NORTH AMERICAN ENERGY STANDARDS BOARD

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July 23, 2019

Filed Electronically

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street N.E., Room 1A
Washington, D.C. 20426

RE: Parallel Flow Visualization Project Status (Docket No. EL14-82-000)

Dear Ms. Bose:

The North American Energy Standards Board ("NAESB") voluntarily submits this report to the Federal Energy Regulatory Commission ("FERC" or "Commission") to update the Commission on the status of the Parallel Flow Visualization effort, an enhanced congestion management process for the Eastern Interconnection. This report provides information from EIDSN, Inc. regarding the completion of the PFV field trial, a timeline for the completion of PFV-related standards development, and the continued coordination efforts of NAESB, EIDSN, Inc., and the North American Electric Reliability Corporation ("NERC").

This report, drafted by NAESB with the support of NERC and EIDSN, Inc., is intended to supplement the previous status reports filed by NAESB on July 11, 2014, January 28, 2015, March 25, 2015, January 29, 2016, October 17, 2016, October 2, 2017, and November 1, 2018. As previously indicated, NAESB will file an additional report with the Commission following the conclusion of the standards development effort. Additionally, NAESB will file intermittent status reports as needed to update the Commission on any delays or changes to the standards development timeline provided in this filing.

Respectfully submitted,

Rae McQuade

Ms. Rae McQuade
President & COO, North American Energy Standards Board

cc: Chairman, Neil Chatterjee, Federal Energy Regulatory Commission
Commissioner, Richard Glick, Federal Energy Regulatory Commission
Commissioner, Cheryl A. LaFleur, Federal Energy Regulatory Commission
Commissioner, Bernard McNamee, Federal Energy Regulatory Commission

Ms. Anna Cochrane, Director, Office of Energy Market Regulation, Federal Energy Regulatory Commission
Mr. James Danly, General Counsel of the Commission, Federal Energy Regulatory Commission
Mr. Andrew Dodge, Director, Office of Electric Reliability, Federal Energy Regulatory Commission
Ms. Jignasa Gadani, Director, Office of Energy Policy and Innovation, Federal Energy Regulatory Commission
Mr. Michael Goldenberg, Senior Attorney, Office of General Counsel, Federal Energy Regulatory Commission

Mr. Jonathan Booe, Vice President and CAO, North American Energy Standards Board
Mr. William P. Boswell, General Counsel, North American Energy Standards Board
Mr. Michael Desselle, Chairman and Chief Executive Officer, North American Energy Standards Board

Mr. James B. Robb, President and Chief Executive Officer, North American Electric Reliability Corporation
Mr. Charles A. Berardesco, Senior Vice President, General Counsel, and Corporate Secretary, North American Electric Reliability Corporation
Mr. Mark Lauby, Senior Vice President and Chief Reliability Officer, North American Electric Reliability Corporation

Mr. Richard J. Mandes, Executive Director, EIDSN, Inc.
Mr. Bryan Wood, Chair of the Interchange Distribution Calculator Steering Committee, EIDSN, Inc.

Enclosures (all documents and links are available publicly on the NAESB website – www.naesb.org)

Appendix A EIDSN Parallel Flow Visualization Metrics Report 2019

Appendix B Parallel Flow Visualization Project Timeline

Appendix C NAESB Full Staffing Process

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

REPORT OF THE NORTH AMERICAN ENERGY STANDARDS BOARD

The North American Energy Standards Board ("NAESB") voluntarily submits this report to update the Federal Energy Regulatory Commission ("FERC" or "Commission") on the Parallel Flow Visualization ("PFV") effort, an enhanced congestion management process being considered within the Eastern Interconnection. This report was drafted with the support of the North American Electric Reliability Corporation ("NERC") and EIDSN, Inc. ("EIDSN") and is intended to supplement the previous status reports concerning the PFV effort filed by NAESB with the Commission on November 1, 2018,[1] October 2, 2017,[2] October 17, 2016,[3] January 29, 2016,[4] March 25, 2015,[5] January 28, 2015,[6] and July 11, 2014.[7] Included as part of this report is information on the completion of the PFV field trial, including the resulting report and analysis provided by EIDSN, the timeline for NAESB to complete the PFV-related standards development process, and the continued coordination efforts of NAESB, NERC, and EIDSN.

The PFV project is an effort by the Eastern Interconnection initiated in 2006 to improve upon its current congestion management procedure by incorporating the use of real-time data into relief obligations calculated by the Interchange Distribution Calculator ("IDC"). The IDC is an industry tool utilized by the Eastern Interconnection to implement NAESB Wholesale Electric Quadrant ("WEQ") Business Practice Standards and NERC Reliability Standards that address the Transmission Loading Relief ("TLR") Procedure. As part of the PFV-related changes to the NAESB WEQ Business Practice Standards, TLR Procedure curtailment priorities would be assigned based on real-time data obtained from one of two methods: the Tag Secondary Network Transmission Service Method that determines curtailment priorities through expanded electronic tagging ("e-tagging") requirements or the Generation Prioritization Method that provides a mechanism for the IDC to use real-time data to assign relief obligations during a TLR event. The current IDC methodology assigns curtailment and relief obligations on a pro-rata basis through

[1] The November 1, 2018 status report is available at the following link: https://naesb.org/pdf4/ferc110118_naesb_pfv_status_report.pdf

[2] The October 2, 2017 status report is available at the following link: https://naesb.org/pdf4/ferc100217_naesb_pfv_status_report.pdf

[3] The October 17, 2016 status report is available at the following link: https://naesb.org/pdf4/ferc101716_naesb_pfv_status_report.pdf

[4] The January 29, 2016 status report is available at the following link: https://naesb.org/pdf4/ferc012916_pfv_status_report.pdf

[5] The March 25, 2015 status report is available at the following link: https://naesb.org/pdf4/ferc032515_pfv_status_report.pdf

[6] The January 28, 2015 status report is available at the following link: https://naesb.org/pdf4/ferc012815_pfv_status_report.pdf

[7] The July 11, 2014 status report is available at the following link: https://naesb.org/pdf4/ferc071114_pfv_status_report.pdf

electronic tags ("e-Tags"), market flows, and network and native load (NNL) calculations. However, the NNL is computed using static information and is based on a default assumption that all generators within the Eastern Interconnection have firm transmission. In some instances, this can cause a deviation between the actual, real-time impacts and the calculated NNL impacts. The PFV enhanced congestion management process replaces the NNL calculations and market flow information with Generation to Load Impact ("GTL"), a calculation of energy flows on a flowgate within a balancing authority's area. Under PFV, curtailment and relief obligations are assigned through e-Tags in a manner consistent with today's IDC methodology or through GTL whereby the IDC tool provides the balancing authority with a targeted megawattage reflective of the assigned TLR. The use of real-time data as part of the PFV enhanced congestion management process provides more detail concerning the factors contributing to congestion, resulting in a more accurate calculation of system impacts and providing Eastern Interconnection reliability coordinators with a better understanding of the current operating state of the bulk electric system through enhanced visibility of the source and magnitude of parallel interchange flows.

On September 28, 2017, EIDSN began conducting a field trial to test the PFV related changes impacting the IDC tool to accommodate the previously referenced modifications to the NAESB WEQ Business Practice Standards. To conduct the PFV field trial, EIDSN created a parallel operations environment, with the PFV enhancement and the IDC tool sharing common interfaces and exchanging data. Although the PFV field trial officially concluded on May 1, 2019, EIDSN plans to continue parallel operations and to collect PFV-related data for benchmark purposes through either industry implementation of the PFV enhanced congestion management process or the project otherwise concludes.

On June 25, 2019, EIDSN provided to NAESB the EIDSN Parallel Flow Visualization Metrics Report 2019.[8] The objective of the report is to evaluate the PFV related modifications to the IDC tool and analyze the accuracy of the proposed PFV enhanced congestion management process.[9] The report was prepared by the EIDSN IDC Working Group ("IDCWG"), which is responsible for the day-to-day management of the IDC tool and PFV field trial and includes an assessment of the data collected from the initiation of the PFV field trial through May 1, 2019. The EIDSN IDCWG report was approved by the EIDSN IDC Steering Committee, to which the EIDSN IDCWG reports and the members of which are the NERC designated reliability coordinators within the Eastern Interconnect. As part of the assessment, the EIDSN IDCWG analyzed the data integrity, measured the ability of the PFV enhanced congestion management process to account for real-time flows on flowgates, and compared the total impacts calculated by the current IDC tool methodology with the total impacts calculated under the PFV enhanced congestion management process. Included in the report are several charts and graphs depicting a visual representation of the data analysis. Through the assessment, the EIDSN IDCWG determined that the PFV enhanced congestion management process is "more favorable than today's IDC with increased accuracy in the accounting for impacts on a flowgate,…[and] [t]he

[8] The EIDSN Parallel Flow Visualization Metrics Report 2019 is included as an attachment to this report as part of Appendix A

[9] EIDSN, *Parallel Flow Visualization Metrics Report 2019* 1 (2019). [Report]

PFV rules and technical calculations assign relief obligations with more effective shifts than the current IDC."[10] Overall, the EIDSN IDCWG concluded that, consistent with its preliminary analysis, the PFV enhanced congestion management process "provides a more accurate model, a better analysis of the impacts on flowgates, assigns relief obligations more accurately, and is a considerable improvement over the current IDC."[11]

As explained in previous status reports, the NAESB WEQ Executive Committee approved the PFV-related NAESB WEQ Business Practice Standards on February 24, 2015 and simultaneously voted to enact the NAESB full-staffing process for this standards development effort.[12] This process is intended to be used for standard development efforts in which the completion of the standards development process is dependent on additional factors, such as the action of an outside organization. Through the implementation of the full-staffing process, the approved business practice standards are being held in abeyance, meaning that the standards have not yet been submitted for ratification. This allowed for EIDSN to conduct the PFV field trial and also provides the NAESB WEQ Business Practices Subcommittee ("BPS") with the ability to modify the standards as needed. At the time of the vote to utilize the full-staffing process, the NAESB WEQ Executive Committee agreed that, regardless if further modifications to the standards were made, the committee would need to vote to re-approve a recommendation on standards development in order to end the full-staffing process and move any adopted standards to the membership ratification process.

Now that EIDSN has completed the PFV field trial and provided the resulting report, NAESB can begin its efforts to complete the standards development process. As indicated in the EIDSN Parallel Flow Visualization Metrics Report 2019, the PFV enhanced congestion management process is working as designed and supported by the standards.[13] Under the coordination process previously agreed to by NAESB, NERC, and EIDSN, the NAESB WEQ BPS and the NERC Operating Reliability Subcommittee ("ORS"), are both responsible for reviewing the report and determining if there are commercial or reliability issues, respectively, that need to be resolved through additional revisions to the standards. After that determination, the NAESB WEQ BPS will make any necessary modifications to the standards, including those to address discovered commercial or reliability issues.

The NERC ORS will meet on September 4 – 5, 2019 to review and discuss the EIDSN Parallel Flow Visualization Metrics Report 2019. During this meeting, the Chair of the EIDSN IDC Steering Committee intends to present the EIDSN IDC Steering Committee's endorsement of the report and conclusion that no modifications are needed to the PFV-related NAESB WEQ Business Practice Standards to address any reliability issues. If the NERC ORS is in agreement with the EIDSN IDC Steering Committee, the Chair of the NERC ORS will report such to the NERC Operating Committee during its meeting on September 10, 2019. As the NERC ORS reports to the NERC Operating Committee, the committee must review and approve any subcommittee recommendations or endorsements.

[10] *Id.* at 11

[11] *Id*. at 3

[12] The NAESB full-staffing process is included as an attachment to this report in Appendix C

[13] *Report* at 1.

The NAESB WEQ Executive Committee will meet on October 15, 2019 to review the EIDSN Parallel Flow Visualization Metrics Report 2019 and discuss the actions of EIDSN and NERC related to the reliability assessment of the PFV field trial. The committee will also provide any needed direction to the NAESB WEQ BPS regarding the completion of the standards development effort. The NAESB WEQ BPS held its initial meeting to review the EIDSN Parallel Flow Visualization Metrics Report 2019 on July 9, 2019. The subcommittee will reconvene in November 2019 to finish the review, evaluate any needed modifications to the standards, and develop a recommendation based on the NAESB WEQ Executive Committee's direction. Assuming there are no reliability or commercial issues that require substantive modifications to the standards, the majority of revisions will likely be minor, and the NAESB WEQ BPS should be able to finalize and vote out a recommendation relatively quickly. Following this, the NAESB office will distribute the recommendation for a formal comment period. NAESB anticipates that the NAESB WEQ Executive Committee will meet sometime in the 1st Quarter, 2020 to consider the recommendation. Should the NAESB WEQ Executive Committee adopt the recommendation, ending the full-staffing period, the standards will be submitted to NAESB WEQ membership for ratification. Any ratified standards will be incorporated into the next version of the NAESB WEQ Business Practice Standards and filed with the Commission.

NAESB, NERC, and EIDSN will continue to engage in coordination activities throughout the finalization of the standards development process. NAESB staff, NERC staff, and EIDSN leadership have remained consistently in contact throughout the PFV field trial and are committed to continued coordination through any industry implementation of the PFV enhanced congestion management process, if necessary. NAESB will continue to work with both NERC and EIDSN to keep the Commission abreast of the progress of the PFV effort through the ratification of the NAESB WEQ Business Practice Standards. Additionally, NAESB will inform the Commission of any delays in the timeline included in this report.

Provided in Appendix A is the EIDSN Parallel Flow Visualization Metrics Report 2019. As described above, the report serves as the assessment of the EIDSN IDC Working Group regarding the PFV enhanced congestion management process and field trial. Through this assessment, the EIDSN IDC Working Group concluded that the PFV-related NAESB WEQ Business Practice Standards are working as intended and the PFV enhanced congestion management process is an improvement over the current Eastern Interconnection congestion management procedures.

Provided in Appendix B is the Parallel Flow Visualization Project Timeline. The timeline includes the history the PFV effort and has been updated reflect the timeframe communicated above for the completion of the PFV-related standards development effort.

Provided in Appendix C is a description of the NAESB full-staffing process. This process is an excerpt from the NAESB Operating Practices as approved by a resolution of the NAESB Board of Directors on September 11, 2015.

Appendices:

A. EIDSN Parallel Flow Visualization Metrics Report 2019

B. Parallel Flow Visualization Project Timeline

C. NAESB Full Staffing Process

EIDSN, Inc.

PARALLEL FLOW VISUALIZATION METRICS REPORT 2019

June 2019

By IDCWG

1.REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION	COMMENTS
06/24/2019	IDCWG	Final Draft	

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2. EXECUTIVE SUMMARY

This Parallel Flow Visualization (PFV) Metrics Report presents the health of the Interchange Distribution Calculator's (IDC) PFV application. The objective of this report is to highlight the accuracy level of PFV enhancement as it relates to accounting for the measured system flows and enforcing NAESB's WEQ-008 Standards. IDCWG has established that PFV application is behaving as designed. Most of the flowgates that RCs are currently monitoring are performing relatively well if measured by the magnitude of unaccounted flow and when system inputs quality is at a high level. The application relies, by design and necessity, on a sizeable amount of real-time data input which includes load, generation and topology information. The report will highlight and demonstrate the correlation between quality of results and data input quality of into the application. During the 18-month Field Trial, the IDCWG identified several challenges with the initial design that were addressed during this period. Most notably, creating overall system health awareness applications, adjusting the methods used to calculate flowgates' post-contingent flows and addressing many complex Control Devices (Phase Shifters, DC Lines and VFTs) deficiencies that inherently came with the current production IDC. These enhancements were necessary after significant inaccuracies were observed during the early stage of the Field Trial period.

The complexity of the system and its heavy reliance on, what needs to be, a production level support contributed to a Field Trial that saw volatility in the quality of the input data and as result the system's produced calculations can be erroneous.

In order to demonstrate the potential of the application's capability to account for system flows and the contributors to such flows, IDCWG has quantified the metrics that focus on time periods when the support of the application was at its highest; however an overall system performance capturing a longer time periods is also presented in the report.

1) The IDCWG reports the following summary of its findings on PFV quality and accuracy in accounting for MW affecting flowgates as designed and supported by the WEQ-008 drafted NAESB standards.
    - The ability to identify inaccuracies that are not flagrant and tracing their cause is a challenge due to the interconnection of the system and large quantities of data that could contribute to such inaccuracy. It takes significant time to shadow the calculations and trace where a possible source of inaccuracy could be suspected.
    - During periods of proper support, PFV shows potential in its ability to more properly account for MWs across the interconnection than the current IDC.
    - Considerations must be given to the fact that three Markets, PJM, MISO and SPP who report Market Flows based on real-time injection and withdrawals of their system. Comparison of PFV GTL against IDC with Market Flows suggests that the systems are

comparable as it relates to accounting for flowgate flows. However, considerations must be given to areas where Market Flows are not the predominant flow impact on a facility.
  - When benchmarking PFV against IDC with no Market Flow considerations (i.e use of NNL for all entities including for PJM, MISO and SPP), PFV results demonstrate improvement in system performance and MWs accounting on flowgates compared to the results utilizing the current IDC's static data. This suggests that the use of PFV for entities that don't report impact based real time quantities is an improvement to system impact estimates.

