Enhanced Fast-Start Pricing

Updated on October 18, 2019
Changes identified in red text

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Market Issues Working Group

September 26, 2019, Krey Corporate Center

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Agenda

- Objectives
- Background
- Cost Amortization
- Next Steps

Objectives

- **This presentation will:**
  1. Describe key design considerations for start-up and min-gen cost amortization.
  2. Discuss findings from the NYISO's analysis of previous fast-start commitments.
  3. Propose a revised incremental offer curve adjustment.

Background

Background

Date	Working Group	Discussion points and links to materials
05-30-19	Market Issues Working Group (MIWG)	Background information about existing fast-start pricing.

Background

- **On December 21, 2017, FERC found that two elements of the NYISO's existing fast-start pricing may be unjust and unreasonable in a 206 proceeding.[1]**
  - On April 18, 2019, FERC issued an Order concerning fast-start pricing in the NYISO's energy markets. FERC is requiring the NYISO to:
    1. Modify pricing logic to allow fast-start resources' commitment costs (*i.e.*, start-up costs and minimum generation (no-load) costs) to be reflected in prices; and
    2. Allow the relaxation of all dispatchable fast-start resources' economic minimum operating limits by up to 100 percent for the purpose of setting prices.
- **The NYISO must submit its compliance filing by December 31, 2019.**
  - Implementation must be completed by December 31, 2020.

1. See FERC Docket No. EL18-33-000.

Fast-Start Pricing - Today

- **Fast-start pricing logic treats eligible Fixed Block Units as flexible in both the DAM and RTM, enabling them to set price.**
  - In the software pricing ("ideal") dispatches of SCUC, RTC, and RTD, eligible block-loaded resources are treated as if they could be dispatched at any level between zero and their UOL.
    - This enables a Fixed Block Unit to set the LBMP as the marginal unit when that resource would be necessary to provide the next MW of Energy.
  - Fast-start resources are never physically dispatched below their economic minimum operating points.
    - Relaxation of minimum generation constraints occurs only in the ideal dispatch, not the physical dispatch.

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Overview of Fast-Start Pricing Changes

Today

- **Existing fast-start pricing logic relaxes minimum generation constraints of these resource types in the ideal (pricing) dispatch:**
  1. Fixed Block Units that can start up and synchronize to the grid in 30 minutes or less, that have a minimum run time or one hour or less, and that submit economic offers for evaluation.
- **In the ideal dispatch, RTD adds the start-up costs of eligible offline 10-minute Fixed Block Units to their incremental offers, which impacts the LBMP calculation.**
  - 10-minute Fixed Block Units cannot offer minimum generation costs

Future

- **Revised fast-start pricing will extend the existing logic to dispatchable units.**
- **After implementation, fast-start pricing will apply to:**
  1. All resources that can start up and synchronize to the grid in 30 minutes or less, that have a minimum run time of one hour or less, and that submit economic offers for evaluation.
- **Revised fast-start pricing logic will include the start-up and minimum generation costs of all fast-start resources in the LBMP calculation in the ideal dispatch.**
- **Revised fast-start pricing logic will also apply in the withdrawal state, for fast-start resources that are eligible to submit commitment costs.**

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Overview of Fast-Start Pricing Changes in SCUC and RTC

Start-up Time	Type of Unit	Eligible Today?	Eligible After Changes?	Commitment Costs Included in Pricing when Injecting or Withdrawing?
N/A	Continuously dispatchable	N/A	N/A	N/A
30 min or less	Fixed Block Unit	Y	Y	Today: No Future: Yes
	Dispatchable	N	Y	

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Cost Amortization

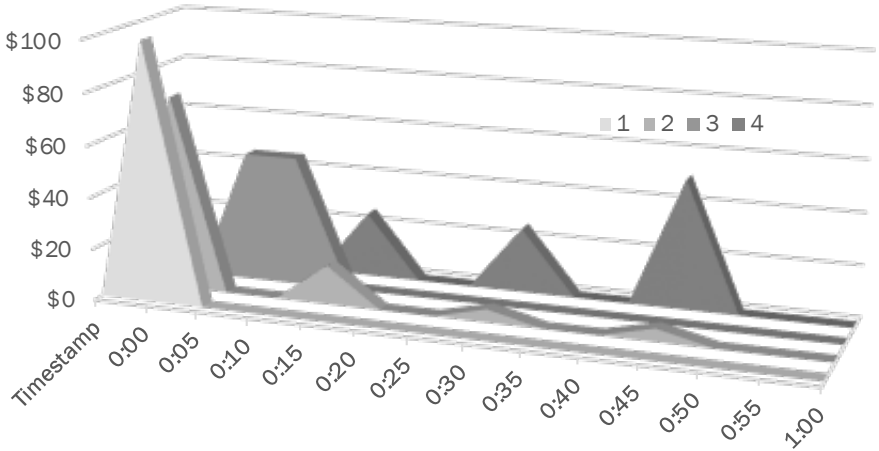
Cost Amortization

- Today, the NYISO uses a front loaded method for amortizing start-up costs when 10-minute offline GTs set LBMPs[1].
- In its initial brief, the NYISO stated that it would adjust the incremental energy offer curves of fast-start units to:
  - Incorporate start-up costs during each fast-start unit's minimum run time.
  - Incorporate minimum generation costs for the duration of the run time.
- In its April 2019 order, FERC allowed the NYISO to seek stakeholder feedback on a cost amortization methodology.
  - The presentation will discuss approaches to amortizing commitment costs for both Fixed Block and dispatchable fast-start units.

