

Niagara Generation Modeling Update

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February 21, 2018

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Background

- In 2016, NYISO implemented a modeling improvement of the Niagara Power Project in the Real-Time and Day-Ahead Markets. The modeling improvement better aligned the market model used for scheduling and pricing with the market model used for assessing constraint flows.
- The purpose of this presentation is to inform Market Participants of additional modeling improvements the NYISO intends on pursuing, and to discuss the implementation timing.
- For details on the changes made in 2016, please see the presentation from the April 5th, 2016 MIWG meeting: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2016-04-05/Niagara_Modeling%20Improvements_MIWG_05APR2016.pdf

Niagara Plant Overview

(from the January 22, 2016 MIWG materials)

Plant Configuration

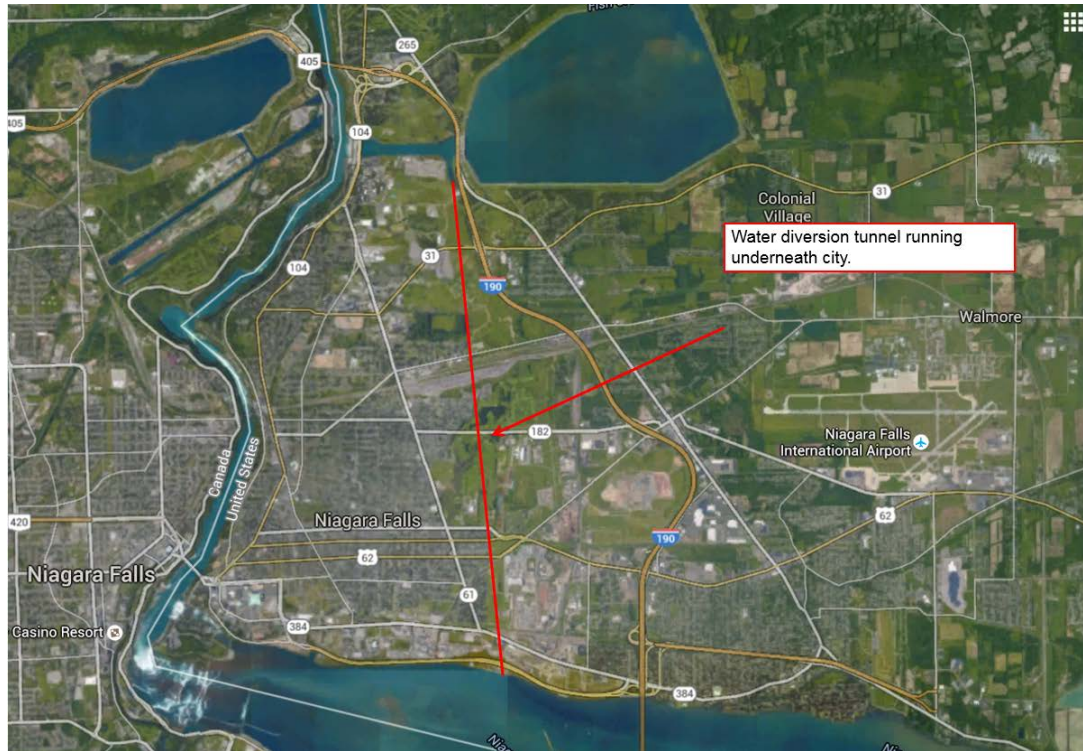
- The Niagara Power Plant is comprised of 25 individual generating units, divided into three distinct points of injection onto the bulk power system:
 - Niagara 230kV Bus:
 - 12 Lewiston Pump Generating units (480MW total)
 - 6 Main Generating units (1290MW total)
 - Niagara 115kV East Bus
 - 4 Main Generating units (860MW total)
 - Niagara 115kV West Bus
 - 3 Main Generating units (645MW total)

Niagara Plant – A bird’s eye view



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Niagara Plant – A bird's eye view



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Plant operating constraints

- **The individual units are subject to strict physical and environmental operating constraints:**
 - The Lewiston units (230kV) cannot be operated without the Main Niagara units (115kV & 230kV) in operation. This is because the Lewiston units' hydraulic output must flow through the other units. As a result, the Lewiston units are hydraulically, and therefore electrically coupled to the Main units.
 - An additional plant constraint is that NYPA must meet requirements governed under an International Treaty that dictates the allowable water diversion for power production.
 - As a result of the hydraulic coupling of the 115kV and 230kV units, there is no ability to establish two unique sets of generating offers for the 115kV and 230kV units that would meet the simultaneous objectives to (a) meet the total plant schedule and, (b) meet the run-of-river requirements of the International Treaty for allowable water diversion.

What was changed in 2016?

Review of the 2016 modeling improvement

- Prior to May 2016, the NYISO market models assumed all Niagara output was injected at the 230kV bus for the purposes of scheduling and pricing through the forward-looking intervals for RTD/RTC/SCUC. The improvement implemented in 2016 involved recognizing the distribution of the plant's output across the three Niagara buses, and maintaining that same distribution throughout the forward time horizon of the RTD/RTC/SCUC models.
 - Plant distribution for the Real-Time Market is based on actual telemetered output from the individual units observed at the time each RTD/RTC execution initializes.
 - Plant distribution for the Day-Ahead Market is generally a single static value applied to all hours based on the previous like day observations (e.g., weekday to previous weekday, weekend to previous weekend day).

Additional improvement planned

What is being enhanced

- **NYISO is planning a modeling improvement that will provide the Real-Time and Day-Ahead Markets greater freedom to distribute the Niagara injections across its three bus locations to solve transmission constraints, subject to the operational limitations of the plant.**
 - In other words, rather than employ a static distribution developed at the time of initialization of RTD/RTC/SCUC for all time steps, the market software will establish its own distribution of the Niagara plant's injections for each time step of their respective optimizations.
- **This modeling change does not alter the Niagara bidding or settlement PTID (23760). The plant will continue to provide a single bid, receive a single schedule, and settle at the LBMP for PTID 23760 reflecting the weighted distribution of each injection point. However, as a result of this modeling change, the way in which the plant's schedule is distributed will impact its schedule and price.**

Why make this change?

- By providing the market software with flexibility to distribute the schedule across the three Niagara buses based on the impacts of injections at each bus, RTD/RTC/SCUC will more effectively resolve transmission constraints with the available generation capability.
- This flexibility is an important prerequisite to securing the Niagara 115 kV transmission constraints in the market models given the significant impacts on those constraints by the Niagara plant. Absent this modeling improvement, the dispatch will not have an effective generator available to solve the 115 kV Western NY transmission constraints.

Next steps

- **NYISO is currently assessing the work involved to activate this modeling improvement in the Scheduling and Pricing algorithms of SCUC, RTC, and RTD.**
- **NYISO will come back to MIWG with detailed examples to review with Market Participants over the coming months, as well as the expected timeline for implementation.**

Questions?

We are here to help. Let us know if we can add anything.

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