2) The IDCWG has determined that the following design elements require further investigations to determine if any enhancements could be made to improve PFV's estimate of MWs source of impact on defined flowgates.
   - The group has identified areas in calculation and data granularity, specifically load zones and import and export zones, which warrant investigation to determine if an adjustment could help further improve accounting of MW impacts on flowgates.
   - The need for further synchronization of system snap shots submitted by the RCs in order to ensure minimal discrepancies in time of data representation.
   - Re-evaluate the Transfer Distribution Factor (TDF) methodology used to estimate transfer impacts from one BA to another via Transaction Schedules. Same methodology is being used in IDC. IDCWG has observed that PFV results in higher impacts than real time flow on those flowgates with high Transaction Schedules impacts.
   - Investigation of a single real-time interconnection wide model to look into the potential to reduce modeling discrepancy errors across different RCs and eliminating the need for data translations between two different models.

3) The working group requests that the industry considers escalating the tool's support from RCs and the vendor to a production level support. Considerations should be given to making this a potential next phase of the project prior to or while considering the system impact assessment of moving the application to production and prior to its use for curtailment. This will allow for additional analysis that can be used as confirmation of the tool's validity. High and continuous monitoring of the results, having short turn around on reporting and addressing system down time and quality of data submitted will help allow for uninterrupted and elongated set of sample results to display the applications capability and viability to replace current IDC with added improvements.

3. BACKGROUND

The Parallel Flow Visualization (PFV) project seeks to improve the wide-area view of Reliability Coordinators (RCs) in the Eastern Interconnection (EI) such that they can better understand the current operating state of the bulk electric system and are better equipped to assign relief obligations during periods of congestion. The goal of the PFV project is to calculate impacts on the system more accurately. PFV provides more details to the factors contributing to congestion than the current IDC.

The use of static information in the current IDC methodology causes a deviation between real-time impacts and the Network and Native Load Calculations (NNL) calculated impacts used for relief obligations. Additionally, the default assumption in the NNL calculation is that all generators in the Eastern Interconnection have Firm Transmission Service.

With the implementation of "Change Order 283- Generation to Load Reporting Requirements", the IDC has a process to collect real time data and calculate Generation to Load Impacts (GTL) for all generators in the EI. NAESB WEQ Business Practices Subcommittee (BPS) approved a revision to NAESB WEQ-008 that requires a mechanism to assign Transmission Loading Relief (TLR) curtailment priorities to the GTL impacts. The revision also details how to treat the GTL impacts along with Firm/Non-Firm Transaction impacts.

NAESB's recommendation proposes the approach for assigning curtailment priorities using either a Tag Secondary Network Transmission Service method or Generator Prioritization method. The Tag Secondary Network Transmission Service method seeks to identify and provide transmission service priorities utilized by all generating units to the congestion management process through the use of expanded tagging requirements. The Generator Prioritization method provides a mechanism to assign priorities of GTL impacts that may be used in the PFV to assign relief obligations during TLR.

The PFV project, as analyzed by the IDCWG members, provides a more accurate model, a better analysis of the impacts on flowgates, assigns relief obligations more accurately, and is a considerable improvement over the current IDC.

Participation of the Eastern Interconnection (EI) Reliability Coordinators (RCs) is key to the success of the project and determining the viability of the enhancement. The following RCs are actively participating in submitting real-time the data to OATI:

- FRCC
- IESO
- MISO
- NYISO

- PJM
- TVA
- SOCO
- SPP
- VACAR-S

ISO-NE, SPC, HQ and NBSO are not participating in the project for various reasons. ISO-NE has validated its lack of participation in the PFV with their unique location and their near electrical isolation from the EI. ISO-NE has operating agreements with NYISO that does not involve the IDC. HQ and NBSO do not participate in the IDC altogether due to their electrical isolation and the lack of their generation serving their load impact on the rest of EI. SPC is not participating at this time.

4. SYSTEM DESIGN OVERVIEW

4.1 SYSTEM DATA INTERFACES

PFV enhancement and current IDC share common interfaces and exchange data. Both applications share the same power flow model, registry definition, sensitivity calculations – specifically GSF, LSF and TDF, flowgate definitions, and other information. This setup allows for flexibility in utilizing the data submitted, calculated or maintained within existing applications (BOF, SDX, and Tagging) without the need for recreating interfaces where RCs and BAs would have to submit the same information twice.

5. GTL CALCULATION

5.1 TLR

The TLR events remain mostly unchanged as part of CO 397 implementation. TLR Levels 0 → 6 continue to exist, with TLR level 3 and 5 addressing current hour and next hour, or next hour only. The differences in TLR between current IDC and PFV are the products involved in the impact evaluation. Current IDC is aware of Tags, NNL (calculated by IDC for areas not submitting Market Flows), and Market Flows (MW impact submitted by the three of east market – SPP, MISO and PJM). CO 397 allows PFV to calculate every BA's GTL impact on a given flowgate, whether the area is associated with an organized market or not. GTL effectively replaces the NNL and Market Flows.

5.2 PFV CALCULATION

5.2.1 GTL CALCULATION

The GTL calculation for every BA intends to represent the impact of the area serving its load from its fleet of generation on a given defined flowgate in PFV. The calculations utilize Generation Shift Factors (GSFs), Load Shift Factors (LSFs) and Transfer Distribution Factors (TDFs) as calculated by IDC today. Below is a high-level step through of the GTL calculation as performed by the PFV. The Generation basepoint used at the start of the GTL calculation is the real time submitted quantity by the RC or BA. All in-service generators participate in scaling in the calculations with their dispatchable range (Min to Max range).

- Scale each area based on net interchange
    - Scale load by the amount of tagged net imports
    - Scale generation by the amount of tagged net exports
- If necessary, apply additional generation scaling to balance each area
- Each of the generator's MW impact to serve load (GSF → LSF of area) is captured and summed up to the BA level making up the BA's impact on a given flowgate.

5.2.2 PRODUCT PRIORITIZATION

- GTL and tag impacts are associated with a transmission priority.
    - Tag transmission priorities are those imported from E-tag as part of the schedule.
    - The GTL product is specified through specific generation priorities as submitted by the RC or BA, or through an intra BA tag with the priority specified via E-tag
- Tag and GTL products participate with equivalent priority categories (0-NX through 7-FN).
- Entities participating in a Joint Operating Agreement may submit allocation limits by flowgate, effectively over-ridding the GTL priority on the coordinated flowgate for the participating BA or market area.
- Each of the products (Tags or GTL) may be further categorized into sub-priorities that are driven by several factors (see CO 397 for design details).

5.2.3 RELIEF ALLOCATION

In the current IDC, the relief allocation associated with each product is performed on a pro-rata basis across each product; market flows, tags, and NNL. Each product may receive relief allocation up to the priority reported in the product in the IDC. Curtailment for any product starts from the lowest to highest priority (0-NX → 7-FN).

Under the PFV, relief occurs through only tags and GTL. Tags and GTL may receive relief allocation up to the priority reported in the product. Curtailment for any product starts from the lowest to highest priority (0-NX → 7-FN). Relief through tags is assigned in the same manner as the current IDC. Relief of GTL is assigned by sending the BA a GTL Target MW that reflects the relief reduction requested from the IDC TLR.

5.3 RELIEF MEASUREMENT

Determining a BA's response to a PFV assigned relief allocation is performed by comparing the GTL Target assigned during a given time period to the GTL Net MW calculated by PFV during the same time period. If relief is achieved through a re-dispatch, then the GTL Net MW should approach, if not equal, the GTL Target assigned during a time period.

6. RESULTS & ANALYSIS

6.1 DATA INTEGRITY

IDCWG has developed metrics to help identify the quality of the input data that ultimately affect the quality of the PFV calculations. These metrics will help to validate the quality of the data submission by each submitting RC or BA.

The figures below show a summary of the metrics as captured from Feb 2019 to April 2019. The metric calculates ratio of total area's generation MW submitted and the area's obligation (Load and Net Scheduled Interchange). A Perfectly balanced submission would result in a ratio of '1'.

As depicted in the figures below, there are instances when data submission shows unhealthy qualities. This is due to intermittency of data submission by the RC or BA. Due to field trial nature of PFV process RC's have limited IT support to rectify these issues quickly. So these issues will continue until PFV is close to production, at which point these issues will be resolved quickly.

To address inaccurate data submissions of the load and generation MW, IDCWG is working on validations that would allow the software to identify poor quality data submission and continue to utilize the previously submitted data until quality data comes in.

It is important to note that these submissions of poor quality data (spikes on the figures below) directly affect the accuracy of GTL and calculated MWs on a given flowgate.

Figure 1 shows the total generation compared as a ratio of the total calculated load obligation of all entities on the Eastern Interconnection over time.

The total calculated load obligation is:

$$Load\ Obligation = Load + Losses + Net\ Exports$$

Ratio of Generation to Load Obligation is:

$$Ratio\ of\ Generation\ to\ Load\ Obligation = \frac{Generation}{Load\ Obligation}$$

Figure 1 - Load Obligation Metric - Entire Eastern Interconnection

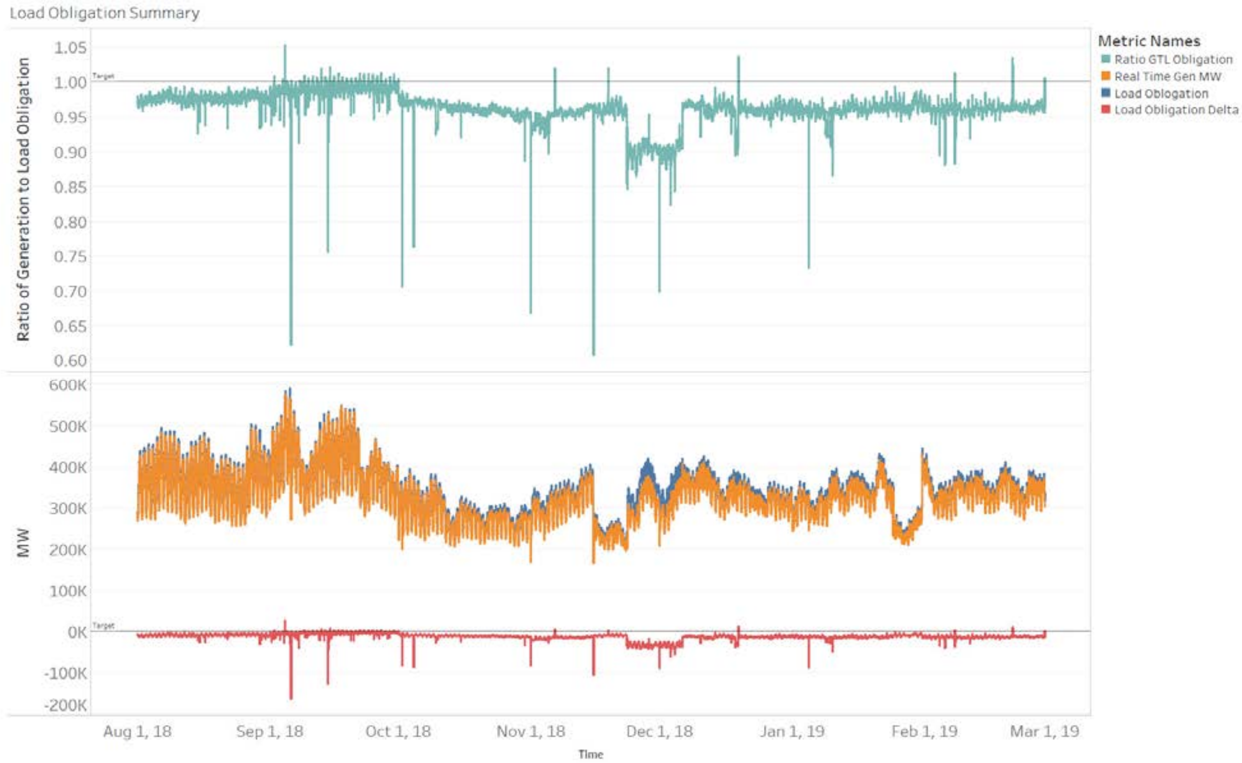


Figure 1 – Interconnection's Obligation to Generation Submission Ratio

Figure 2 shows the total generation and load obligation ratio metrics by RC.

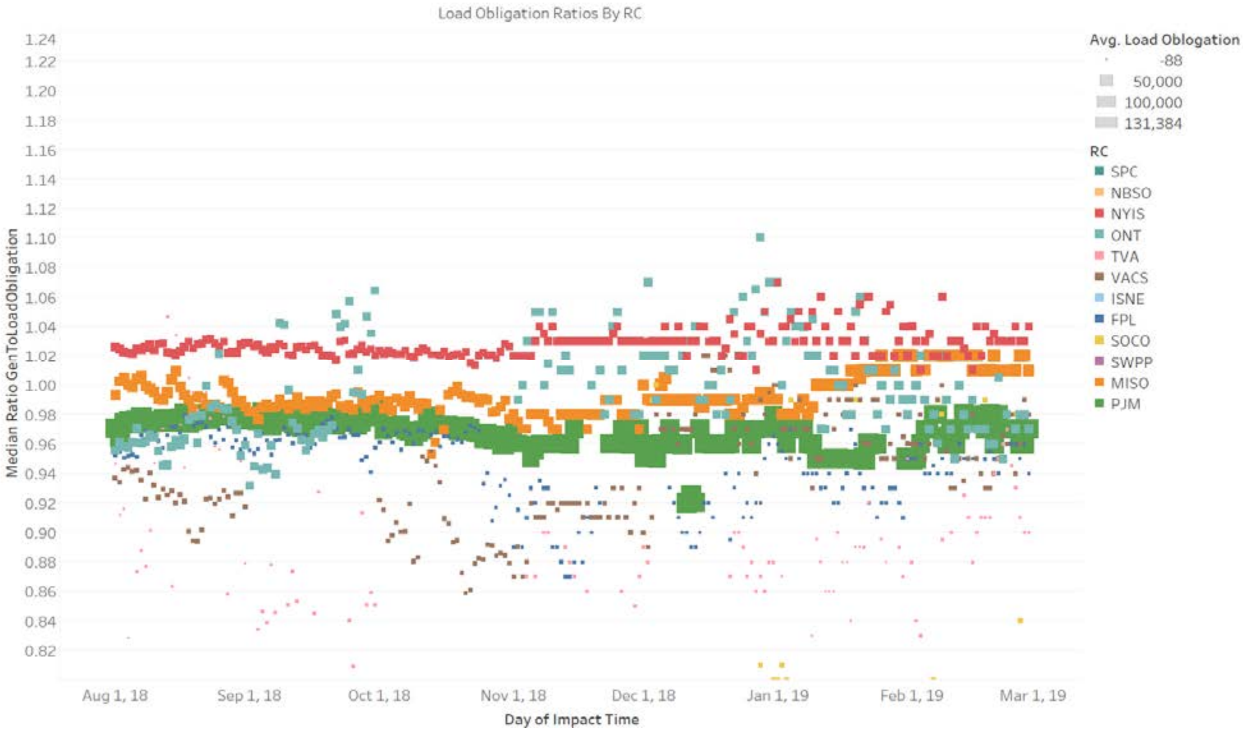


Figure 2 – BA Obligation to Generation Submission Ratio

6.2 UNACCOUNTED FLOW MWS IMPACTS

As a measure of accuracy of the calculations performed, the PFV's ability to account for the reported real time post-contingent flow is deemed key to demonstrating the ability to visualize the source of the flows on a given flowgate. In the analysis below, the IDCWG has focused on key frequently constrained flowgates across a diverse geographical area within the Eastern Interconnect to validate the application's accuracy, considering all unique transmission topology, control devices impacts, and business practices.

The unaccounted impact metrics compares the Total PFV net impacts to the total reported real-time flow for each flowgate over the period of March 1st, 2019 to May 1st, 2019. The IDCWG has worked through a number of metrics it believes best show the overall PFV calculation performance.

The total net impact of the PFV calculation can be quantified by the following expression:

$$Total\ Impact_{PFV} = \sum GTL + \sum Tags + \sum Control\ Devices$$

This is then compared to actual real-time flow, as determined by each RC.

First, an absolute error was calculated for each flowgate:

$$Absolute\ Error = Total\ Impact_{PFV} - Realtime\ Flow$$

Then relative error metric was calculated that normalized the error to the facility rating:

$$Relative\ Error_{Rating} = \frac{ABS(Absolute\ Error)}{Flowgate\ Rating}$$

The IDCWG believes this is a relatively good metric to use in analyzing error because it normalizes error across all flowgates and allows for a qualitative interpretation using quantitative data, while avoiding any skewing that might arise from the relative error metric based on real-time flow.

6.2.1 UNACCOUNTED IMPACTS FLOWGATE PERFORMANCE MAP

Figure 3 shows performance of around 80 key flowgates across eastern interconnection with un-accounted impacts metric. IDCWG considers flowgates with <10% unaccounted flows are performing better (green circle) in PFV and flowgates >10% not performing better (red circle). More than 80% of flowgates are performing better and remaining flowgates performance seem to vary between 10% and 25%. IDCWG does not believe any PFV design shortcomings that are affecting these poor performers. IDCWG believes some of these poor performers affected by Tag impact calculations. These calculations are exactly same as current IDC tag impact calculations. IDCWG is considering different alternatives to improve some of the tag impact calculations.

