Lake Erie Loop Flow Modifications

Tolu Dina

Market Issues Working Group

June 23, 2016

Updated June 27, 2016

DRAFT – FOR DISCUSSION PURPOSES ONLY

Background

- **The purpose of this presentation is to inform market participants of modifications to how Lake Erie Loop Flow values will be initialized in the Real-Time Energy Markets.**
- **The NYISO's Real Time Commitment and Dispatch algorithms currently utilize a snapshot of Lake Erie Loop Flow as calculated at the New York-Ontario border at the start of each run.**
- **This snapshot is used as a starting point to forecast Lake Erie Loop Flow over the optimization horizon.**
- **Potomac Economics has attributed a correlation between the inherent volatility of these snapshots and large Balancing Congestion shortfalls.**
- **The impact of Lake Erie Loop Flow on grid reliability and real-time market resource scheduling and pricing has been exacerbated in recent months.**
- **This has been particularly impactful in Western NY due to prevalent West Zone transmission constraints since the retirement of the Huntley Generating Station at the end of February 2016.**

Ontario-Michigan PARs

- **These PARs are used for controlling Lake Erie Loop Flow within an operating bandwidth of 400MW (+/-200MW).**
- **Monthly averages of Lake Erie Loop Flow are typically close to zero. However, hourly and intra-hour changes in Lake Erie Loop Flow can exceed 400MW.**
- **When actual observed Lake Erie Loop Flow is outside the stated bandwidth, the IESO or MISO operators take taps on the ON/MI PARs to return flow to within the bandwidth.**
- **This process typically occurs within 15 minutes of observing Lake Erie Loop Flow outside the bandwidth.**
- **This manual process in taking taps results in an observed Lake Erie Loop Flow operating range of approximately 600MW (+/-300MW) within an operating day.**
  - ***Transmission Reliability Margins (TRM) are meant to address power flow uncertainties that could result in reliability issues. The TRM for OH and PJM AC interfaces is 300MW, which is about ½ of the potential range of Lake Erie Loop Flow.***
  - ***One possible solution to limit the undesirable impacts of loop flow could involve increasing the TRM for the IESO and PJM interfaces, however, significantly increasing the TRM could reduce the ATC of these interfaces to zero in some hours and is not being considered at this time.***

Issue

- **In their 2015 SOM Report, Potomac identifies Lake Erie Loop Flow (loop flow) as a driver of unnecessary real-time pricing volatility. Potomac also attributes the increase in Balancing Congestion shortfalls from 2014 to 2015 primarily to higher shortfalls accrued on the West Zone lines.**
- **The pricing volatility and higher shortfalls were driven by a number of factors of which loop flow is a significant one.**
- **Unscheduled clockwise loop flow in real-time reduces the transmission capacity available on these lines for internal generation and external transaction imports to satisfy internal load and increases unnecessary pricing volatility.**
- **Large congestion shortfalls are typically coincident with RTD dispatch intervals where the amount of unscheduled clockwise loop flow was significantly higher than the amount forecasted in the corresponding RTC commitment run.**
- **A correlation exists between the severity of West Zone congestion and the magnitude of unscheduled clockwise loop flow and sudden changes in loop flow interval-over-interval in the clockwise direction.**

Example

- **April 13,2016 - large counter-clockwise (CCW) loop flow in RTC that is unrealized in RTD**
  - ***RTC initializes the run scheduling transactions for HB11 with 258MW of CCW loop flow.***
  - ***RTC results show zero congestion in the West zone and no limiting west constraints.***
  - ***RTD initializes the last 3 dispatch intervals of HB11 with loop flow values of 136MW Clockwise (CW), 160MW CW and 201MW CW respectively.***
  - ***RTD results for HB11, from 11:45 through end of hour, had an average of $611/MWh congestion cost in the West zone and limiting west constraints having shadow costs exceeding $1500/MW.***

Modification #1

- **NYISO plans to cap the maximum value of loop flow used to initialize RTC. RTC will initialize with the current loop flow, but will ~~assume that CCW loop flow ramps to 0MW in all intervals~~ not allow the initialized CCW loop flow to exceed 0MW.**
- **The basis for this modification is recognition that over the RTC optimization horizon, the value of loop flow will, on average, trend towards zero.**
- **This modification will limit the impact of CCW loop flow on scheduling decisions by RTC.**
- **Allowing RTC to predict loop flow over its optimization horizon starting from significantly CCW snapshot values and quickly changing to be significantly more clockwise can be very costly to the market and can contribute to reliability concerns in Western NY.**
- **The market models should not rely on a RTC assumption that CCW loop flows will persist over the full RTD optimization horizon in order to achieve the schedules established in RTC.**