1. For more information on offline GT pricing, please refer to the presentation below: https://www.nyiso.com/documents/20142/1404014/agenda_06_pres_re_rtd_gt_treatment.pdf/3c2d9156-54ca-6af8-f20b1a46e803d88

Cost Amortization

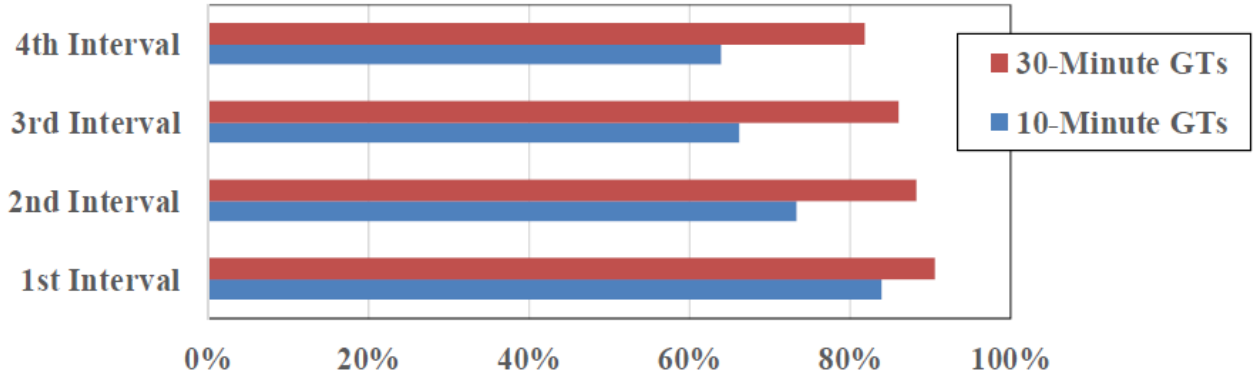
- The NYISO is considering how to allocate start-up ~~commitment~~ costs across the minimum run time period of fast-start resources.
- Example: Generator A is a fast-start unit with a start-up cost of $50 and a Minimum Generation cost of $50. Its minimum run time is 1 hour.
  - How should the $100 of commitment costs for Generator A be allocated across its minimum run time (1 hour)?
- The NYISO has analyzed historical data, reviewed the practices of other ISO/RTO's, and considered feedback from stakeholders.



Example of Commitment Cost Amortization Approaches

Potomac Analysis

- **In its comments, Potomac Economics provided a historical analysis of fast-start GT commitments in 2017[1]**
- **This analysis found that 30-minute GT's were frequently forecasted to displace more expensive resources.**
  - Potomac recommended that the NYISO amortize start-up costs in a front-loaded manner because "this figure strongly suggests that these units have the greatest value early in the commitment period."
  - Potomac also recommended that the NYISO dynamically adjust the amortization weighting based on advisory prices
    - i.e., if advisory prices indicate that the unit was started for an anticipated need in the first 2 intervals, the start-up cost should be fully allocated to those two intervals, rather than spread evenly across the minimum run time.

