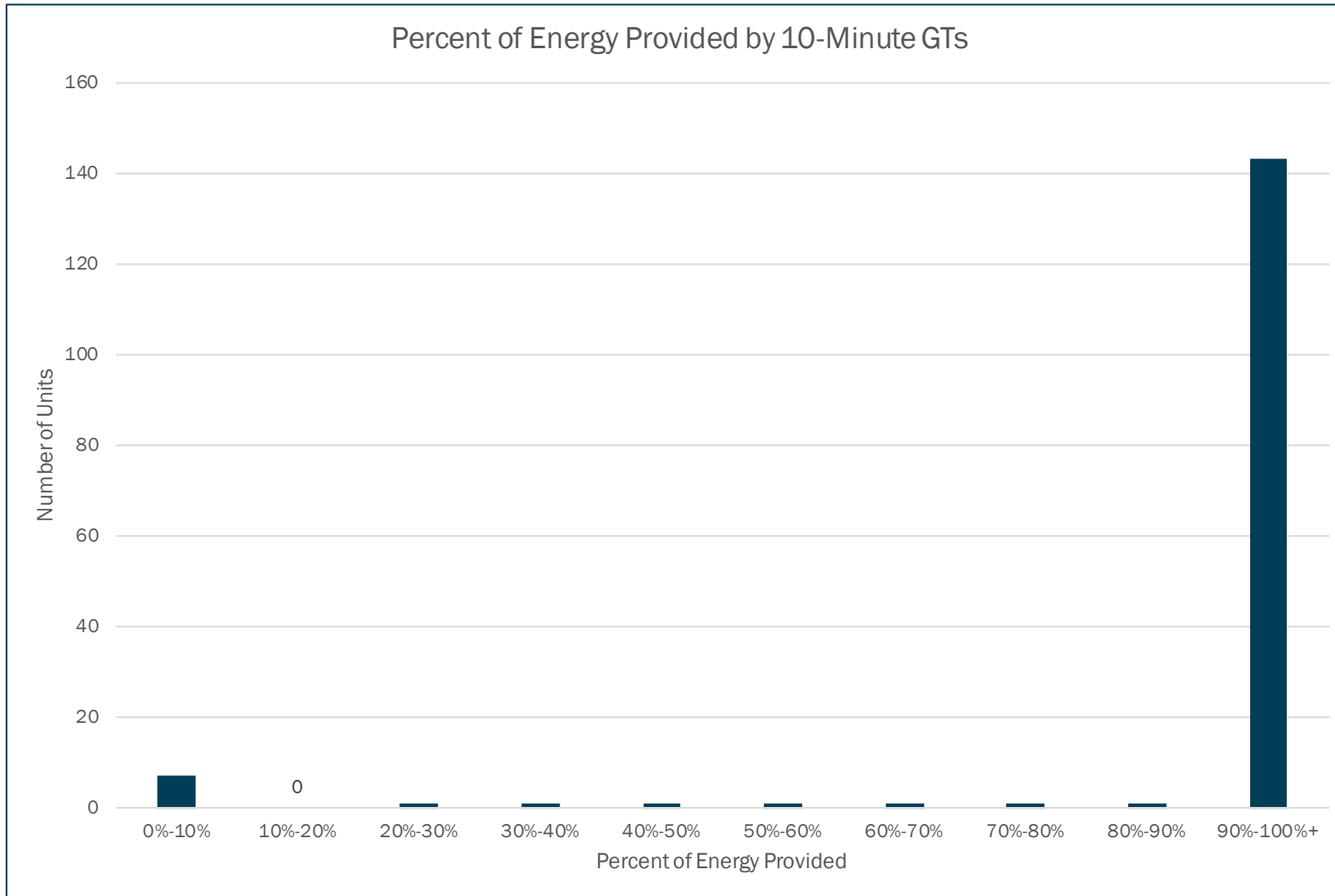
Note: These tables have not changed since last presented at the [February 10, 2020 MIWG/ICAPWG](#).

