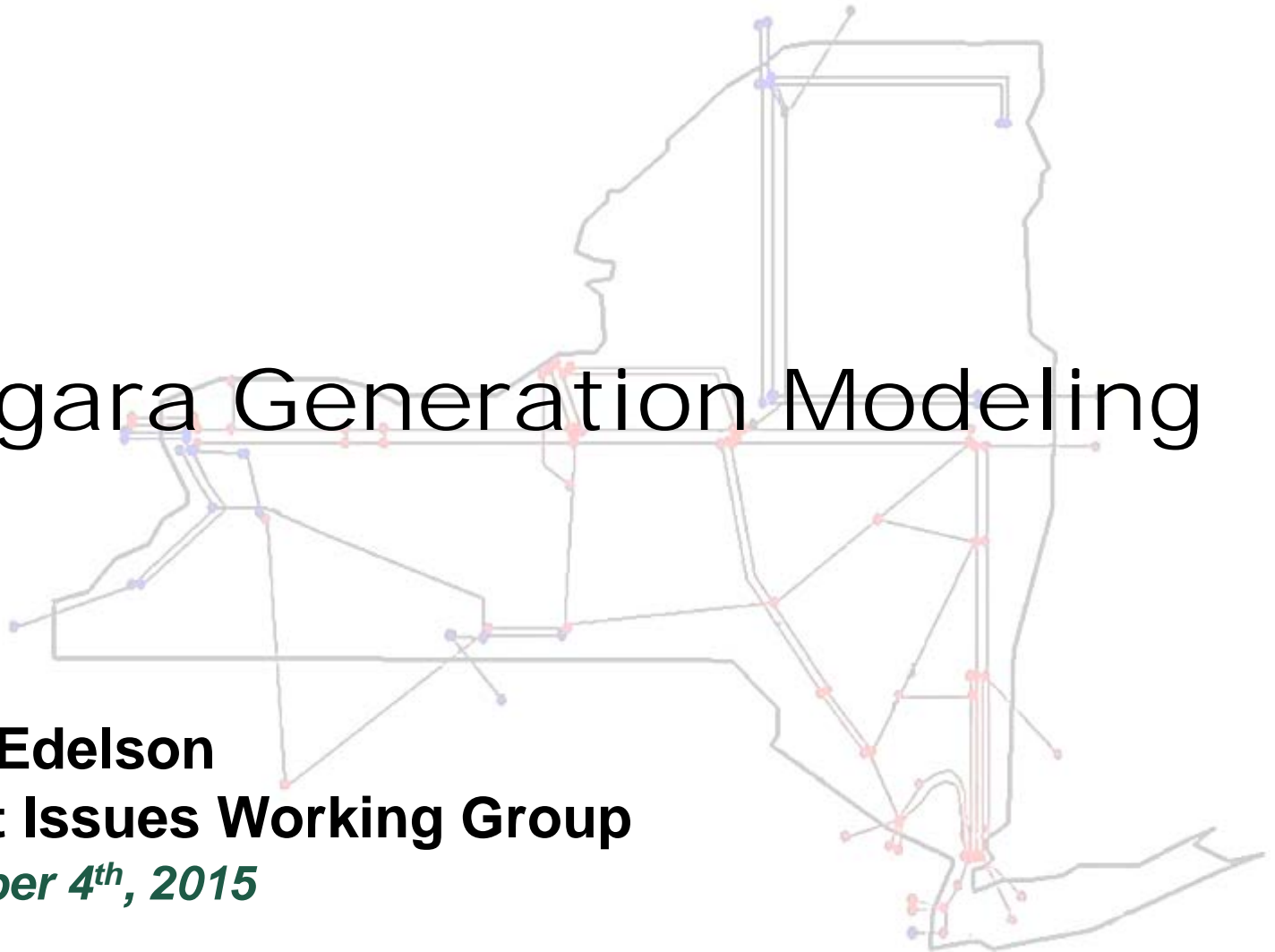


Niagara Generation Modeling

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Purpose

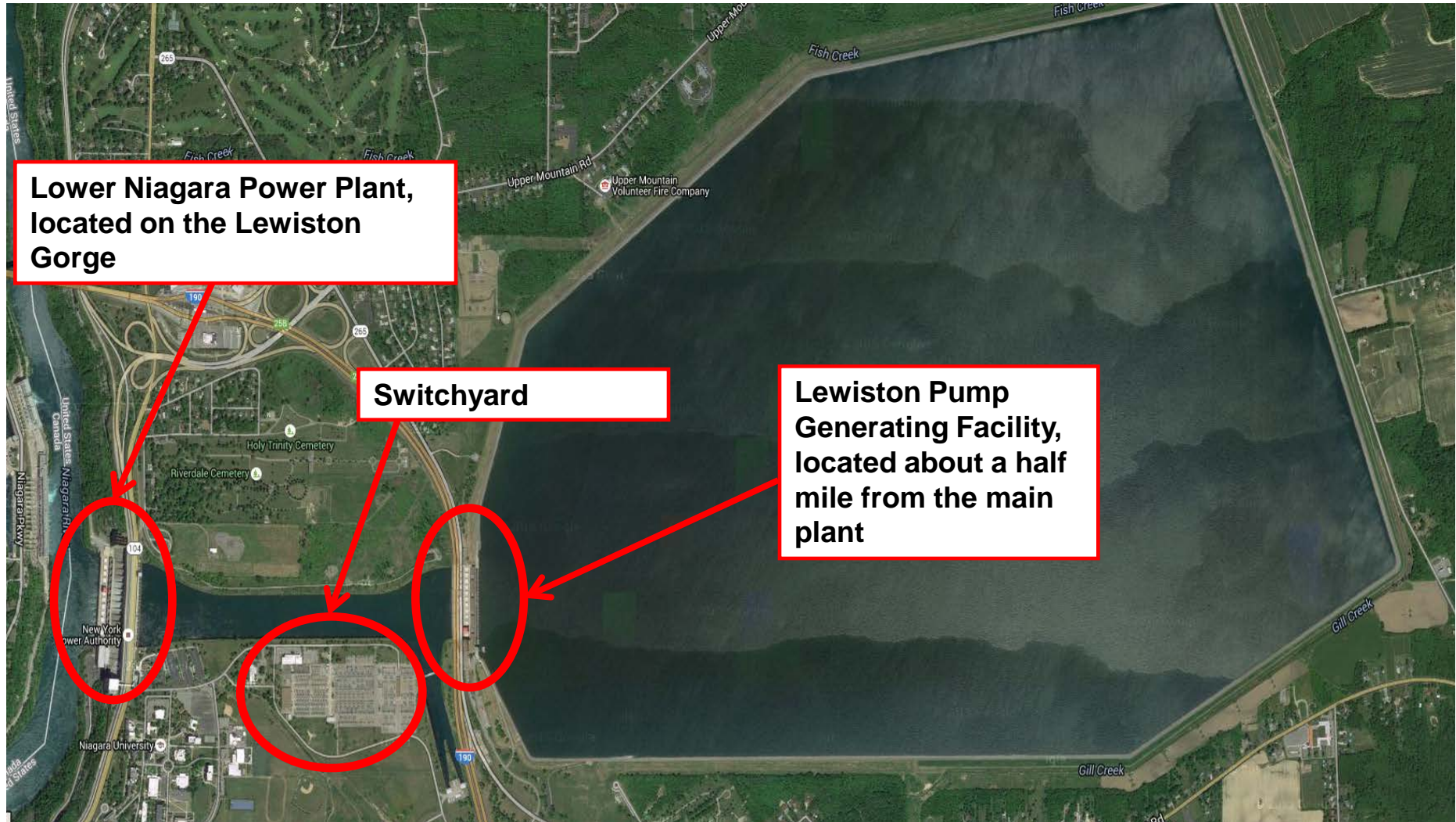
- ◆ **The purpose of this presentation is to begin a discussion with Market Participants on the modeling of the Niagara Power project. Specifically: a) its configuration, b) its impacts on Western NY congestion, c) how it is modeled in the NYISO Markets, and d) ideas to improve the transparency and modeling of the plant.**

Niagara 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)

- ◆ **In the NYISO Energy Markets, the plant is modeled in a distributed fashion to assess constraint flows for transmission security. However, it is represented at a single point of injection for scheduling and pricing purposes. This point of injection is modeled at the 230kV bus. The plant has been operated and scheduled as a single aggregate generator since 1969.**
 - ***The TCC Market employs a distributed plant model for Niagara in both the power flow and scheduling algorithms.***

Niagara Plant – A bird's eye view



Niagara Plant – A bird's eye view



**Water diversion
tunnel running
underneath city.**

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.*

Impacts on transmission constraints

- ◆ **There are several key constraints for which Niagara generation impacts differ between the 230kV and 115kV station units:**
 - *Packard-Sawyer 230kV for I/o Packard-Sawyer 230kV*
 - *Niagara-Packard 230kV #61 for TWR:PACKARD 62 & BP76*
 - *Niagara-Packard 230kV #62 for TWR:NIAGARA 61 & 64*
- ◆ **Increasing output from the Niagara units on the 115kV system tend to relieve these constraints, while increasing output from units on the 230kV system aggravate them.**