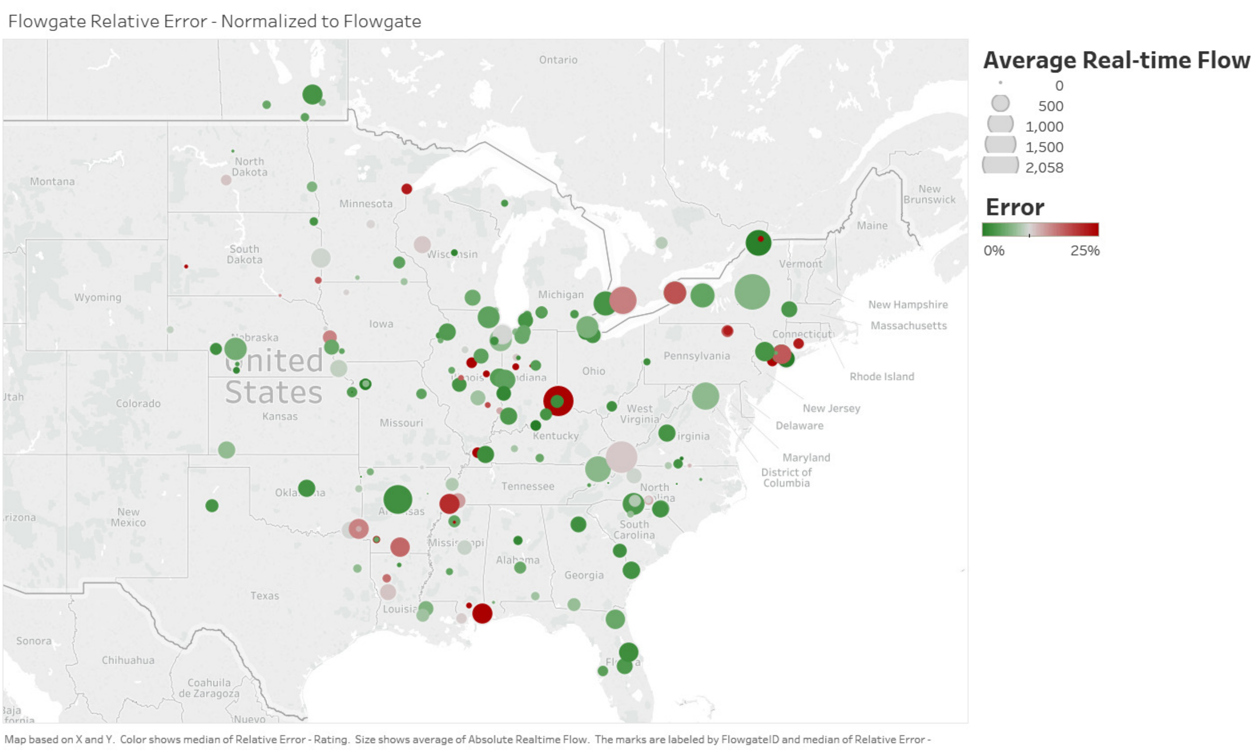


Figure 3 – Flowgate Relative Error Normalized to Flowgate Rating

6.2.2 UNACCOUNTED IMPACTS FLOWGATE PERFORMANCE MAP POOR PERFORMERS

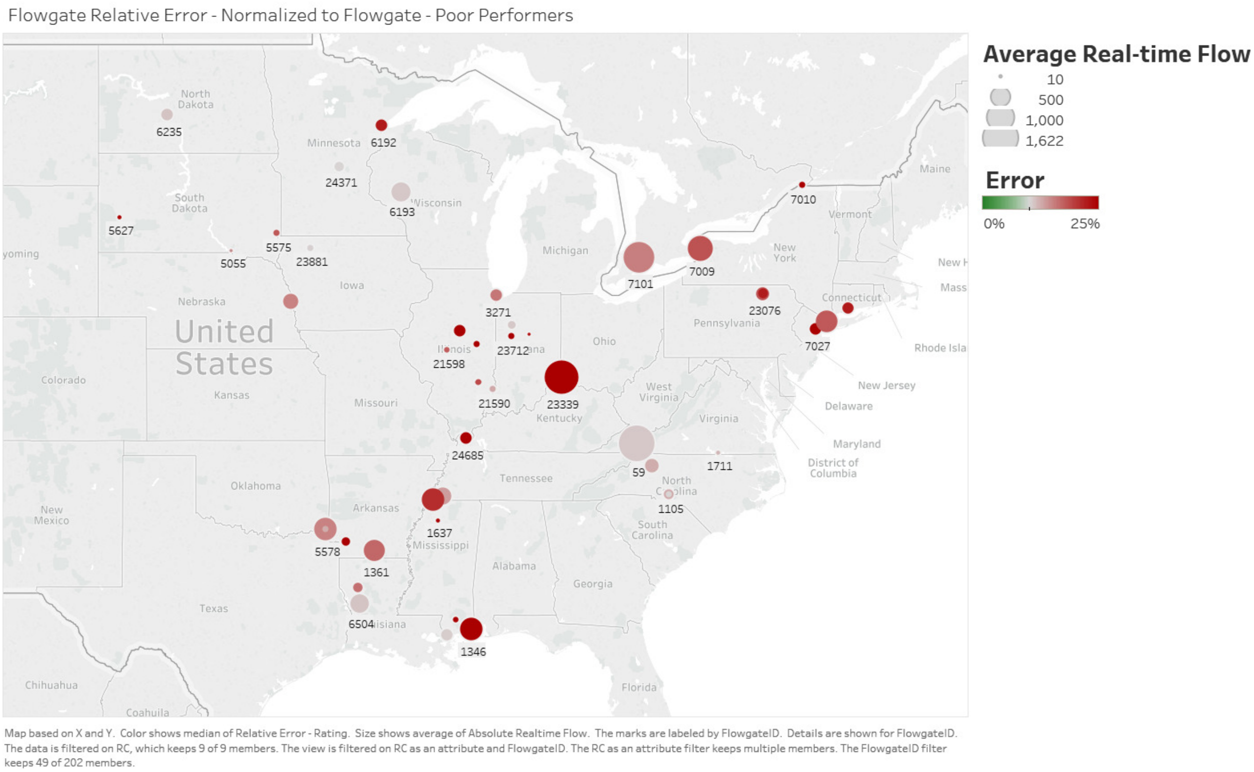


Figure 4 - Unaccounted Impacts Flowgate Performance Map Poor Performers

6.3 IDC TOTAL IMPACTS VS PFV TOTAL IMPACTS COMPARISON

The PFV utilizes the GTL calculation for every BA in the Eastern Interconnection. Conversely, the current IDC performs NNL estimates utilizing static model data for every BA. Developing this metric has been really data intensive to calculate IDC total impacts. Tag impact calculation is same in both IDC and PFV.

6.3.1 PFV VS. IDC TOTAL IMPACTS

Figure 5 below shows a comparison between IDC total impact calculations vs PFV total impact calculations using unaccounted flow metric. Flowgates with unaccounted flow metric <10% are considered performing well (green circle) and flowgates >10% unaccounted flows are considered not performing well (red circle). Calculating IDC total impacts is calculation intensive process since IDC was not designed to calculate total impact on a flowgates. Therefore, this resulted in getting total IDC impacts for only fewer flowgates.

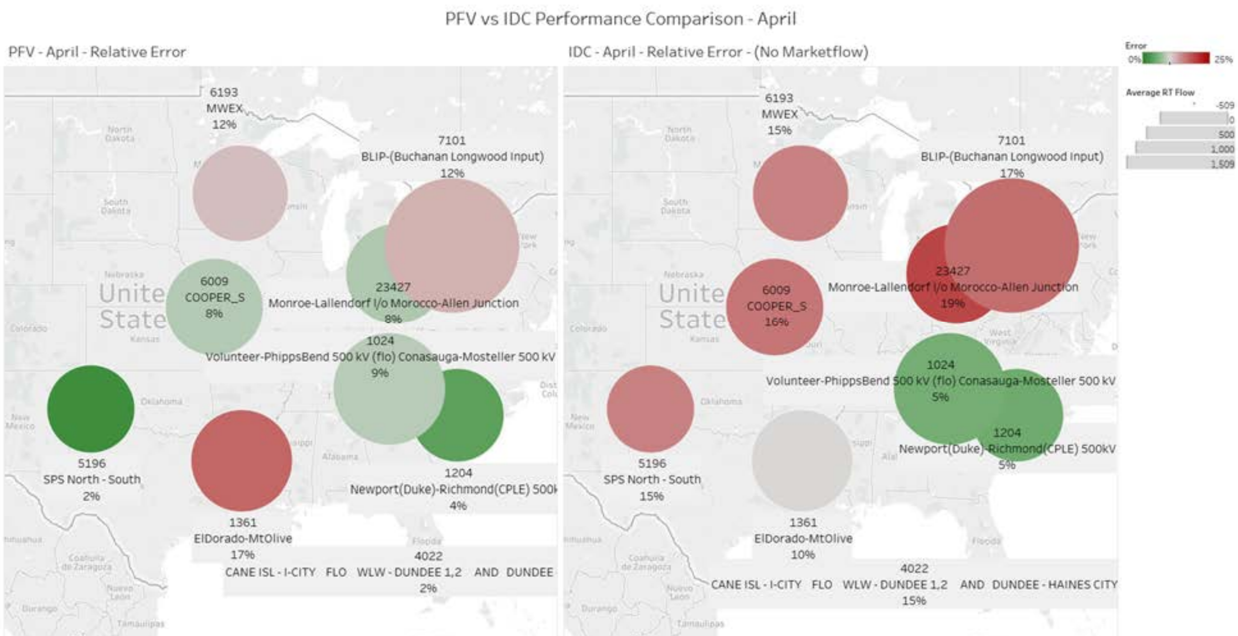


Figure 5 – PFV vs. IDC Performance Comparison

6.4 IDC TLR VS. PFV TLR PERFORMANCE

The PFV utilizes the GTL calculation for every BA in the Eastern Interconnection. Conversely, the current IDC receives Market Flows or performs NNL estimates utilizing static model data. This makes the new PFV application more favorable than today's IDC with increased accuracy in accounting for impacts on a flowgate. The PFV rules and technical calculations assign relief obligations with more effective shifts then current IDC.

When a TLR is issued in IDC production, the PFV will mimic the TLR inputs and recreate the TLR in PFV. This allows the IDCWG to compare the TLR results of IDC production and PFV.

The figures below quantify a sample of TLR data from the current IDC compared to PFV, which validates the following:

There are differences in tag impact and available relief. The differences are associated with the utilization of GTL. This allows generators to participate at a service level that is not limited to a Firm priority (as is done in the current NNL calculation).

- The difference in tag MW impacts is due to PFV's utilizing the real time quantities in the calculations.
- There are differences in current NNL + Market Flows calculations as compared to the PFV GTL calculations. The differences are due to the PFV calculations being performed utilizing real time information and more granular awareness of the

model. This is especially the case when comparing the current IDC's NNL and the PFV calculations for non-market areas.

The IDCWG has validated that the prioritization performed for every production TLR level, including the flowgate allocation method based prioritization, is accurate and in accordance with the business rules set forth in WEQ-008. The group has also confirmed the tag impacts and GTL to be accurate on a micro level and globally reasonable with acceptable input data. Based on this information, the TLR relief assignment was tested and confirmed to be in accordance with the NAESB business practice rules.

6.4.1 TLR 3 CURTAILMENT COMPARISON

Figure 6 below demonstrates TLR3 curtailment comparison which captures the differences between PFV system curtailments and IDC system curtailments when a TLR 3 is issued. With the availability of either non-firm BA GTL impacts or non-firm intra BA tag impacts in the PFV system the curtailments in TLR 3 might result in a different set of curtailments than what IDC prescribes on the same flow gate. If curtailments in both system are always equal then the pie charts will have equal representation of color representation. Orange is used for PFV curtailment representation and green is used for IDC curtailments representation. Overall, the curtailments are close between PFV and IDC on flowgates that are not impacted by the intra BA tags. Also with the availability of non-firm GTL in PFV, some flowgates do have these curtailments, which do not exist in IDC.

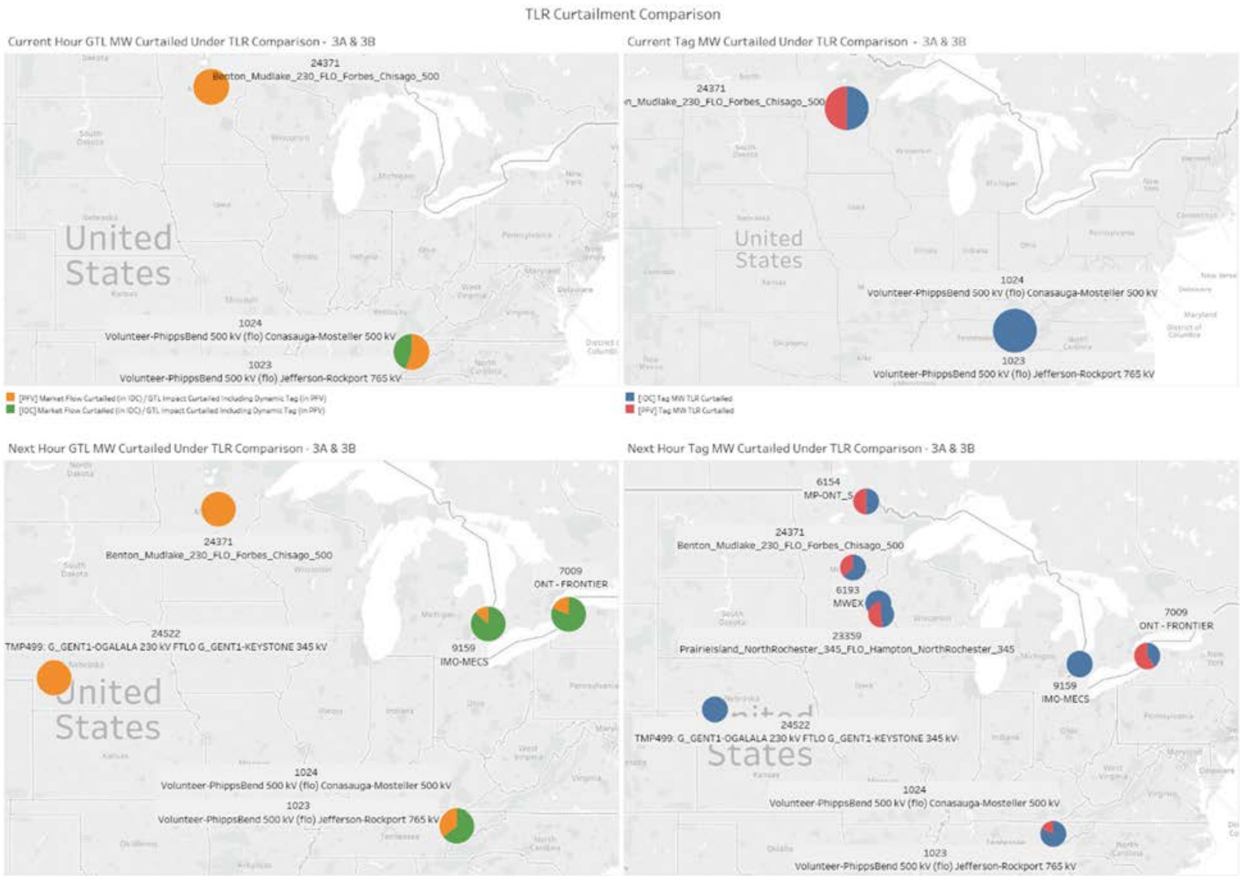


Figure 6 – TLR 3 Curtailment Comparison

6.4.2 TLR 5 CURTAILMENT COMPARISON

Figure 7 below demonstrates TLR5 curtailment comparison which captures the differences between PFV system curtailments and IDC system curtailments when a TLR 5 is issued. With the availability of firm BA GTL impacts in the PFV system the curtailments in TLR 5 might result in a different set of curtailments than what IDC prescribes on the same flow gate. If curtailments in both system are always equal then the pie charts will have equal representation of color representation. Orange is used for PFV curtailment representation and green is used for IDC curtailments representation. Overall, the curtailments are close between PFV and IDC on flowgates that are not impacted by the intra BA tags.