Percent of Energy Provided



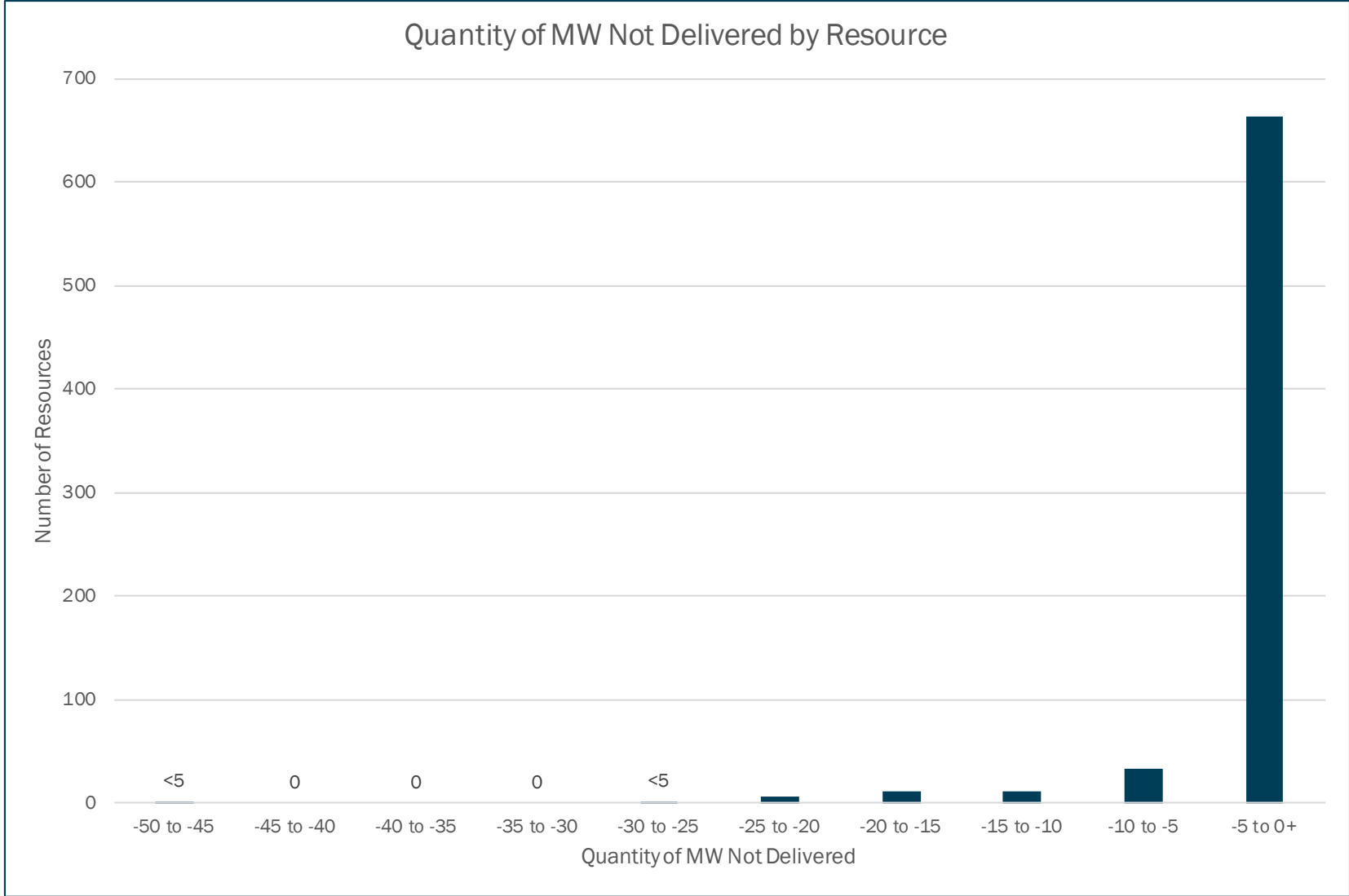
- This graph shows the distribution of the percent of energy (total energy provided/total energy expected) provided by each reserve provider that was asked to convert reserves to energy when an RPU was activated in real time
 - 87 RPUs occurred between November 2018 and November 2019
 - There were 732 unique instances in which a resource was asked to convert reserves to energy
 - For GTs, total energy provided was measured at the 11th minute after the start of the RPU. For all other resources, total energy provided was measured one minute after the end time of the RPU
- This graph shows that 85% of the time, resources provided more than 90% of total energy expected