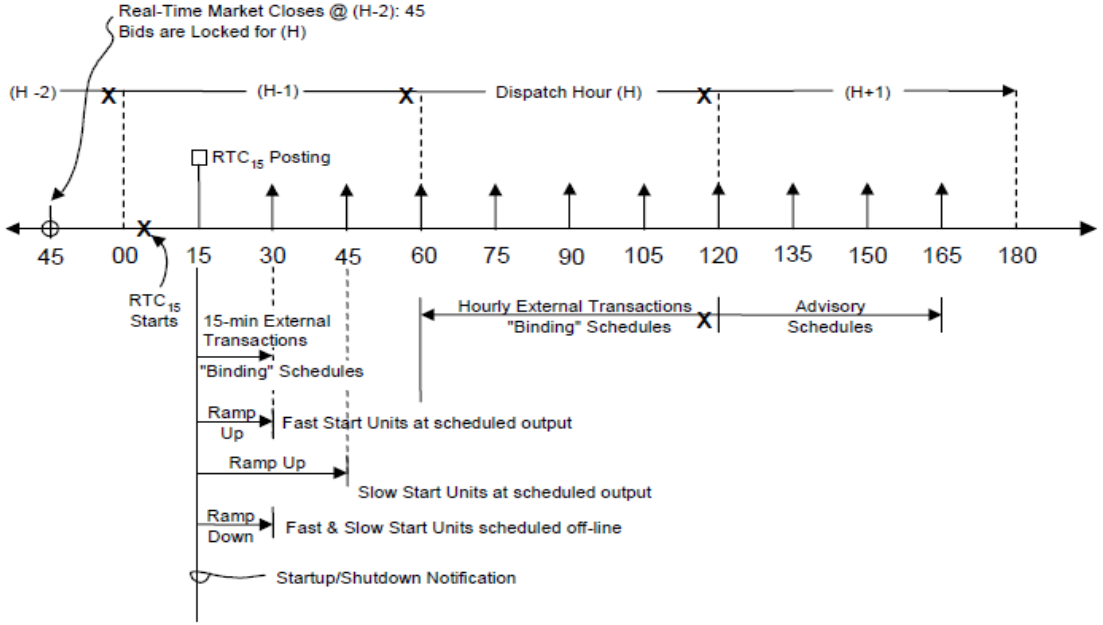


1. See *Comments of the New York ISO's Market Monitoring Unit*, Filed February 13th, 2018 in FERC Docket No. EL18-33-000

NYISO Analysis

- **NYISO staff analyzed start-up data for fast-start units for September 2018 – August 2019**
  - Reviewed and analyzed RTC runs where fast start resources were started.
- **Based on all of the analysis and the existing treatment of offline GT pricing, the NYISO is considering amortizing the start-up costs over the first fifteen minutes after the Fast Start Unit is started.**
  - The data compares the RTC LBMPs for Fast Start Units during their initial commitment
    - For example, when RTC starts a GT compare the RTC LBMPs of each of the first four time steps (see next slide for RTC sequence reference)
      - 1st time step (0 minutes)
      - 2nd time step (15 minutes)
      - 3rd time step (30 minutes)
      - 4th time step (45 minutes)
    - The comparison is a percent delta between the RTC LBMP at 0 minutes and the other 3 RTC LBMPs

RTC Sequence



Source: NYISO Transmission and Dispatching Operations Manual,
https://www.nyiso.com/documents/20142/2923301/trans_disp.pdf/9d91ad95-0281-2b17-5573-f054f7169551

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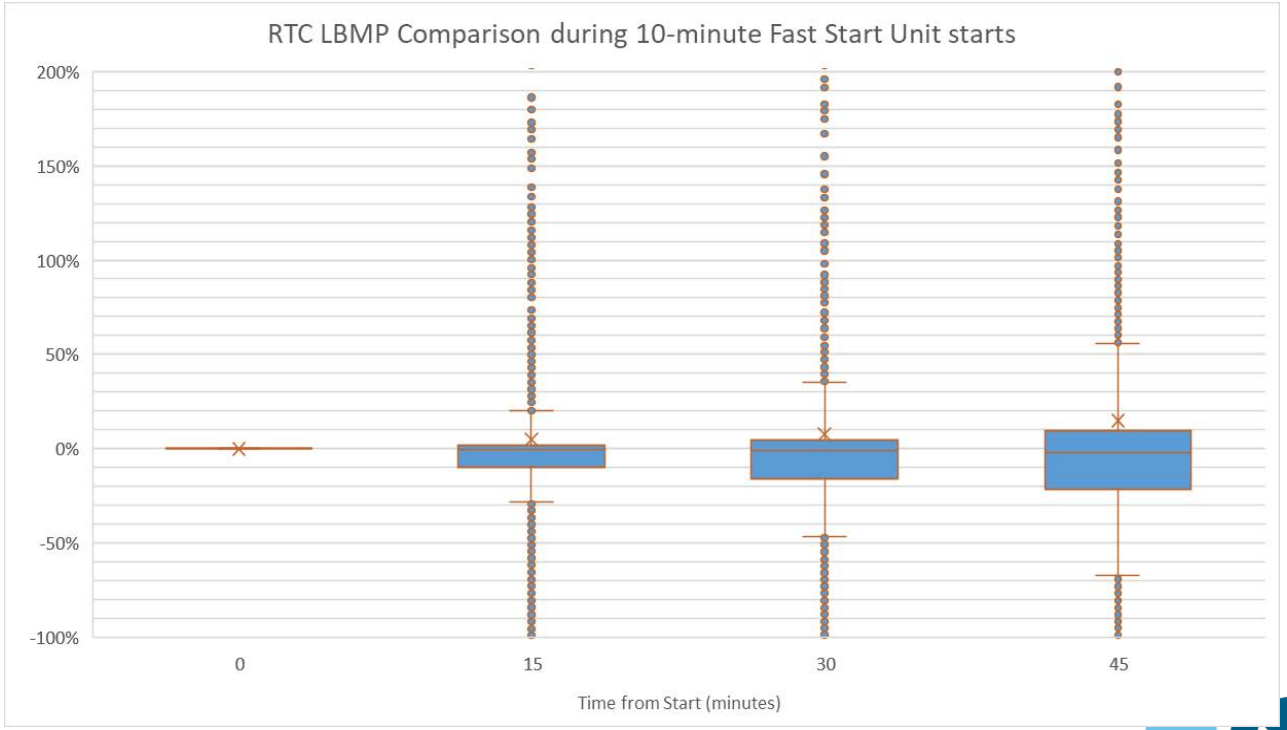
NYISO Analysis of RTC LBMPs during GT Starts