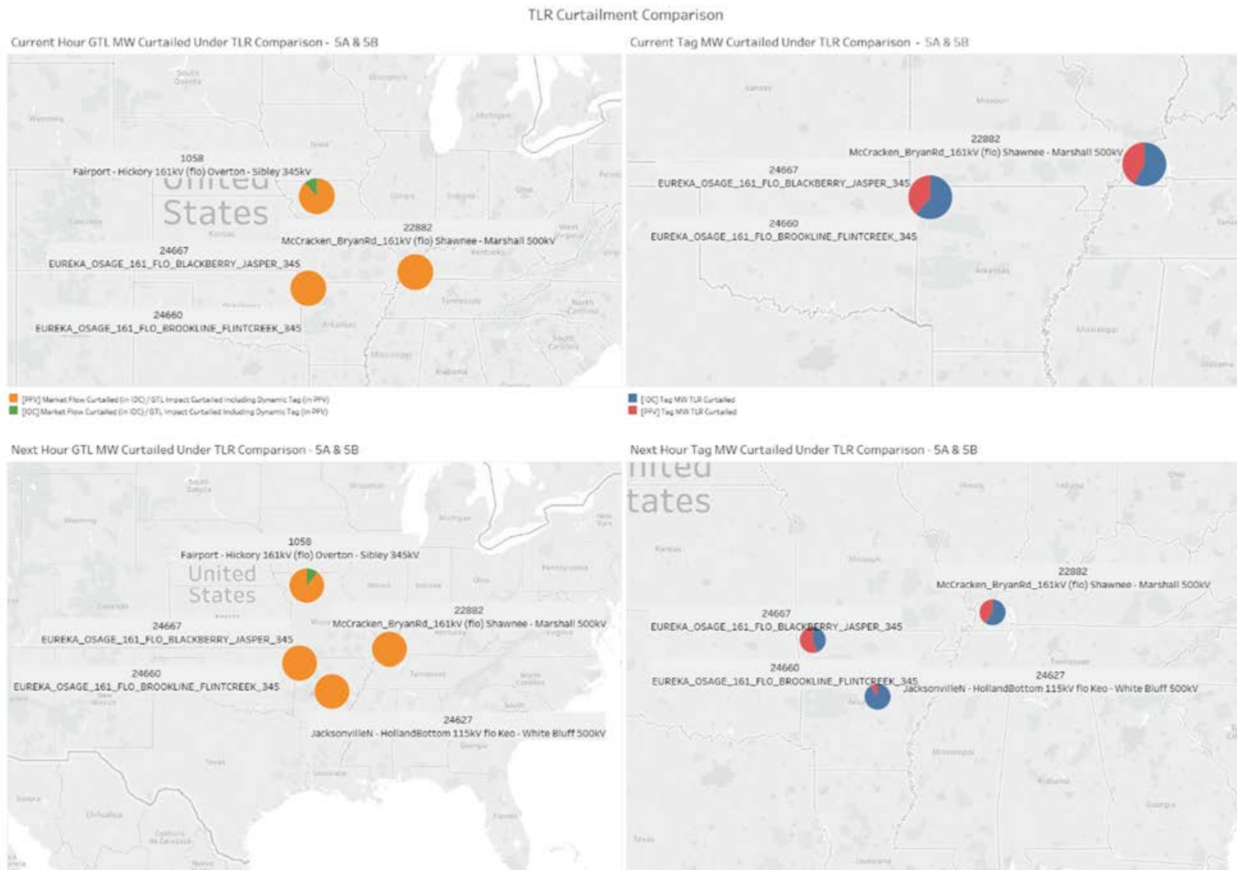


Figure 7 – TLR 5 Curtailment Comparison

6.4.3 TLR SHORTFALL AND EXCEEDANCE

When a RC issues TLR and BA provides less relief than it was asked for than the BA is shortfall. PFV process adjusts the sub priority of shortfall MW at lowest sub priority for a BA, exposing them for first curtailment within the priority for subsequent TLR hour. When a RC issues TLR and BA provides more relief than it was asked for then the BA is in exceedance. PFV process adjusts exceedance MW and reports them as highest priority protecting them from first curtailment within the priority for subsequent TLR hour.

Figure 8 shows average TLR shortfall and exceedances from both firm and non-firm TLR.

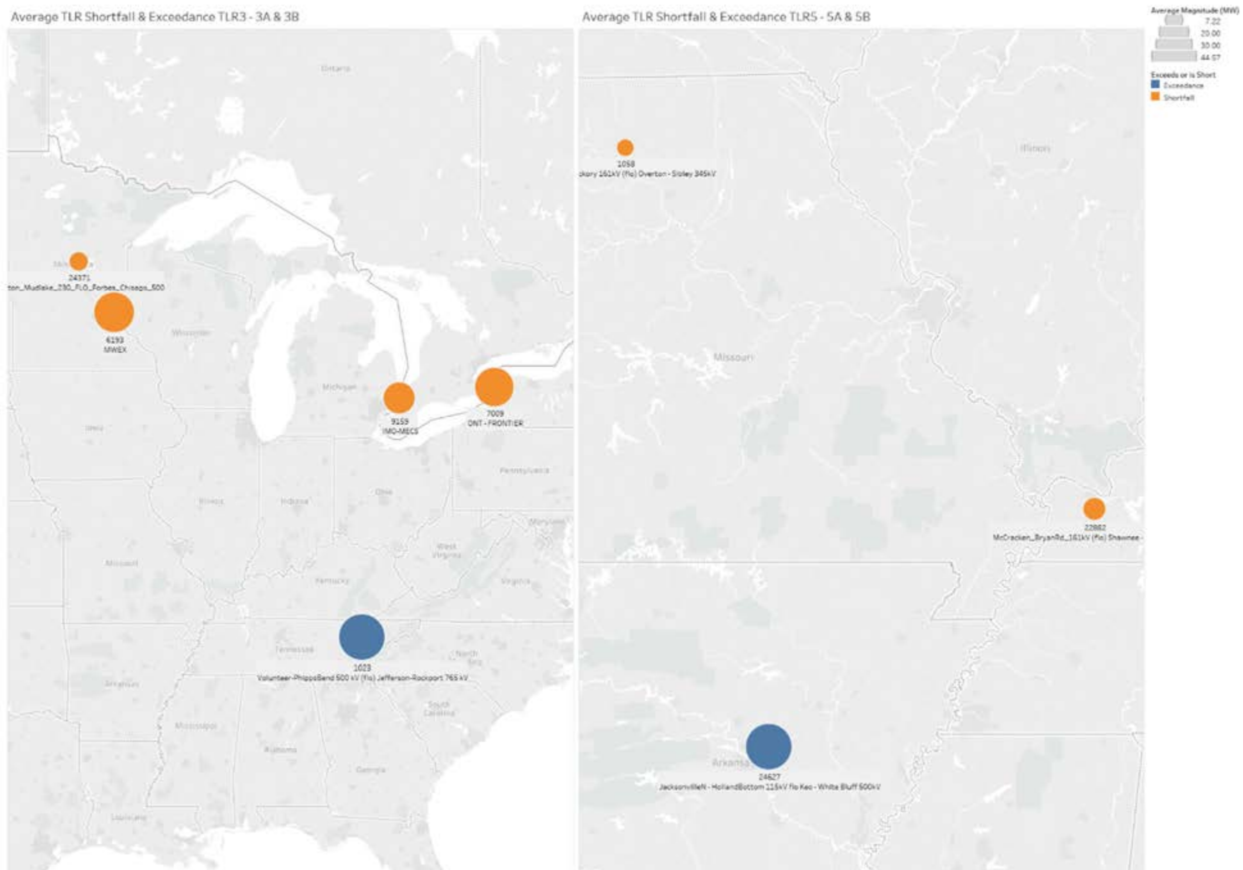


Figure 8 – TLR Shortfall and Exceedances

6.4.4 PFV TLR FIRM GTL /NON-FIRM GTL CURTAILMENT COMPARISON

Under PFV, process each generator can be designated a priority level from (0 to 7). BA reports priority of each generator and PFV calculates the GTL of the generator based on the reported priority. A BA can also choose to tag secondary non-firm instead of reporting priority. PFV treats the tags as intra-BA and curtails them in a TLR based on priority. BAs with joint agreements, on coordinated flowgates, provide the total priority cap for each priority level. The engine calculates all GTL impacts, and then it fills up from Firm (7) to lowest non-firm (0) respecting each limit on each priority bucket. Figure 9 below shows the curtailment of firm/non-firm GTL.

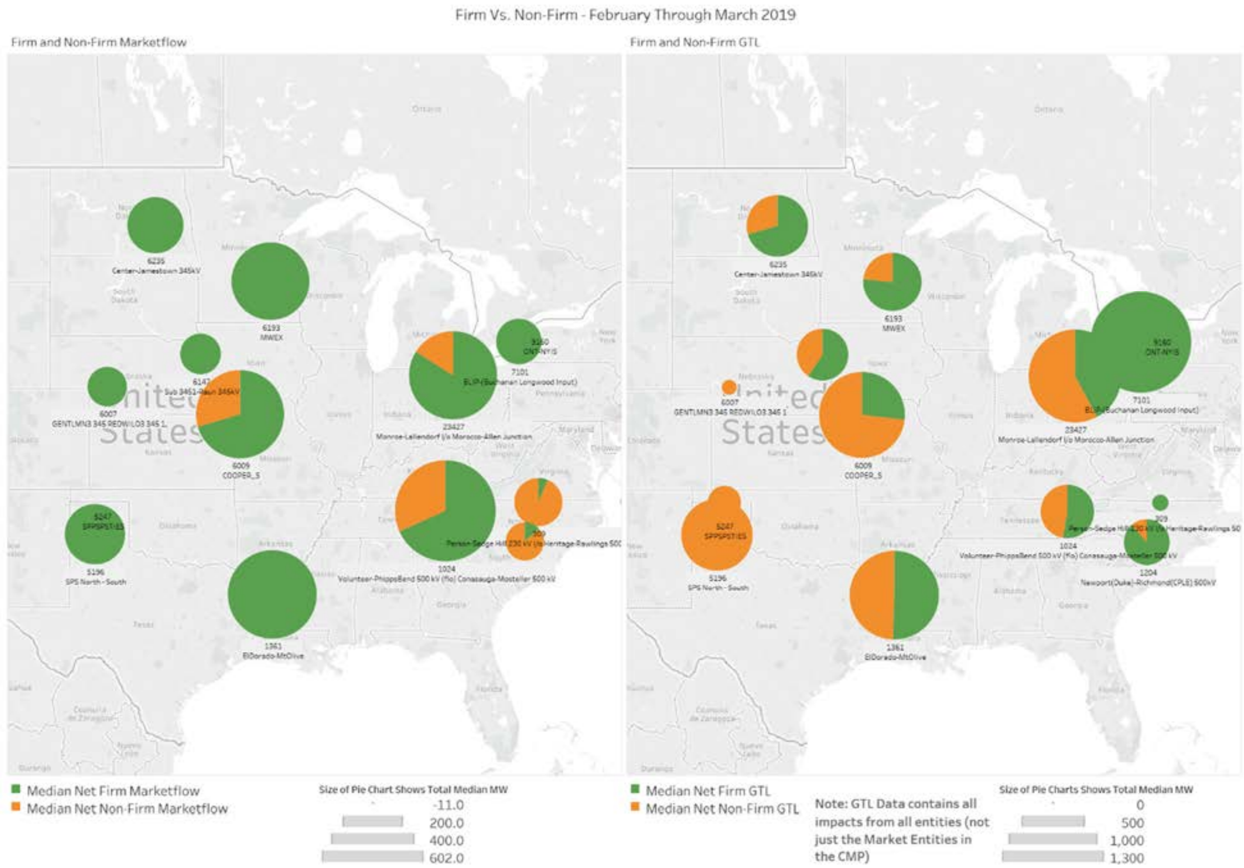


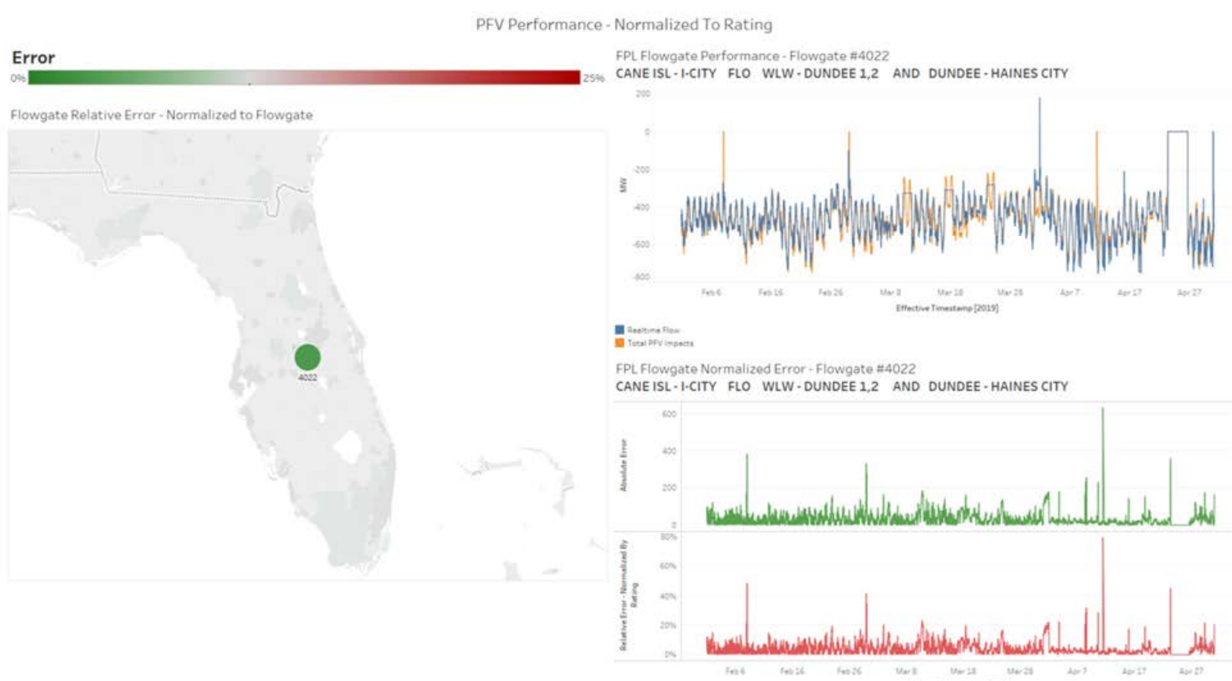
Figure 9 – GTL vs. Market Flow Curtailment

Appendix A – RC Flowgate Unaccounted Flow Analysis

6.5 FRCC

6.5.1 FPL - 4022 - CANE ISL - I-CITY FLO WLW - DUNDEE 1,2 AND DUNDEE - HAINES CITY

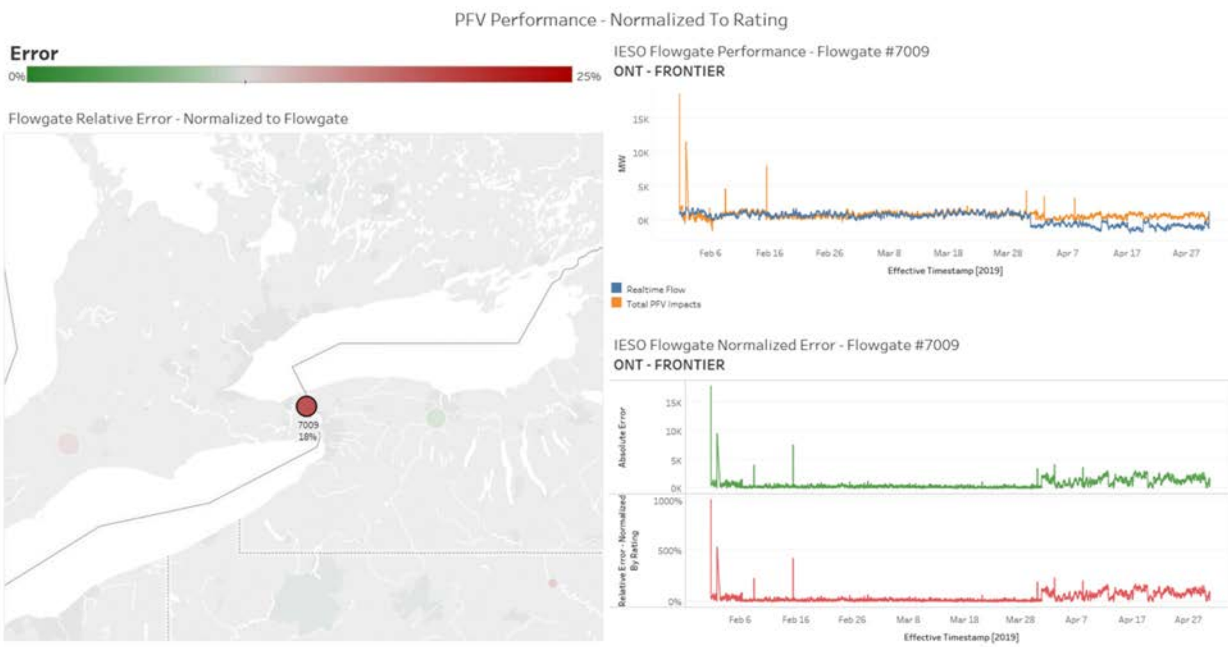
The flowgate below is one, which is wholly confined to the Florida Reliability Coordinating Council, Inc. (FRCC) region and is physically located in the central Florida area. It is impacted by multiple entities' flows and is sensitive to local contingencies, particularly a double circuit one. As can be seen in the graphs below, this flowgate is performing well. In fact, the absolute error is at a very acceptable level over the course of the sampling period and the relative error normalized to the rating is approximately 10%. There are some spikes in the charts, but it is believed that these are due to data input error, i.e. telemetry problems, or system issues with servers not behaving as expected