Percent of Energy Provided by GTs



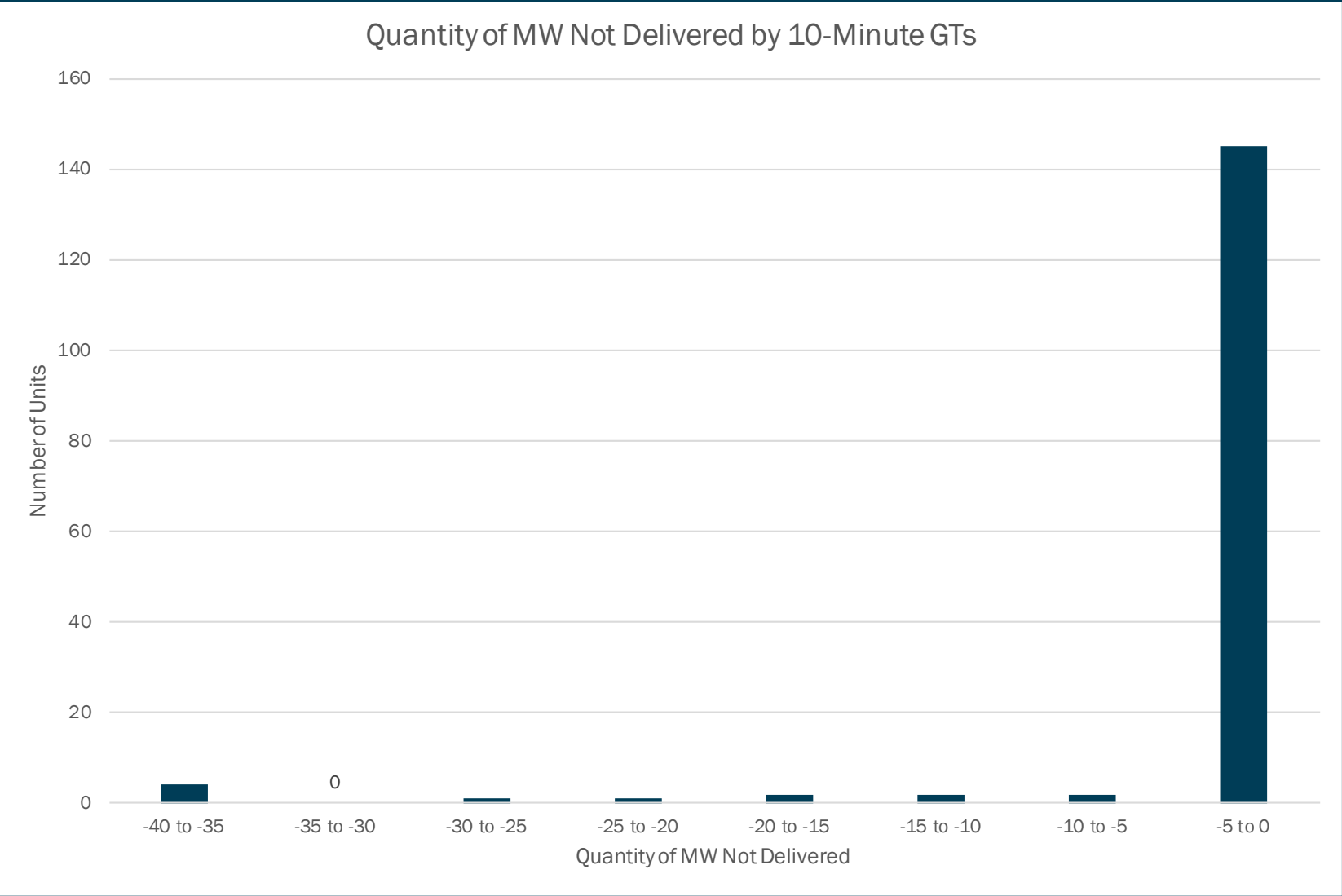
- This graph shows the distribution of the percent of energy (total energy provided/total energy expected) provided by 10-Minute GTs when asked to convert reserves to energy when an RPU was activated in real time
 - 87 RPUs occurred between November 2018 and November 2019
 - There were 157 unique instances in which a GT was asked to convert reserves to energy
 - Total energy provided was measured at the 11th minute after the start of the RPU
- This graph shows that **91% of the time, units provided more than 90% of total energy expected**