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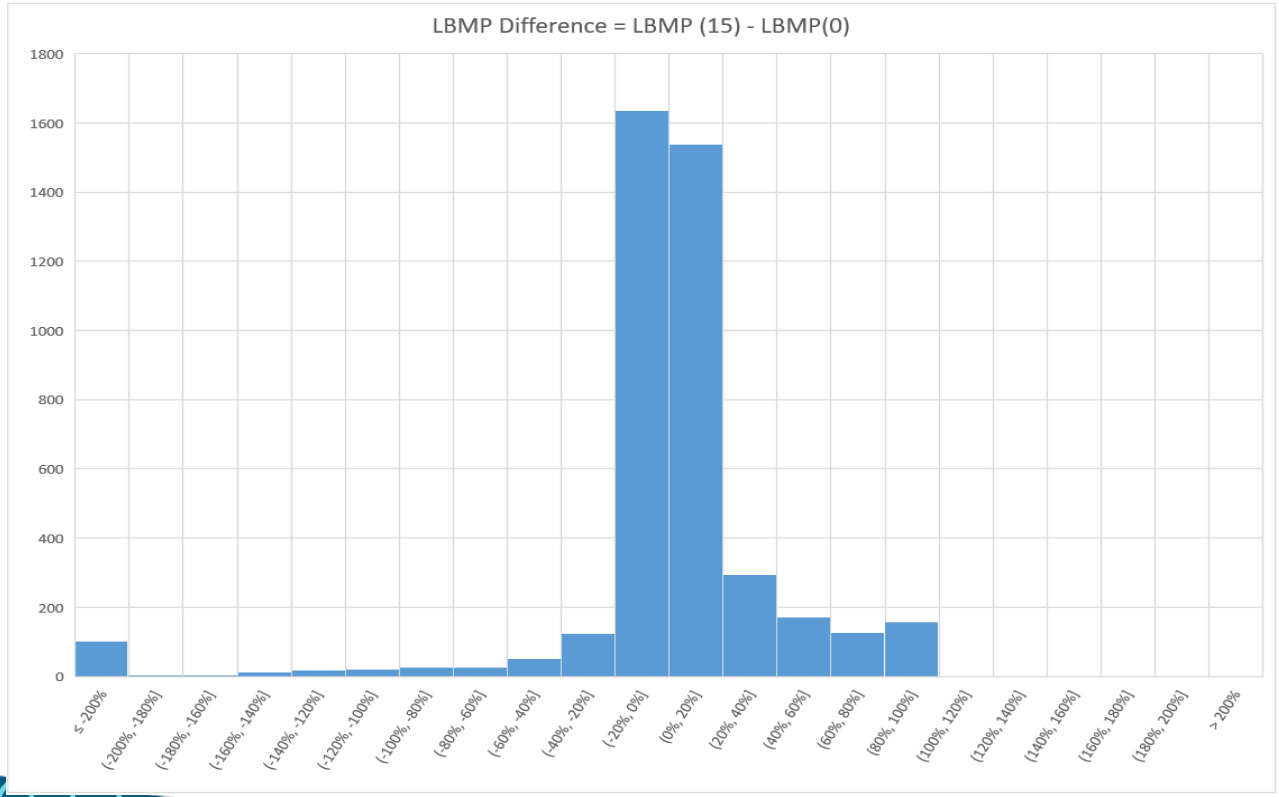
Histogram for LBMP Comparison

15-minutes from start of the GT



New Slide

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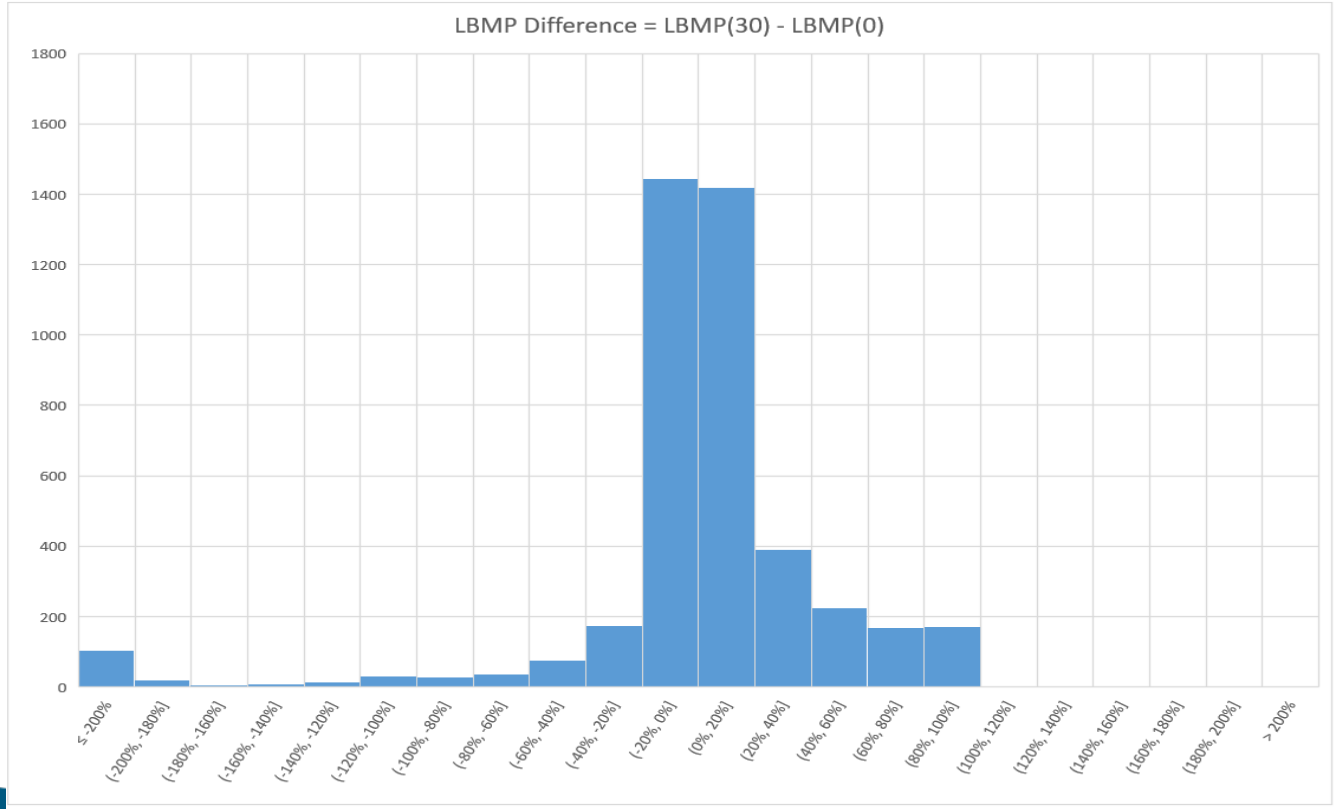
Histogram for LBMP Comparison