6.6 IESO

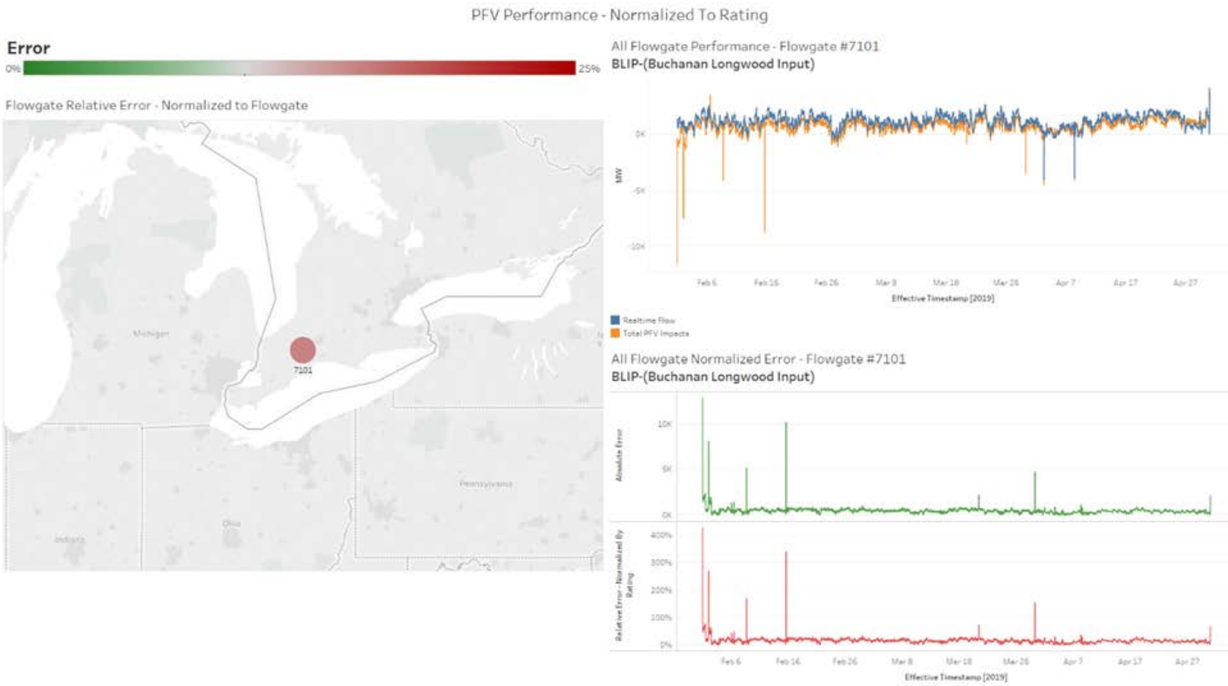
6.6.1 IESO - 7009 - ONT – FRONTIER

The Ontario – Frontier interface is one of two flowgates (ONT-FRONTIER and ONT-ADIRONDACK) that make up the Ontario – New York interface. The ONT-FRONTIER interface is made up of four free flowing AC ties while the ONT-ADIRONDACK interface is made up two phase shifters that are modelled as fixed angle phase shifters (FAPS). These FAPS change tap positions several times a day and until June, the IESO was not submitting dynamic tap positions for these FAPS. This was causing Lake Ontario circulation in the PFV model which leads to minor errors in the ONT-FRONTIER flows. With the FAPS tap positions now being submitted, the ONT-FRONTIER is consistently more accurate. The ONT-MICH PARS are also operated with a +/- 200 MW deadband. Any loop flows within that deadband generally appear on the ONT-FRONTIER interface therefore anything within +/- 200 MW is considered acceptable.



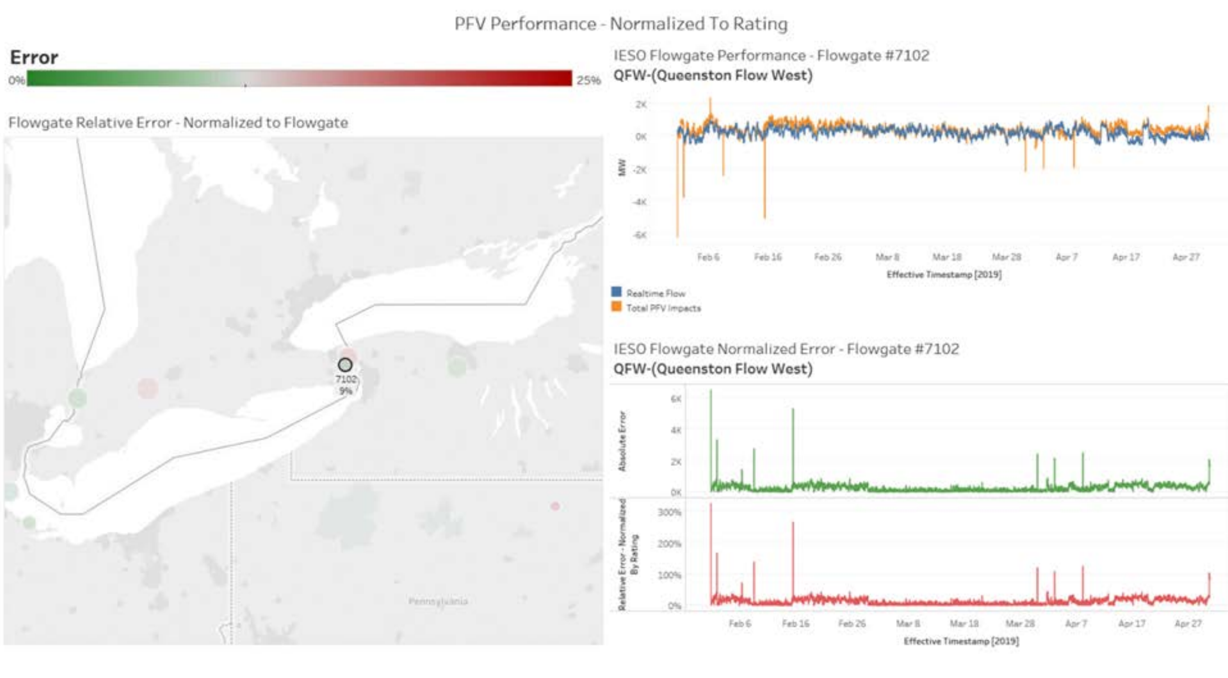
6.6.2 IESO - 7101 - BLIP-(BUCHANAN LONGWOOD INPUT)

The BLIP interface is made up of three 500kV circuits and five 230kV circuits and is a measurement of the flow from central Ontario into southwestern Ontario. The IESO believes the errors in the BLIP interface are attributed to minor load modelling errors in the southwest pocket of the province. With the ONT-MICH PARS usually in regulate mode, the error seen in this flowgate is a discrepancy between the generation and load balance in the pocket. The PSSE model is being revised to better reflect the load distribution seen in real-time operations.



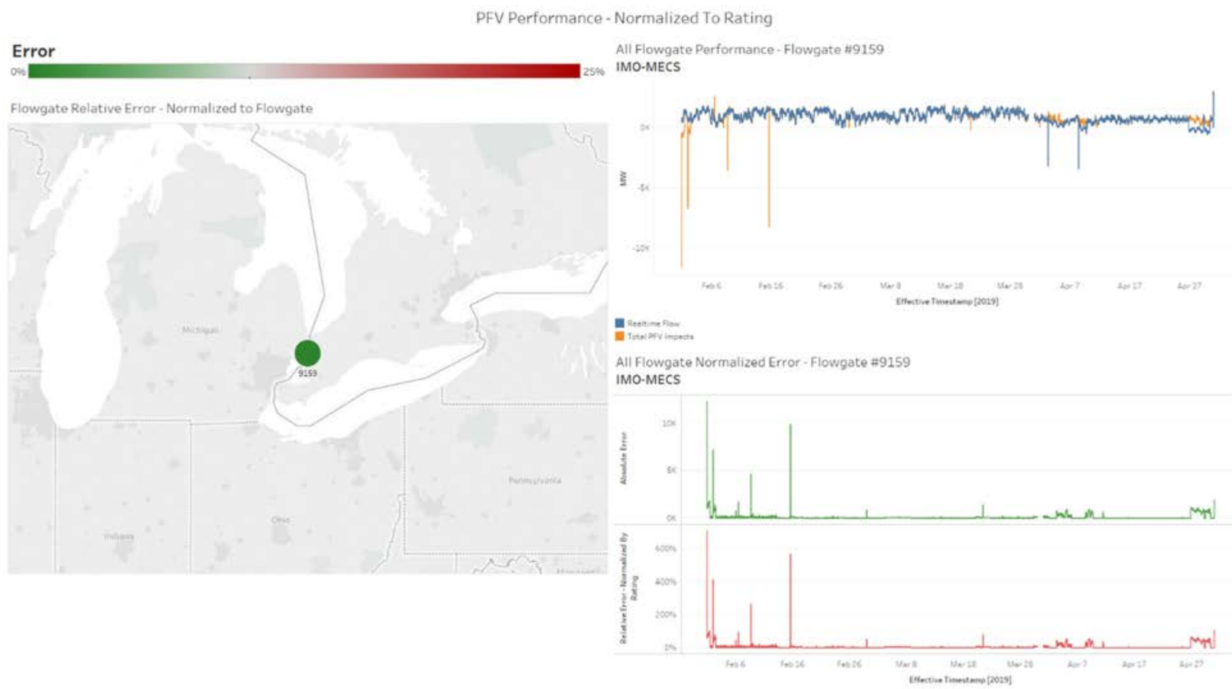
6.6.3 IESO - 7102 - QFW-(QUEENSTON FLOW WEST)

The QFW interface is measured in the Niagara area of Ontario and is essentially a measurement of the Niagara area generation along with transfers (imports) from NYISO. The small errors seen on this flowgate can be attributed to the issues with the fixed angle phase shifters on the ONT-ADIRONDACK interface causing circulation around Lake Ontario. This issue has been resolved.



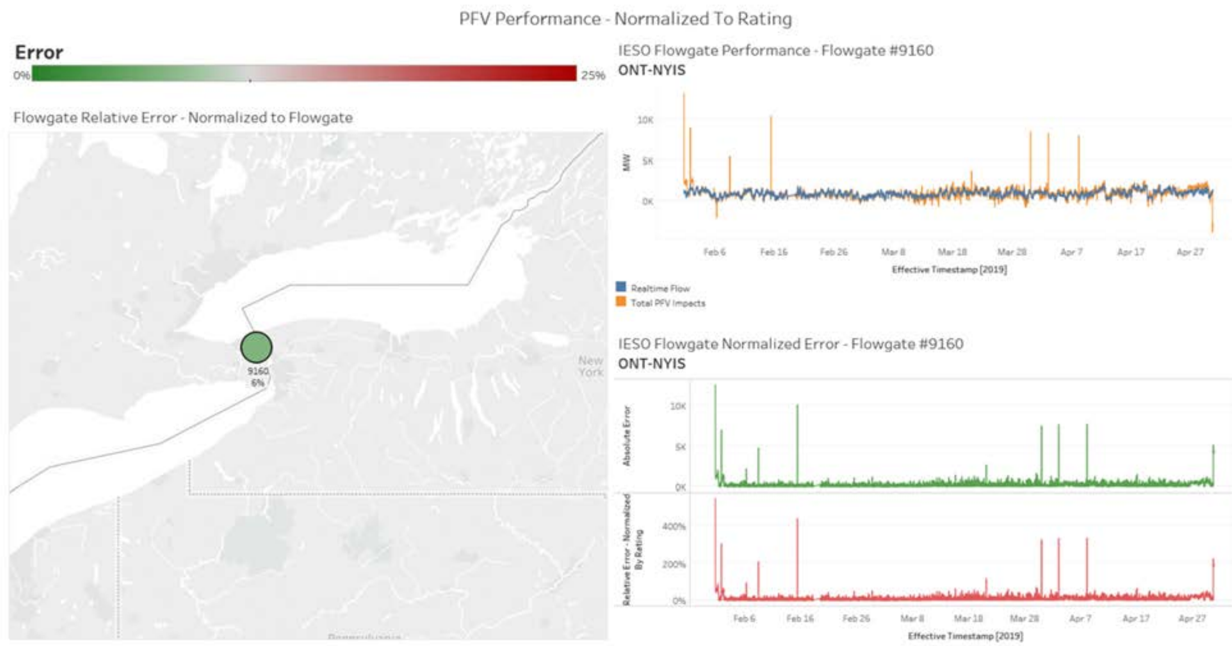
6.6.4 IESO - 9159 - IMO-MECS

The IMO-MECS interface is made up of two 230kV circuits and two 345kV circuits that run between Ontario and Michigan. Each circuit has a series phase shifter and the interface is operated in regulate mode almost all the time. While in regulate mode, the interface is operated to flow equals schedule. This flowgate is expected to perform well and any error can be attributed to the fact that although the interface is operated to flow equals schedule, there is a +/- 200 MW control deadband. Any deviation of less than 200 MW on the interface is considered accurate.



6.6.5 IESO - 9160 - ONT-NYIS

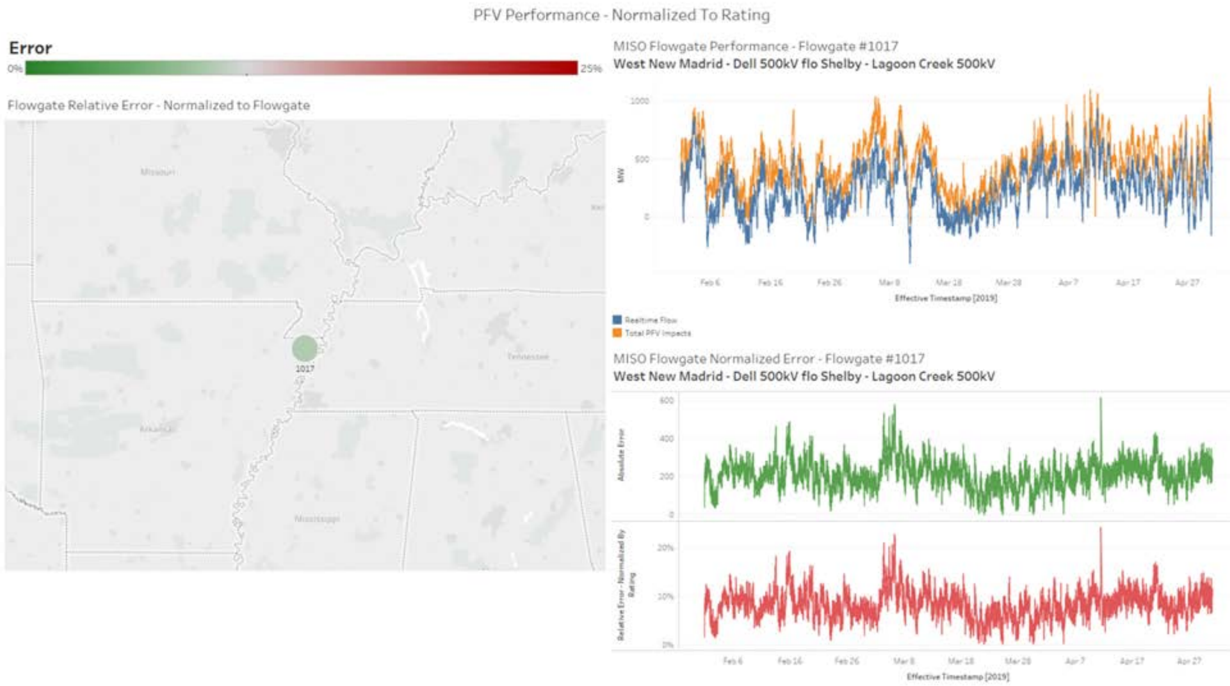
As described earlier, the ONT-NYIS interface is made up of two separate interfaces, the ONT-FRONTIER and ONT-ADIRONDACK interfaces. While the Ontario-Michigan PARS are in regulate, the ONT-NYIS interface is the only free flowing AC interface that Ontario has with the eastern interconnection. This flowgate is performing well, as expected, and any deviation can be attributed to the ONT-MICH PARS +/- 200 MW control deadband or normal ACE deviations that show up this free flowing interface.



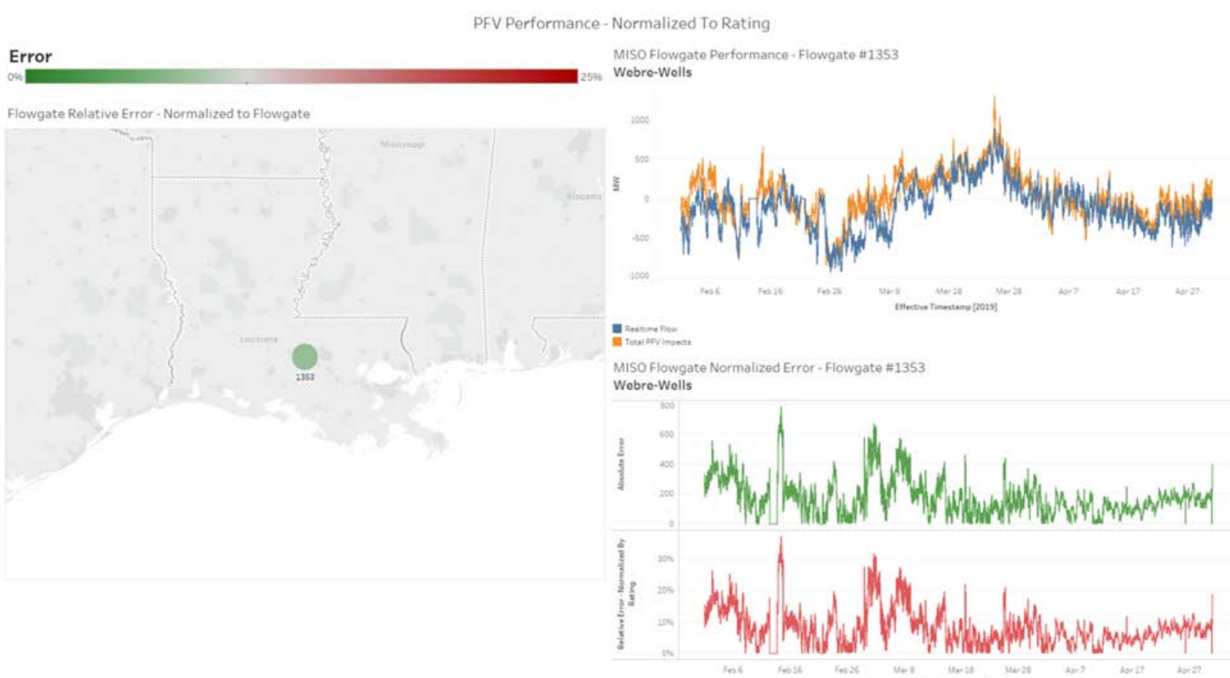
6.7 MISO

6.7.1 MISO - 1017 - WEST NEW MADRID - DELL 500KV FLO SHELBY - LAGOON CREEK 500KV

Flowgate is located in Entergy Arkansas. Overall, this flowgate has been performing well under 10% unaccounted flows compared to flowgate rating. PFV is consistently estimating higher impacts than real time flow on the flowgate. MISO GTL impacts and MISO tag impacts MISO GTL impacts are major part of the PFV impacts. This flow gate has fair amount of tag impacts and they seem to be higher on this flowgate, which is resulting in higher PFV impacts. We suspect MISO marginal zone methodology (same process in existing IDC) of tag impacts is resulting in higher tag impacts on this flowgate.