Modification #2

- **NYISO plans to cap the maximum value of loop flow assumption change between successive RTD initializations. To start, the cap will be +/-75 MW.**
- **The basis for this modification is recognition that a value of loop flow based on an instantaneous sample may be volatile and not representative of the loop flow over the RTD optimization horizon. If a change in loop flow is sustained, changes of +/-75MW will allow the loop flow impacts to be appropriately considered.**
- **This will limit the impact of the loop flow volatility.**
- **NYISO operators will monitor actual loop flow telemetry versus the RTD assumption and true up the assumption when needed.**
- **Both of the NYISO's proposed modifications will be posted in the Interface Pricing web posting and any future changes to these caps will be updated in the aforementioned posting.**

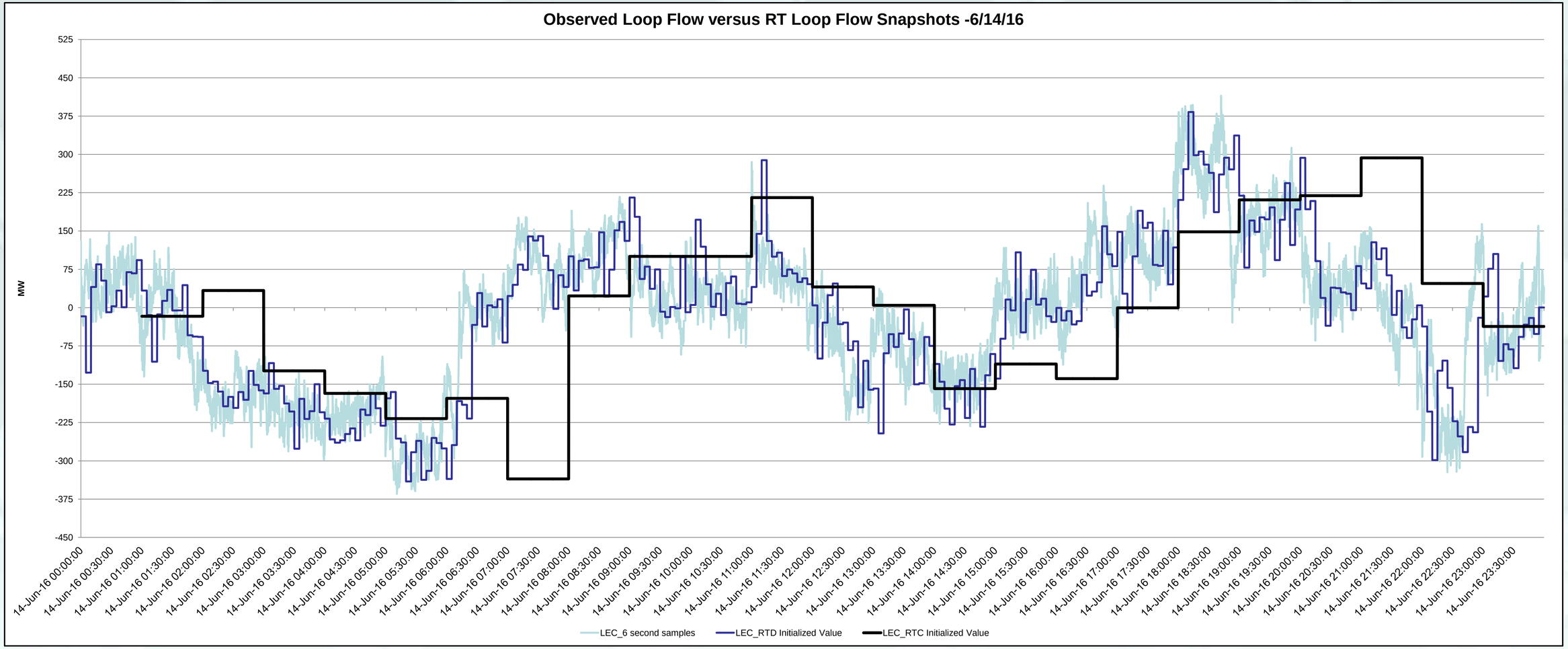
Next Steps

- **The estimated date of implementation is June 28, 2016.**
- **The NYISO will continue to monitor reliability and market outcomes to identify further potential opportunities to improve the market models.**
- **The NYISO will keep stakeholders apprised of its analysis and actions.**
- **A step we have already taken to manage grid reliability concerns on the western NY constraints was to update the Constraint Reliability Margins (CRM) on the Packard-Sawyer 230kV circuits (modified from 20MW to 50MW).**

Appendix A: LEC snapshot clarification

- **Loop Flow Snapshot: the RTC and RTD snapshots of loop flow are instantaneous measurements at the time of initialization for each and every execution run.**
- **The expected unscheduled power flow is determined based on (1) observed Lake Erie Circulation, and (2) the estimated power flow contribution associated with NYISO/PJM and NYISO/IESO scheduled interchange.**
- **See the OASIS Interface Pricing Data file and Section 17.1 of the NYISO's MST for further details.**

Appendix B: Real-Time Loop Flow Chart



The Mission of the New York Independent System Operator, in collaboration with its 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 policy makers, stakeholders and investors in the power system***

www.nyiso.com