30-minutes from start of the GT



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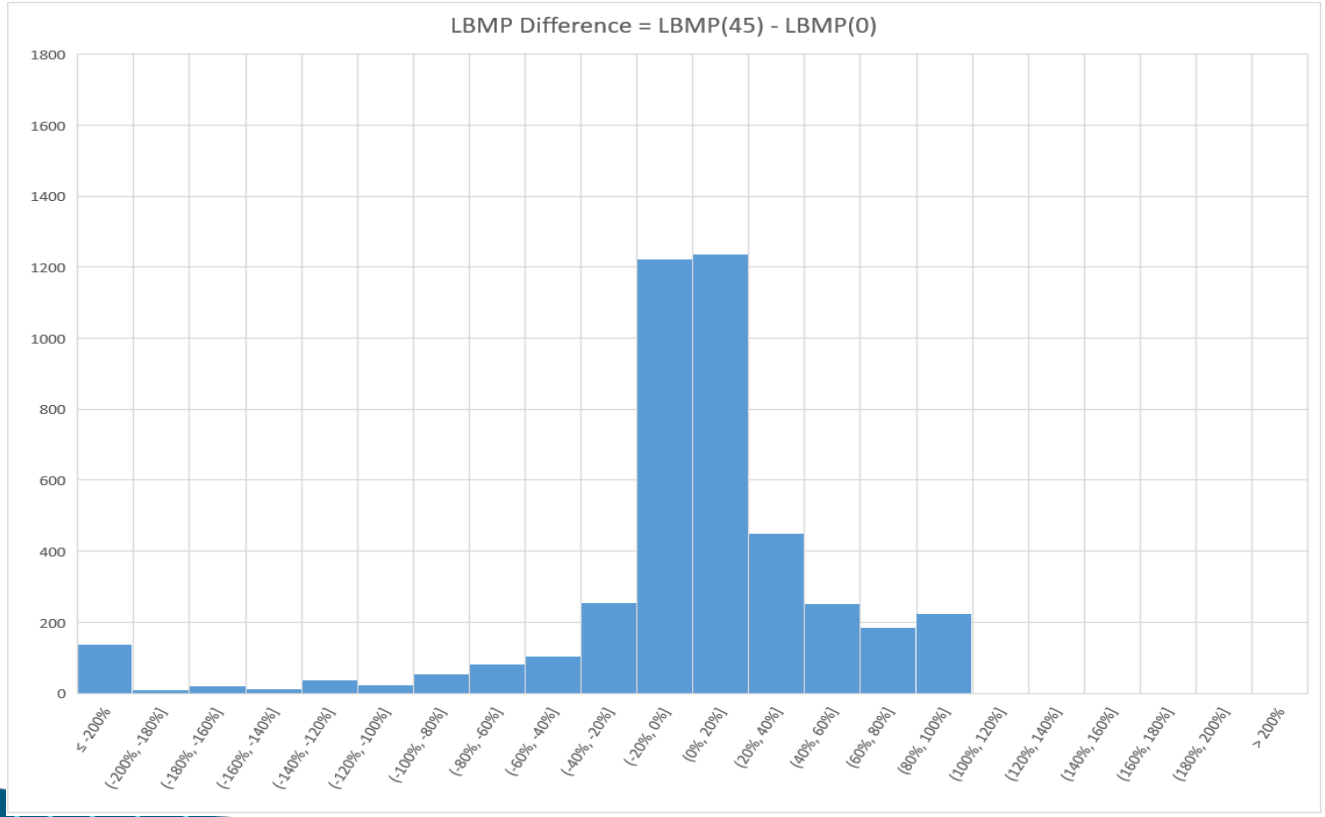
Histogram for LBMP Comparison