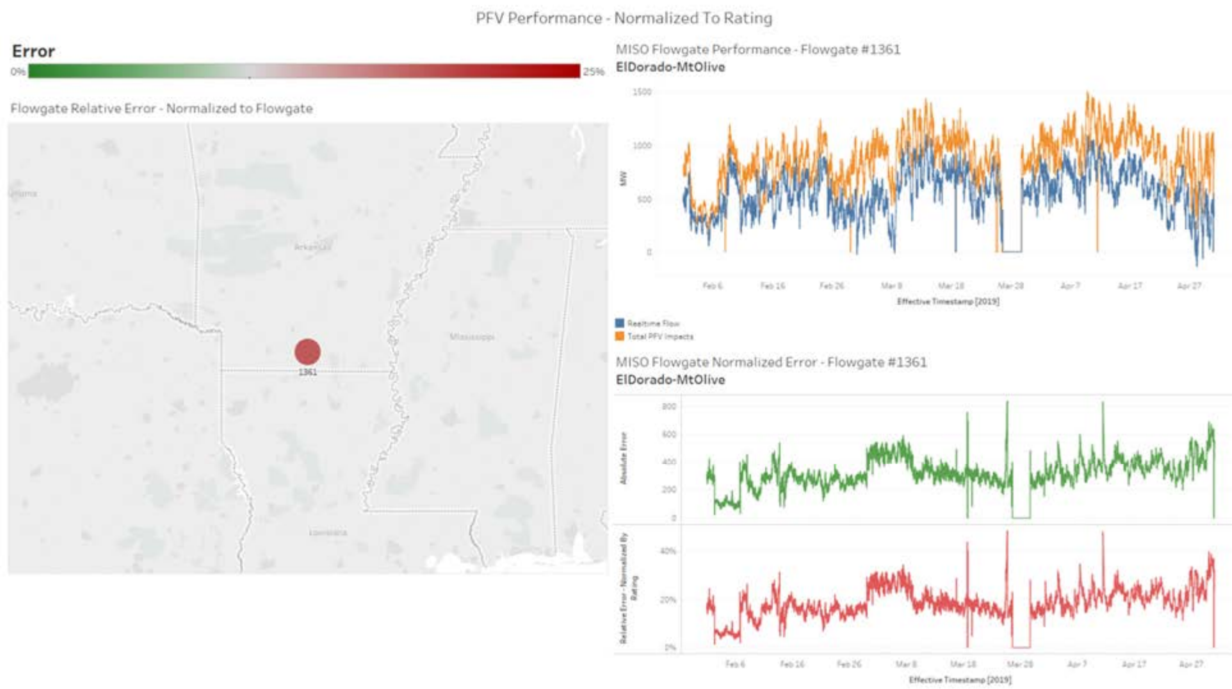


6.7.2 MISO - 1353 - WEBRE-WELLS



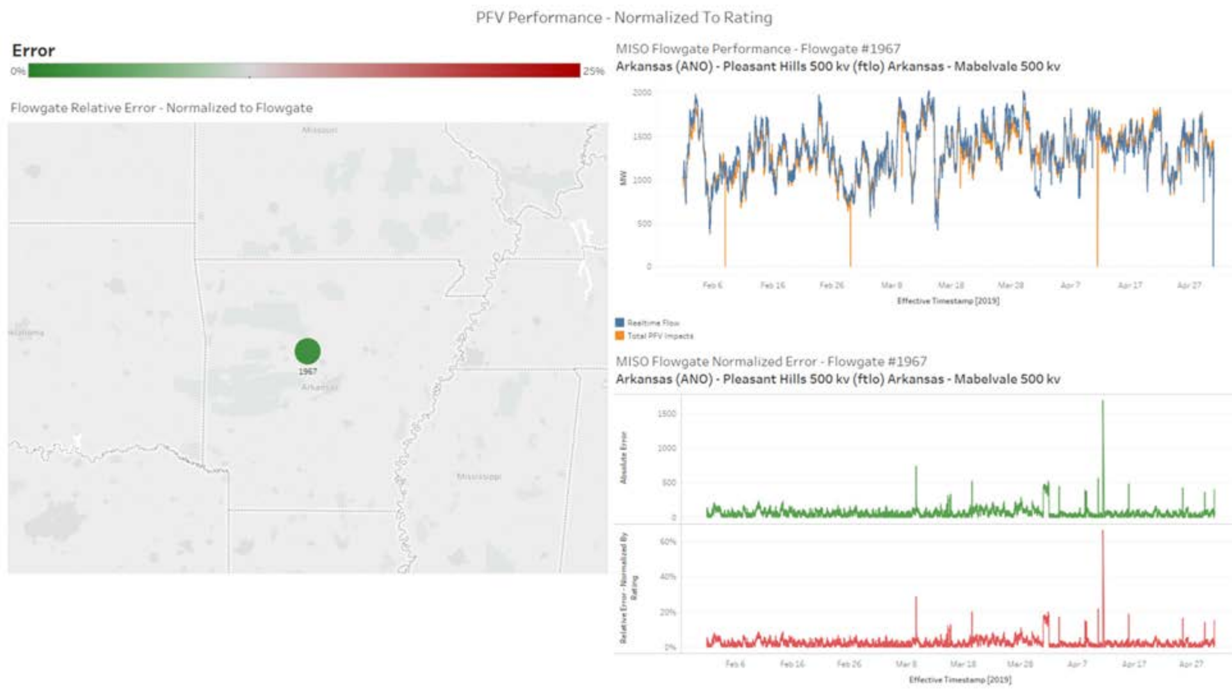
6.7.3 MISO - 1361 - ELDORADO-MTOLIVE

Flowgate is located in Entergy Arkansas. Overall, this flowgate has not been performing. Unaccounted flows compared to flowgate rating are around 17%. PFV is consistently estimating higher impacts than real time flow on the flowgate. MISO GTL impacts and MISO tag impacts MISO GTL impacts are major part of the PFV impacts. This flow gate has fair amount of tag impacts and they seem to be higher on this flowgate, which is resulting in higher PFV impacts. We suspect MISO marginal zone methodology (same process in existing IDC) of tag impacts is resulting in higher tag impacts on this flowgate.



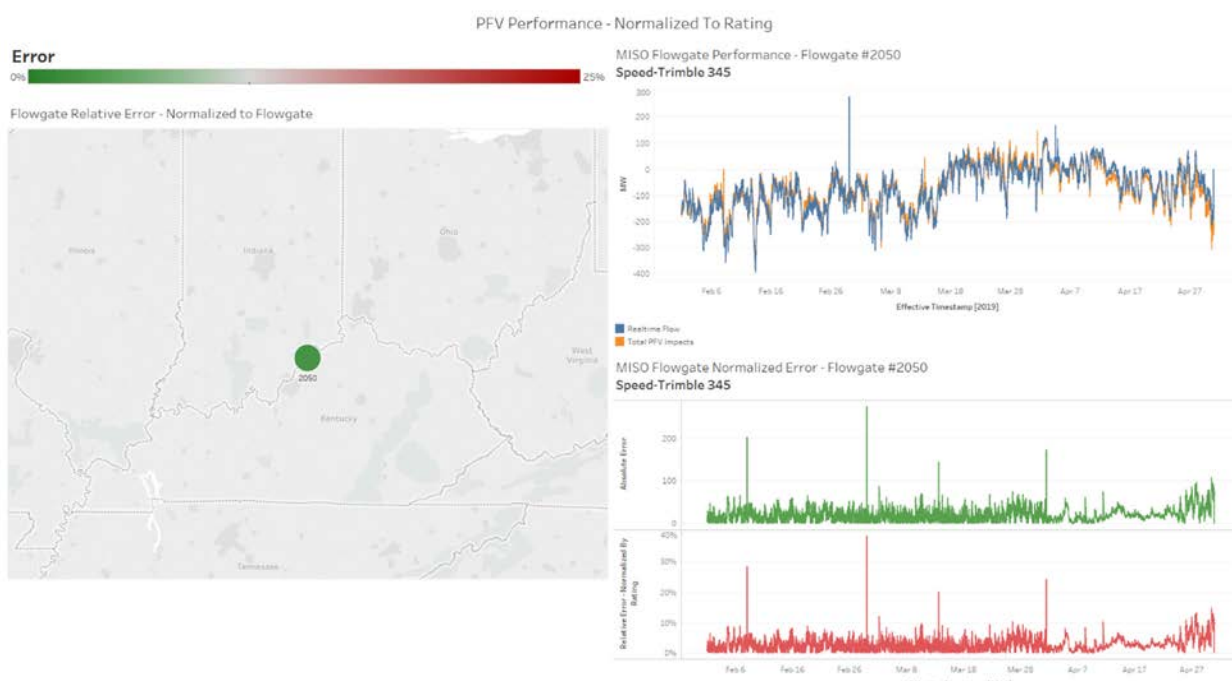
6.7.4 MISO - 1967 - ARKANSAS (ANO) - PLEASANT HILLS 500 KV (FTLO) ARKANSAS - MABELVALE 500 KV

Flowgate is located in Entergy Arkansas. This flowgate is performing well and PFV is calculating impacts pretty close to real time flow on the flowgate. Average unaccounted flow error % is around 3%. Considering average flow on this flowgate is around 1200 mw this flowgate performance is acceptable.



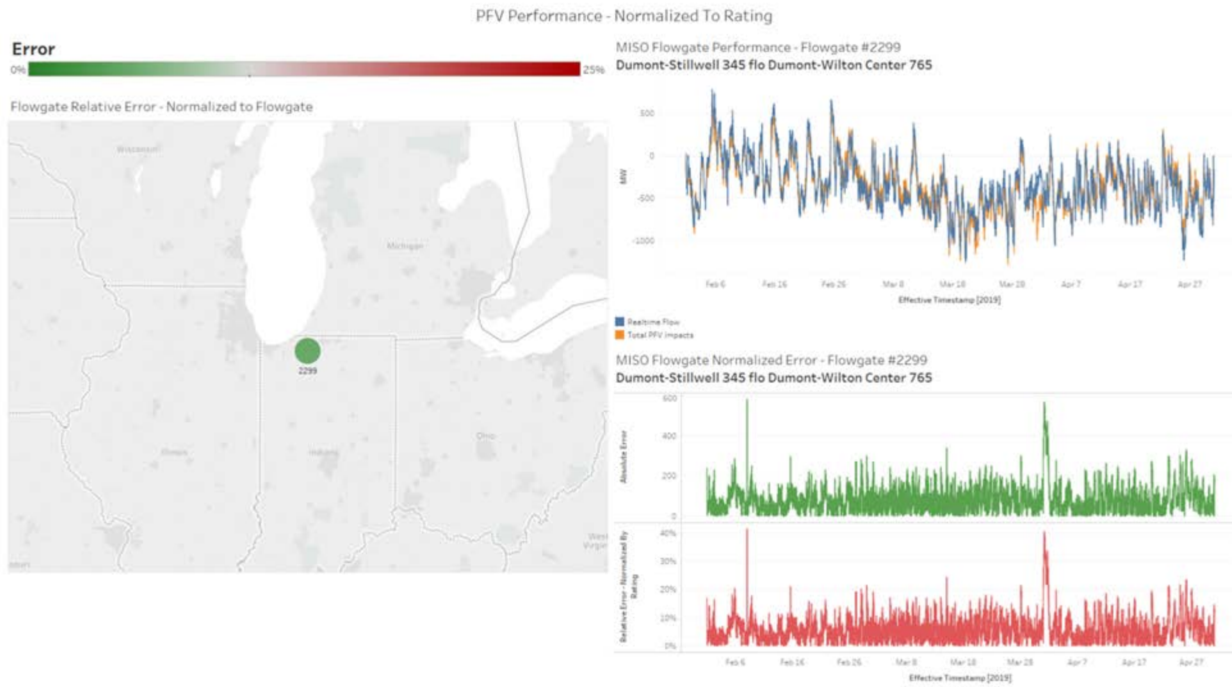
6.7.5 MISO - 2050 - SPEED-TRIMBLE 345 KV

Flowgate is located central Indiana. This flowgate is performing well and PFV is calculating impacts pretty close to real time flow on the flowgate. Average unaccounted flow error % is around 2%.



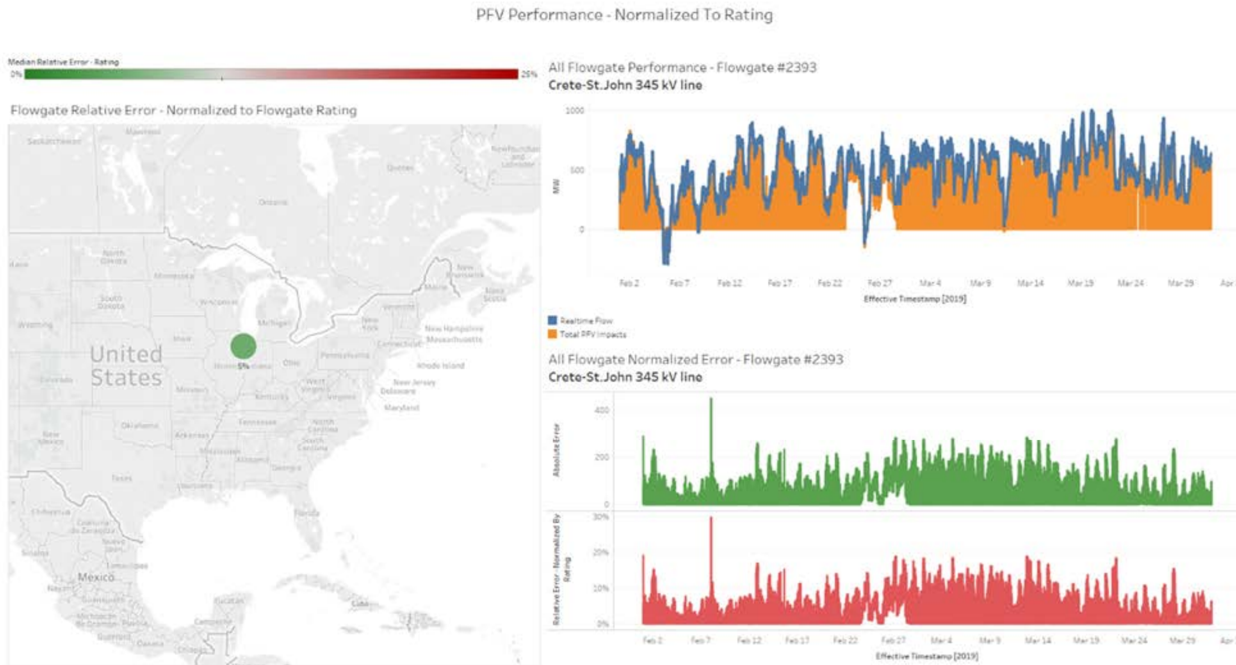
6.7.6 MISO - 2299 - DUMONT-STILLWELL 345 FLO DUMONT-WILTON CENTER 765

Flowgate is located on north Indiana and is tie between MISO and PJM. This flowgate is performing well and PFV is calculating impacts close to real time flow on the flowgate. Average unaccounted flow error % is around 5%.