Quantity of MW Not Delivered



- This graph shows the distribution of the quantity of MW not delivered (total energy expected minus total energy provided) for each reserve provider when asked to convert reserves to energy when an RPU was activated in real time
 - 87 RPUs occurred between November 2018 and November 2019
 - There were 732 unique instances in which a resource was asked to convert reserves to energy
 - For GTs, total energy provided was measured at the 11th minute after the start of the RPU. For all other resources, total energy provided was measured one minute after the end time of the RPU
- This graph shows that 91% of the time, a resource met, exceeded, or missed its expected energy by less than 5 MW

Quantity of MW Not Delivered by GTs



- This graph shows the distribution of the quantity of MW not delivered (total energy expected minus total energy provided) for 10-Minute GTs when asked to convert reserves to energy when an RPU was activated in real time
 - 87 RPUs occurred between November 2018 and November 2019
 - There were 157 unique instances in which a GT was asked to convert reserves to energy
 - Total energy provided was measured at the 11th minute after the start of the RPU
- This graph shows that 92% of the time, a unit met, exceeded, or missed its expected energy by less than 5 MW

Reserve Provider Audit Process

Reserve Audits: Actions in the Event of Unsuccessful Performance

- **Technical Bulletin 142 outlines NYISO's process for handling unsuccessful performance during a reserve audit**
 - If a resource does not perform, or performs poorly, it will fail the audit
 - The NYISO may derate the response rate and/or UOLN of a reserve supplier that fails audit
 - The resource will have the opportunity to propose a correction process to the NYISO
 - Resources are expected to provide a written explanation that describes the reason(s) for the failure and a corrective action plan
 - Written explanation is required to be submitted with 5 business days after a resource receives a copy of its audit report
 - The resource will not be scheduled to supply reserves until it passes a subsequent audit
 - Often, a resource will be able to identify the cause of a failed audit and successfully retest within 24 hours
- **Section 15.4.3.5 of Rate Schedule 4 of the Market Administration and Control Area Services Tariff also provides the NYISO authority to disqualify reserve providers for consistent failures to perform when called upon to convert to energy**

For more information, please see [Technical Bulletin 142](#)

Reserve Audits: Actions in the Event of Unsuccessful Performance (continued)

- **The NYISO has previously committed to implementing the following enhancements to the audit process:**
 - Increasing the number of reserve audits that it conducts, seeking to audit all reserve providers at least once per year
 - Using the analysis of RPU event performance in conjunction with reserve audits to:
 - Evaluate the performance of reserve providers
 - Assess the need for remedial action for addressing any demonstrated performance concerns
 - Reviewing the procedures for actions taken in response to demonstrated performance concerns, including limitations/restrictions on a resource's continued ability to provide reserves
 - The procedures outlined in Technical Bulletin 142 have been efficient to determine causes of unsuccessful performance during a reserve audit and to implement corrective actions
 - At this time, NYISO is not recommending any changes to its existing procedures for responding to poor performance

Next Steps

Reserve Provider Performance: Next Steps

- **The NYISO will use analysis of RPU performance in conjunction with reserve audits to continuously evaluate the performance of reserve providers and assess the need for remedial action for addressing any demonstrated performance concerns**
 - As previously described, the NYISO will on a going forward basis provide additional reserve provider performance reporting at SOAS and MIWG meetings
 - The NYISO will provide this additional performance reporting at least once per Capability Period
- **The NYISO does not recommend the development of a performance metric or other reserve payment discounting mechanism at this time**
 - The NYISO will proceed with implementing the reserve provider audit and performance reporting enhancements previously discussed to facilitate its ongoing evaluation of performance
 - The proposed enhancements are further described in the presentation given at the November 6, 2019 BIC meeting

Questions?

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