45-minutes from start of the GT



New Slide

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Incremental Offer Curve

Adjustment Methodology

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Incremental Offer Curve Adjustment

- **In its initial brief, the NYISO proposed a simple methodology to incorporate commitment costs into the incremental cost curve of fast-start resources in the ideal pass:**
  1. A fast-start resource would submit an offer with minimum generation costs and MWs, start-up costs, and incremental cost components
  2. The NYISO would determine how the minimum generation costs and start-up costs should be adjusted prior to adding these costs to the incremental energy cost curve.
  3. The NYISO would add the minimum generation cost adjustment to the no-load point and, when appropriate, the start-up cost to the incremental energy curve to calculate LBMPs.
- **An example is provided on the following slides**

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Incremental Offer Curve Adjustment - Example

1. A dispatchable, fast-start resource will submit an offer with minimum generation costs and MWs, start-up costs, and incremental costs components

Sample Resource Offer			
Upper Operating Level (MW)	100	Incremental Costs - Block 1 ($/MWh)	$ 30.00
		Incremental Level - Block 1 (MW)	91
Minimum Generation Costs ($/hr)	$ 4,000.00	Incremental Costs - Block 2 ($/MWh)	$ 40.00
Minimum Generation Level (MW)	90	Incremental Level - Block 2 (MW)	95
		Incremental Costs - Block 3 ($/MWh)	$ 50.00
Start-up Costs ($)	$ 400.00	Incremental Level - Block 3 (MW)	100
Minimum Run Time (hr)	0.5		

Incremental Offer Curve Adjustment - Example

2. The NYISO would determine how the minimum generation costs and start-up costs should be adjusted prior to adding these costs to the incremental energy cost curve.

Determining Offer Adjustments		
No-Load Costs ($/hr)	$ 1,300.00	[Minimum Generation Costs]-([Incremental Costs - Block 1]*[Minimum Generation Level])
Amortized No-Load Costs ($/MWh)	$ 13.00	([Minimum Generation Costs]-([Incremental Costs - Block 1]*[Minimum Generation Level]))/[Upper Operating Limit]
Amortized Start-up Costs ($/MWh)	$ 8.00	[Start-up Costs]/([Upper Operating Level]*[Minimum Run Time])

Incremental Offer Curve Adjustment - Example

3. The NYISO would add the minimum generation cost adjustment to the no-load point and, during the startup period (up to minimum run time), the start-up cost to the incremental energy curve to calculate LBMPs.

Adjusted Offer used for Price Setting during Minimum Run Time Period		
Adjusted Incremental Costs - Block 1 ($/MWh)	$ 51.00	[Incremental Costs - Block 1]+[Amortized No-Load Costs]+[Amortized Start-up Costs]
Incremental Level - Block 1 (MW)	91	
Adjusted Incremental Costs - Block 2 ($/MWh)	$ 61.00	[Incremental Costs - Block 2]+[Amortized No-Load Costs]+[Amortized Start-up Costs]
Incremental Level - Block 2 (MW)	95	
Adjusted Incremental Costs - Block 3 ($/MWh)	$ 71.00	[Incremental Costs - Block 3]+[Amortized No-Load Costs]+[Amortized Start-up Costs]
Incremental Level - Block 3 (MW)	100	

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Incremental Offer Curve Adjustment - Example

3. The NYISO would add only the minimum generation cost adjustment to the no-load point after the minimum run time to the incremental energy curve to calculate LBMPs.

Adjusted Offer used for Price Setting after Minimum Run Time Period		
Adjusted Incremental Costs - Block 1 ($/MWh)	$ 43.00	[Incremental Costs - Block 1]+[Amortized No-Load Costs]
Incremental Level - Block 1 (MW)	91	
Adjusted Incremental Costs - Block 2 ($/MWh)	$ 53.00	[Incremental Costs - Block 2]+[Amortized No-Load Costs]
Incremental Level - Block 2 (MW)	95	
Adjusted Incremental Costs - Block 3 ($/MWh)	$ 63.00	[Incremental Costs - Block 2]+[Amortized No-Load Costs]
Incremental Level - Block 3 (MW)	100	