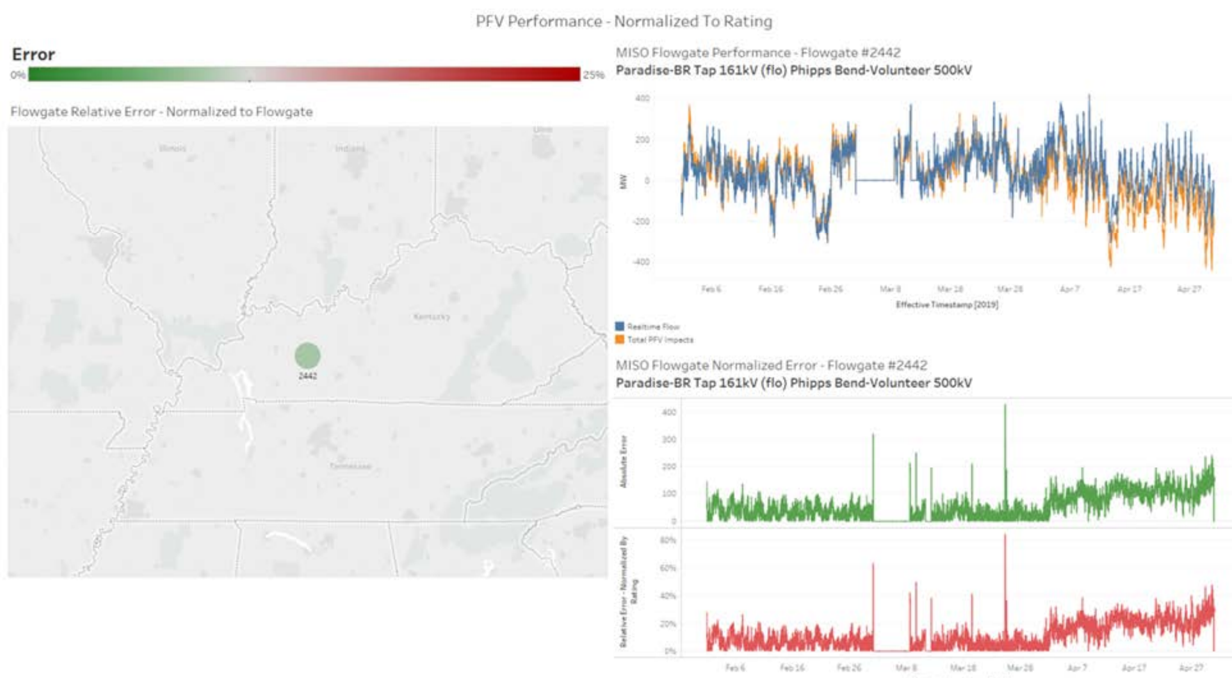
6.7.7 MISO - 2393 - CRETE-ST.JOHN 345 KV LINE

Flowgate is located in Wisconsin area and is a tie line between MISO and. This flowgate is performing well and PFV is calculating impacts close to real time flow on the flowgate. Average unaccounted flow error % is around 5%.



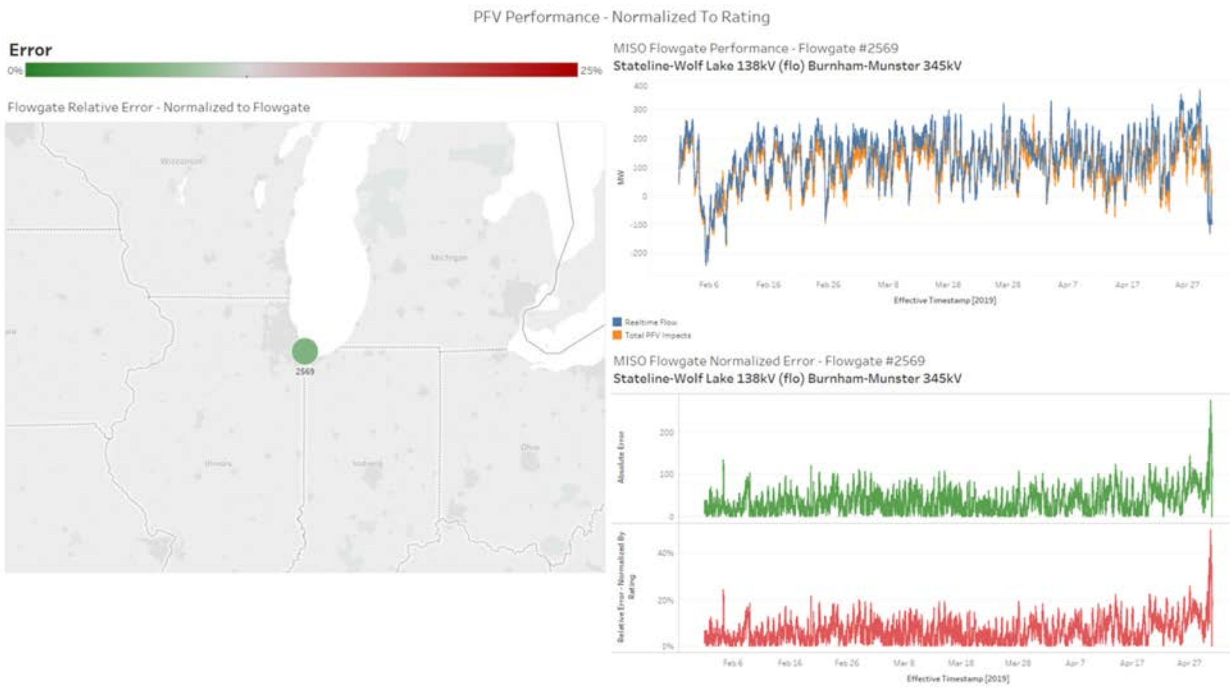
6.7.8 MISO - 2442 - PARADISE-BR TAP 161KV (FLO) PHIPPS BEND-VOLUNTEER 500KV

Flowgate is located in Kentucky and is owned by big river electric cooperative. This flowgate is performing well. Average unaccounted flow is around 5%.



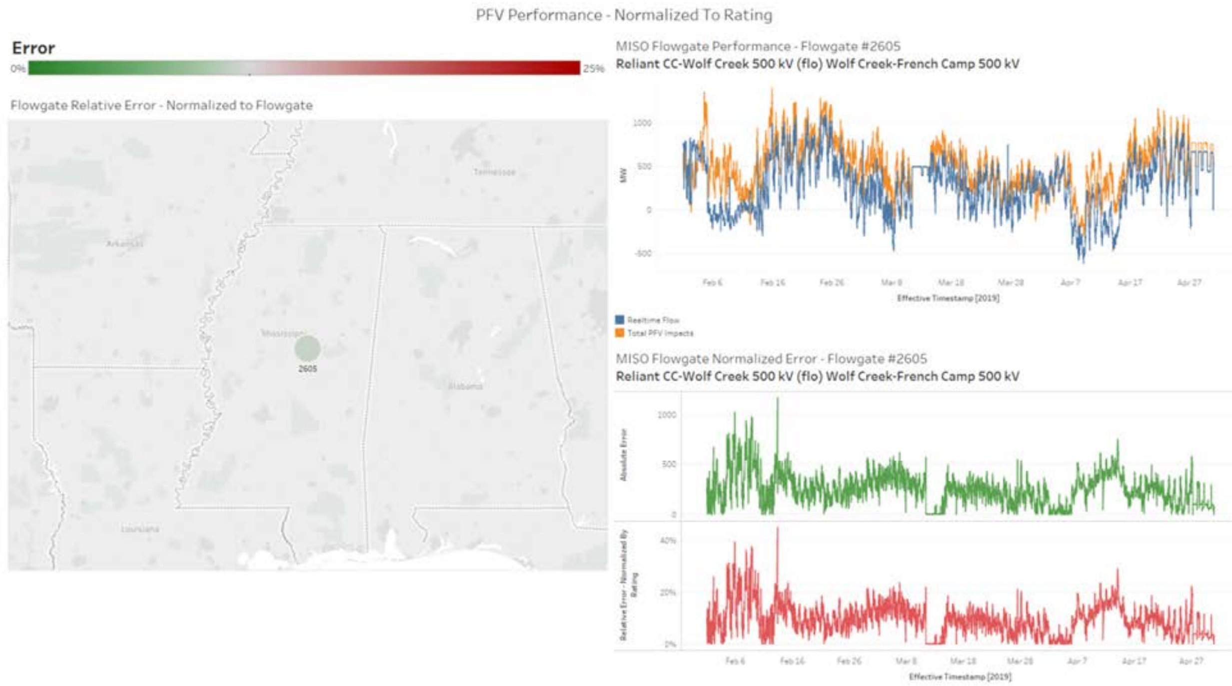
6.7.9 MISO - 2569 - STATELINE-WOLF LAKE 138KV (FLO) BURNHAM-MUNSTER 345KV

Flowgate is located in Northern Indiana. This flowgate is performing well. Average unaccounted flow is around 5%.



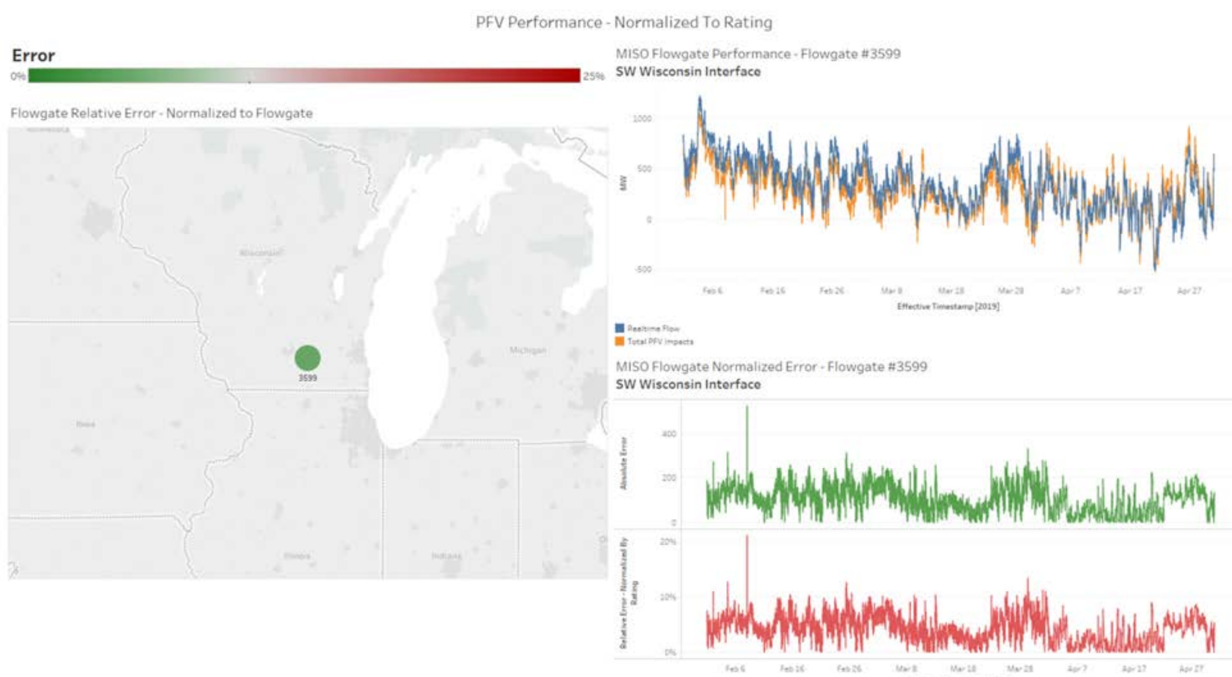
6.7.10 MISO - 2605 - RELIANT CC-WOLF CREEK 500 KV (FLO) WOLF CREEK-FRENCH CAMP 500 KV

Flowgate is located in Entergy Arkansas. This flowgate is performing within 10% unaccounted flows compared to flowgate rating. Average unaccounted flow error percentage is around 9%.



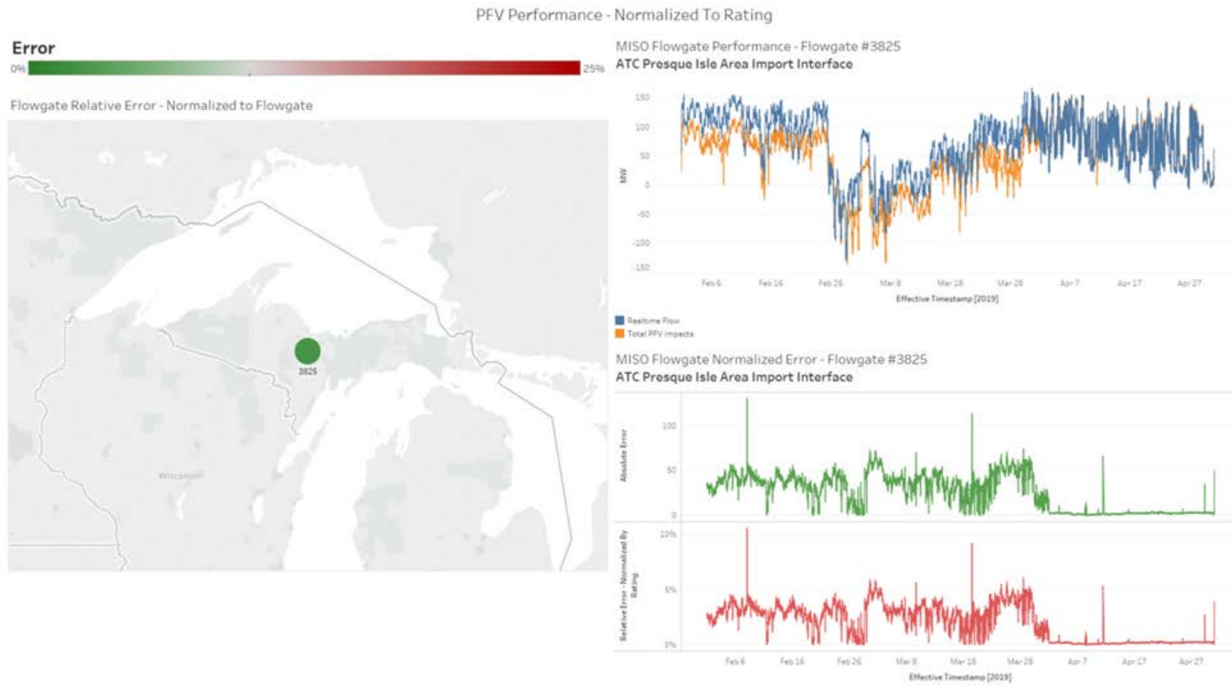
6.7.11 MISO - 3599 - SW WISCONSIN INTERFACE

This flowgate is in Wisconsin area of MISO footprint. Most of the flowgate impacts on this flowgates is MISO GTL. This flowgate is performing well and unaccounted flow is less than 10%. PFV calculated impacts track real time flow well as shown in the chart.



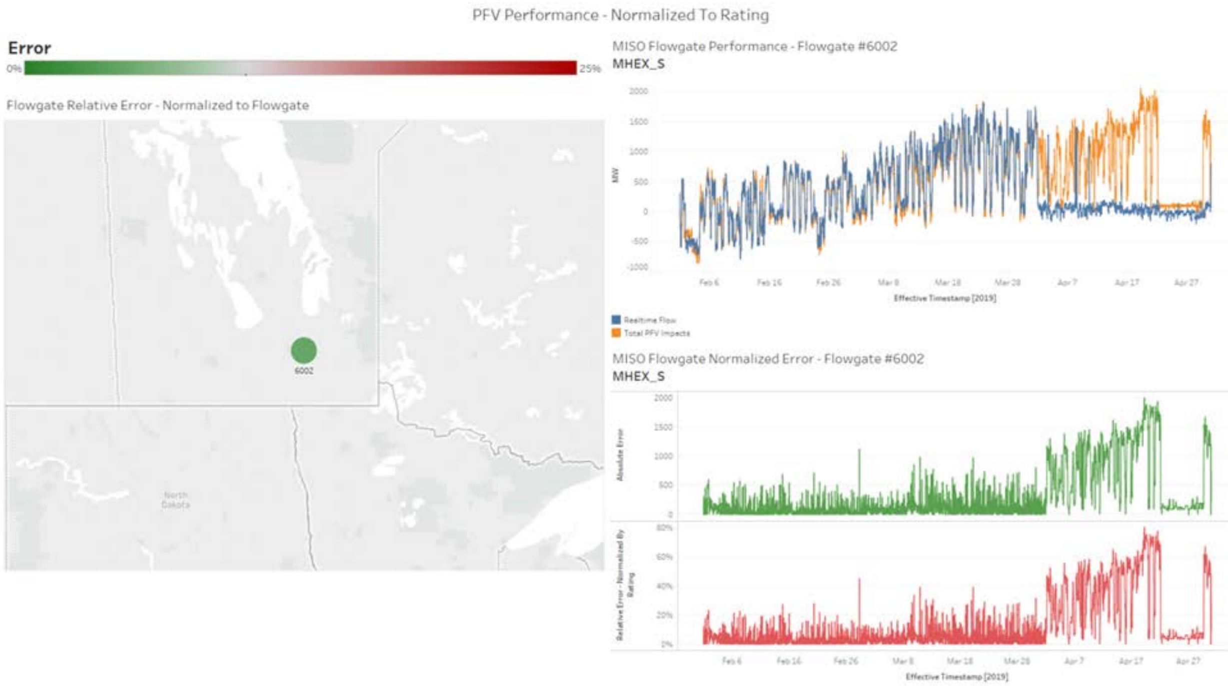
6.7.12 MISO - 3825 - ATC PRESQUE ISLE AREA IMPORT INTERFACE

This flowgate measures the flows into upper peninsula. The flowgate is performing well and PFV impacts track real time flow very well. Its impacted completely by MISO GTL.