- ◆ **NYISO has historically managed these constraints by maximizing production at the 115kV yards to meet the plant's schedule when it would be optimal to do so.**

Discussion – Improved modeling

- ◆ **NYISO is exploring a modeling change that would better reflect the distributed impacts of Niagara.**
- ◆ **The change involves recognizing the current distribution of the plant output for scheduling and pricing. This change would better align the market model used for scheduling and pricing with the market model used for assessing constraint flows.**
 - ***This change would also better align the Energy Market with the TCC Market.***
- ◆ **The purpose of discussing this now with Market Participants is to initiate the dialogue early in this process.**
- ◆ **As we progress through our analysis of this change, we will come back to Market Participants to share results and timelines.**

Discussion – Additional pricing points

- ◆ In order to improve transparency to the Market surrounding the relative impacts each of the Niagara points of injection have on the system, NYISO will begin developing and publishing LBMPs representing the plant's points of injection at the 115kV East and West bus and the 230kV bus. These LBMPs are informational only, and will not replace, nor impact, the existing aggregate Niagara 23760 PTID LBMP that is currently produced.
 - *The three new LBMP points will be:*
 - *NIAGARA_115W_LBMP (323714)*
 - *NIAGARA_115E_LBMP (323715)*
 - *NIAGARA_230_LBMP (323716)*
- ◆ The intention of the three new LBMP points is to more accurately depict the value of energy at each of the Niagara points of injection.

Next Steps

- ◆ **NYISO will continue researching refinements to the way in which Niagara is modeled in the energy markets and will return to a future MIWG with additional information once it becomes available.**

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