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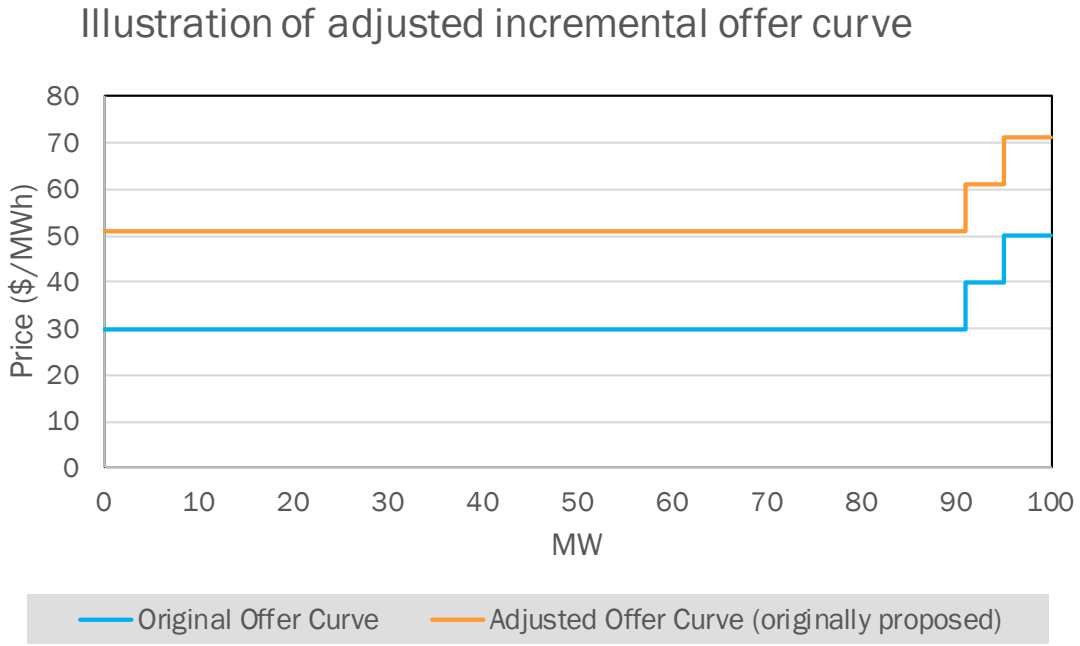
Incremental Offer Curve Adjustment - Example



- This figure shows a representation of the offer curve that the NYISO proposed in its initial compliance filing.
- This figure illustrates the scenario on #Slide 21

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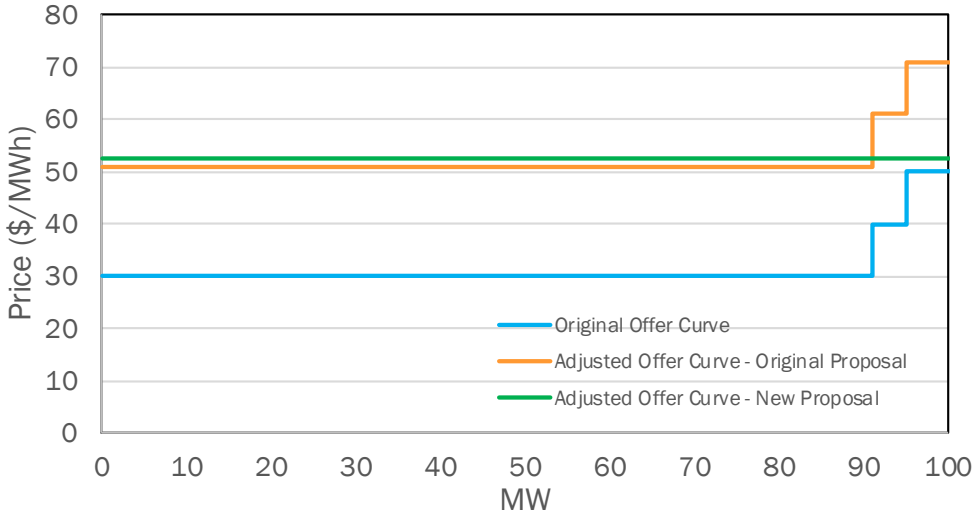
Revised Incremental Offer Curve Adjustment

- **Atlantic Economics proposed an alternative methodology that would require one additional step:**
  1. A fast-start resource would submit an offer with minimum generation costs and MWs, start-up costs, and incremental cost components
     a) The NYISO would then calculate the average production cost in $/MWh for each step of the incremental offer curve, and determine which step in the curve has the minimum average cost.
  2. The NYISO would determine how the minimum generation costs and start-up costs should be adjusted prior to adding these costs to the incremental energy cost curve.
  3. For points on the offer curve that are less than the minimum average cost, in $/MWh, the NYISO would adjust the offer curve to be equal to the minimum average cost.
     - For points on the offer curve that are greater than the point with the minimum average cost, the NYISO would not make any adjustments.
- **An illustration is provided on the next slide**
- **A write up of the Atlantic Economics proposed alternative method is provided with the meeting materials.**
  This can be found in the comments TOs filed in their response to NYISOs filing

Revised Incremental Offer Curve Adjustment

- **Illustration of revised incremental offer curve adjustment:**
  - Assumption: the lowest average production cost is $52.4/MWh
  - Since the lowest average production cost is greater than the production cost at all segments of the curve, all of them are adjusted.



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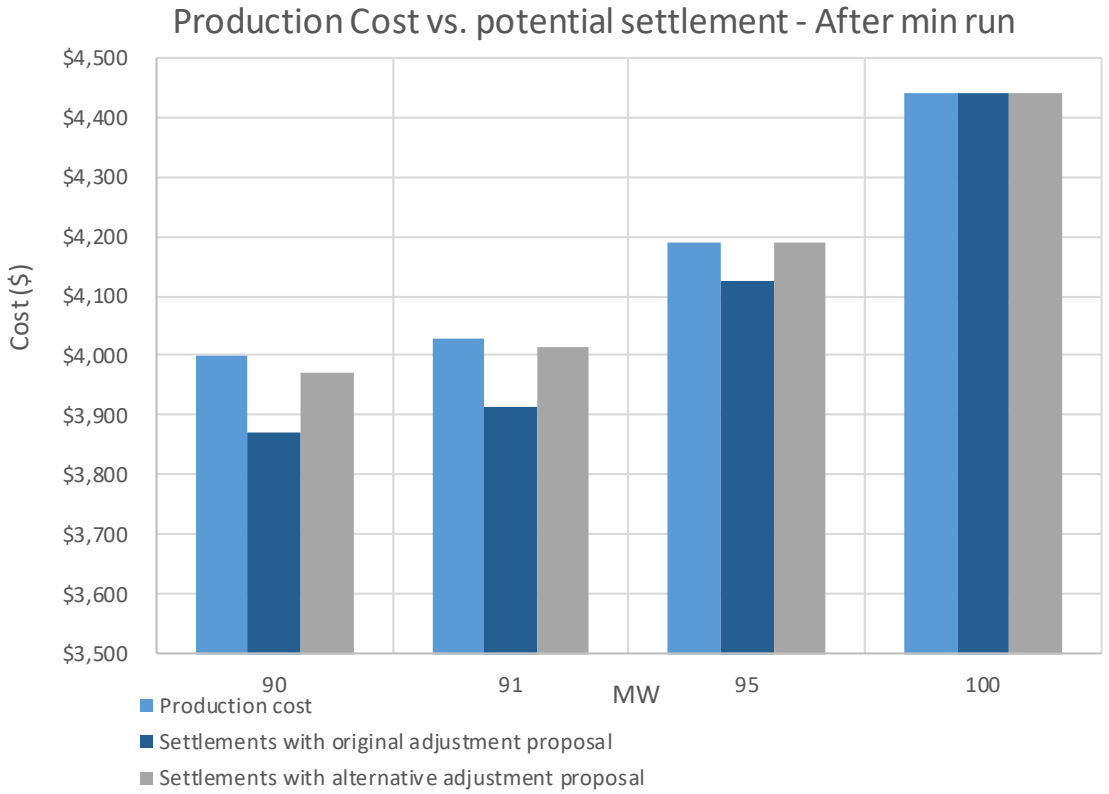
Revised Incremental Offer Curve Adjustment

- The NYISO proposes to adopt the alternative method, because it should:
  1. Reduce gaming opportunities resulting from manipulation of the minimum generation and startup cost blocks
  2. Promote better convergence between ideal and physical dispatch
  3. More accurately reflect commitment costs in pricing.
- This approach is not expected to impact solve times or add significant complexity to implementation

Revised Incremental Offer Curve Adjustment



- The bar chart illustrates one scenario, in which the production cost would significantly exceed the potential settlement using the originally proposed offer curve adjustment in certain intervals.
  - In other intervals studied, the originally proposed offer curve adjustment significantly understated production costs.
- In contrast, the alternative method would result in a settlement that is much closer to production costs, and therefore, results in better convergence between the ideal and physical dispatch.
- NYISO staff tested a number of different scenarios to ensure that this method works under many initial conditions.

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Other ISO/RTOs

ISO-NE

- **ISO-NE proposed changes to its fast-start pricing practices in 2015.[1]**
  - Defines "fast-start" resources the same way that the NYISO does:
    - Fast-start resources are capable of starting in 30 minutes or less, and have both a minimum run time and minimum down time of one hour or less.
  - Uses a flat no-load cost and start-up cost amortization
    - No-load and start-up cost adjustments are included in the incremental energy bid curve for the pricing pass.
    - These commitment cost adjustments are the same in every interval.
  - Provides a lost opportunity cost payment for dispatchable generators that back down to make room for block-loaded fast-start resources.
    - This payment is intended to deter uninstructed overgeneration.

1. See FERC docket ER15-2716 for ISO-New England's 205 filing on *Revisions to Fast-Start Resource Pricing and Dispatch*

PJM

- **FERC opened a 206 proceeding with PJM and SPP concerning fast-start pricing in 2017, simultaneously with the NYISO.**
  - PJM received a final order on April 18th, 2019.
  - SPP has not received an order to date.
- **PJM was ordered to consider resources that are capable of starting up in 1 hour or less to be fast-start resources.**
  - PJM will amortize start-up and minimum generation costs evenly across the designated operating periods.
  - PJM will provide a lost opportunity cost payment to disincentivize uninstructed overgeneration.

1. See FERC docket EL18-34 for more information about PJM's fast-start pricing plans

Next Steps

Next Steps

- **September 26th, 2019 (today):**
  - Propose consumer impact analysis methodology
- **October 18th, 2019:**
  - Present and discuss consumer impact analysis
  - Present and discuss draft tariff revisions
- **October/November 2019:**
  - Complete tariff revisions
  - Market Design Complete presentation
- **November/December 2019:**
  - Submit compliance filing by 12/31/19

Feedback/Questions?

- Email additional feedback or questions to:
  - Debbie Eckels, deckels@nyiso.com

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