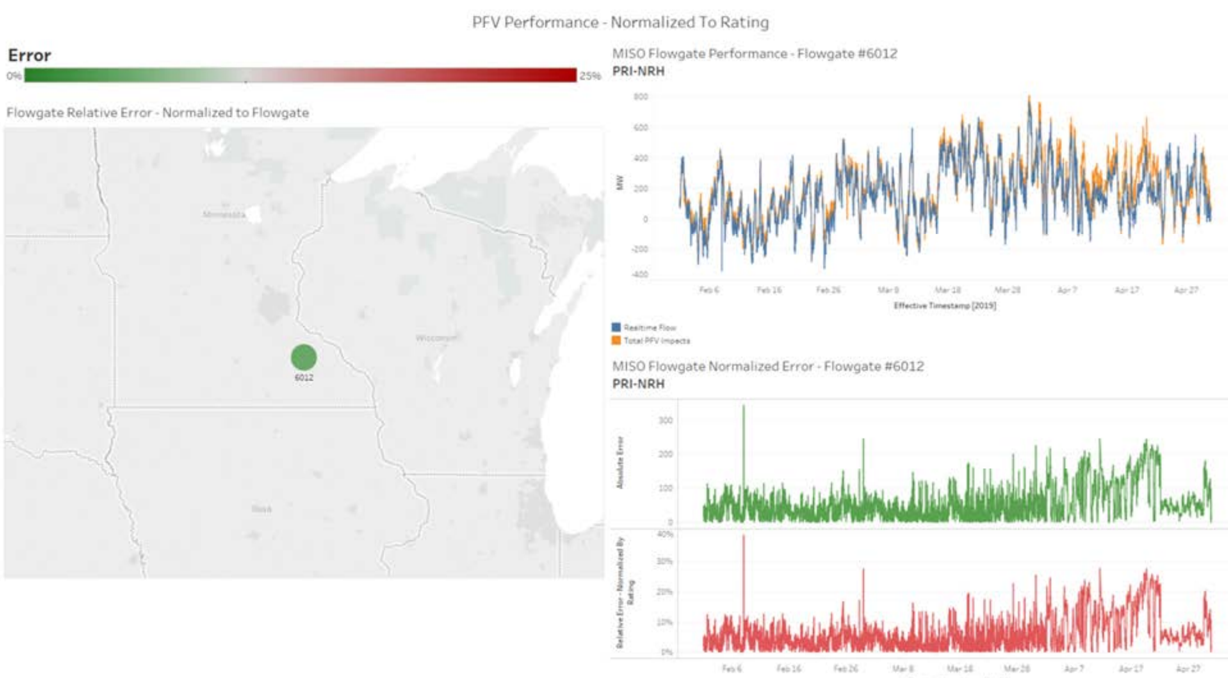
6.7.13 MISO - 6002 - MHEX_S

Flowgate is a tie interface between USA and CANADA and flowgate is owned by MHEB. Tags affect this flowgate. This flowgate is performing well. Average unaccounted flow is around 3%.



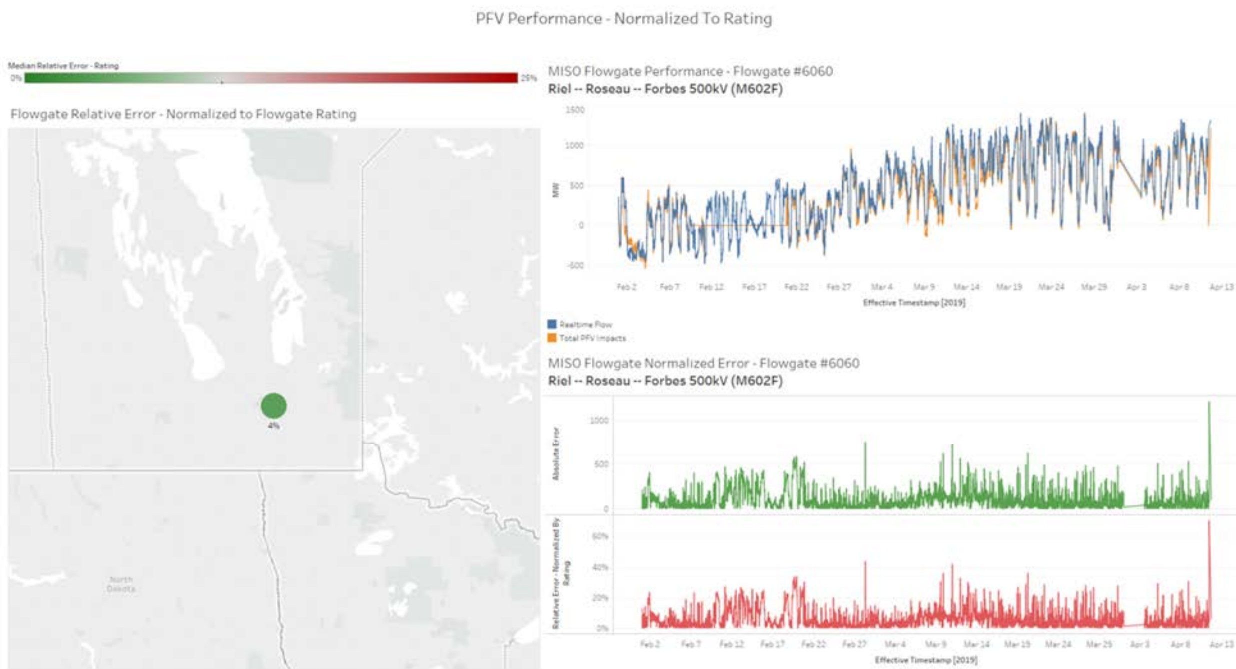
6.7.14 MISO - 6012 - PRI-NRH

Flowgate tracks the flows from Minnesota into Iowa. This flowgate is owned by NSP. The flowgate is performing well.



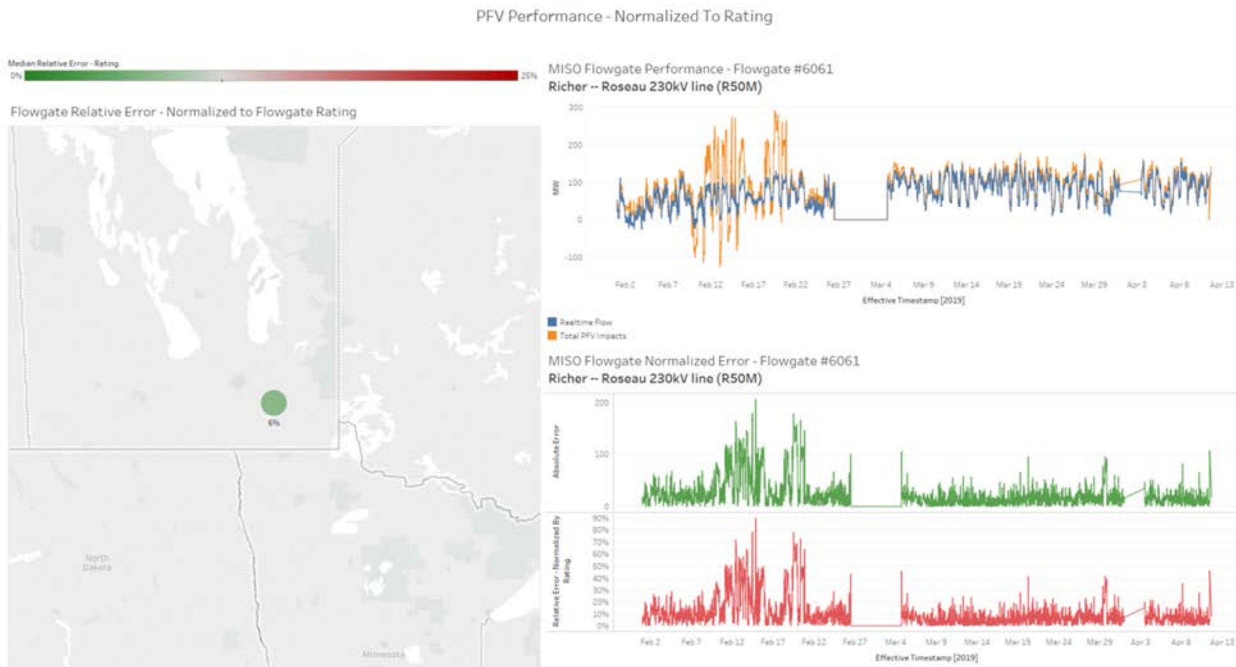
6.7.15 MISO - 6060 - RIEL -- ROSEAU -- FORBES 500KV (M602F)

Flowgate is a tie interface between USA and CANADA and flowgate is owned by MHEB. MHEB GTL/MISO GTL and Tags affect this flowgate. This flowgate is performing well with an average unaccounted flow around 4%.



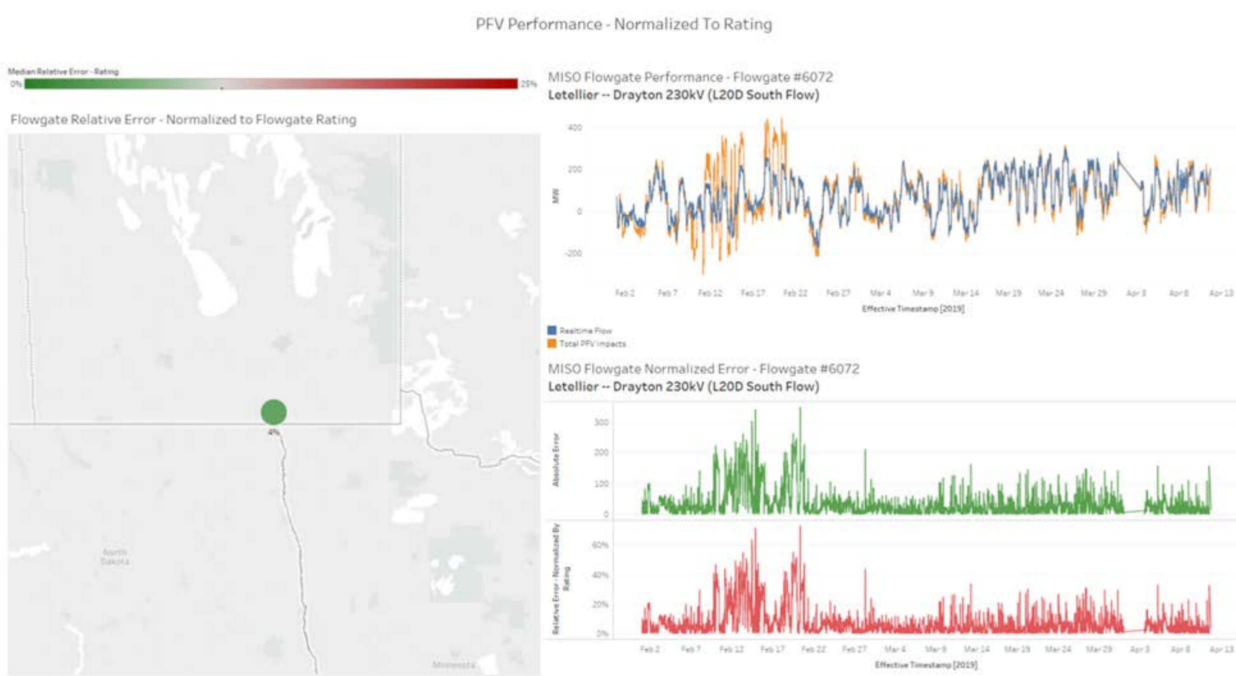
6.7.16 MISO - 6061 - RICHER -- ROSEAU 230KV LINE (R50M)

Flowgate is a tie interface between USA and CANADA and flowgate is owned by MHEB. MHEB GTL/MISO GTL and Tags affect this flowgate. This flowgate is performing well with an average unaccounted flow around 6%.



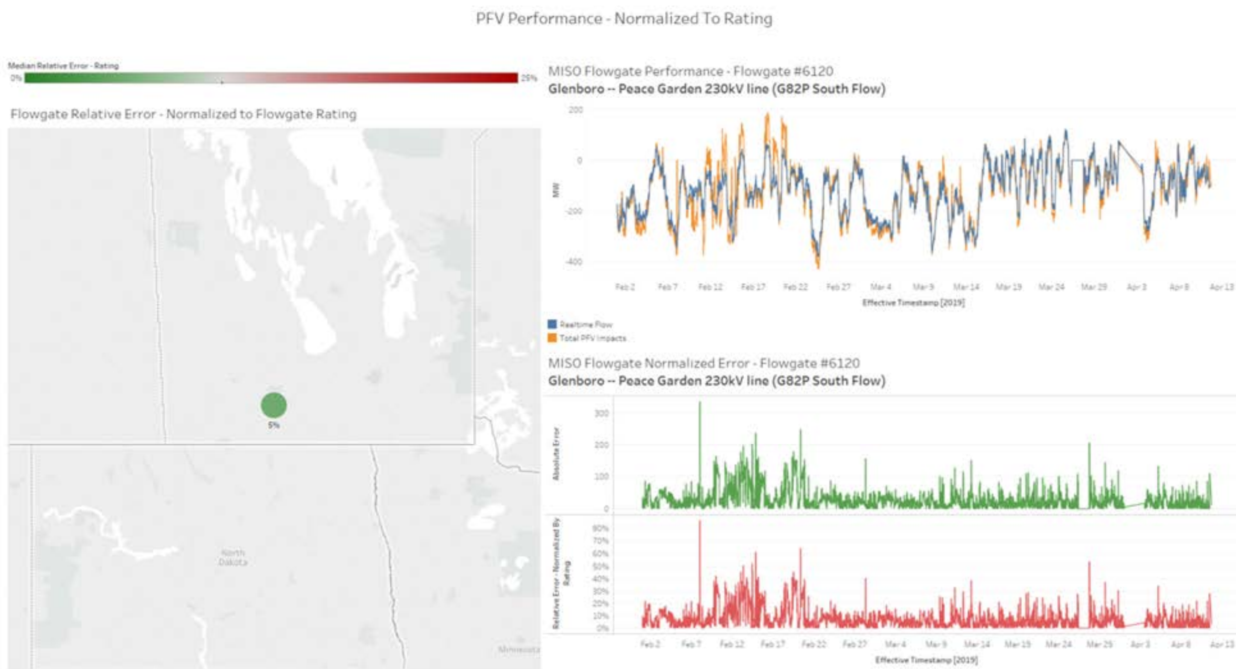
6.7.17 MISO - 6072 - LETELLIER -- DRAYTON 230KV (L20D SOUTH FLOW)

GTL/MISO GTL and Tags affect this flowgate. This flowgate is performing well with an average unaccounted flow around 4%.

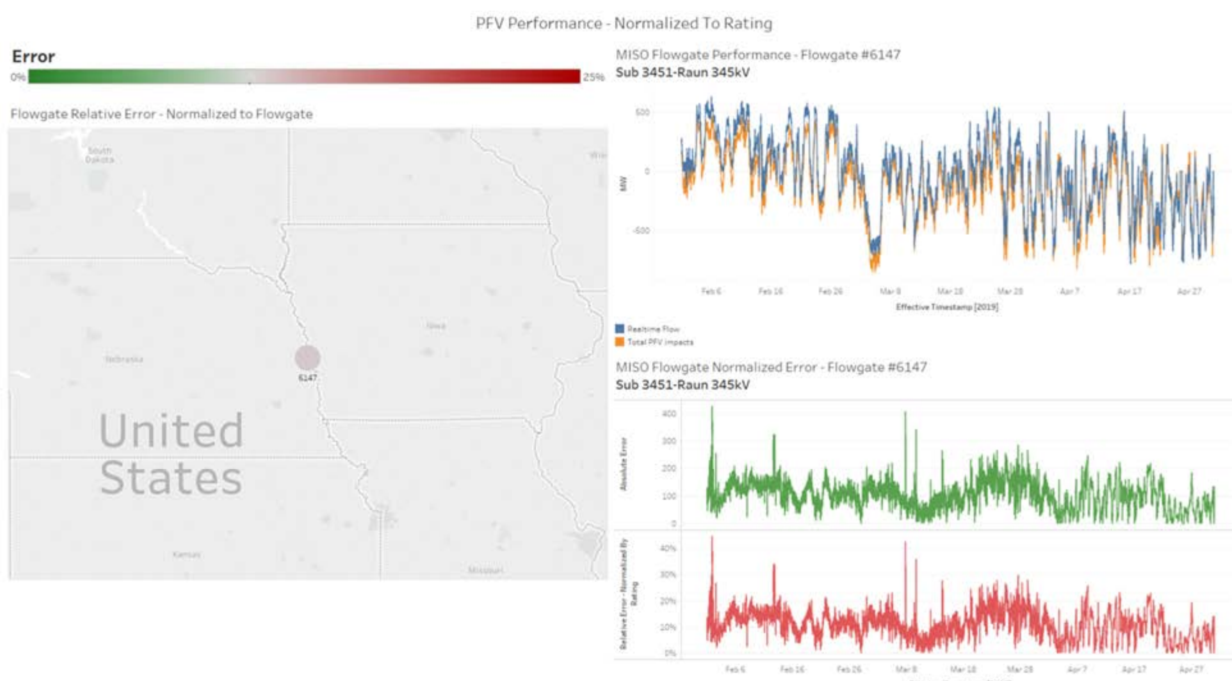


6.7.18 MISO - 6120 - GLENBORO -- PEACE GARDEN 230KV LINE (G82P SOUTH FLOW)

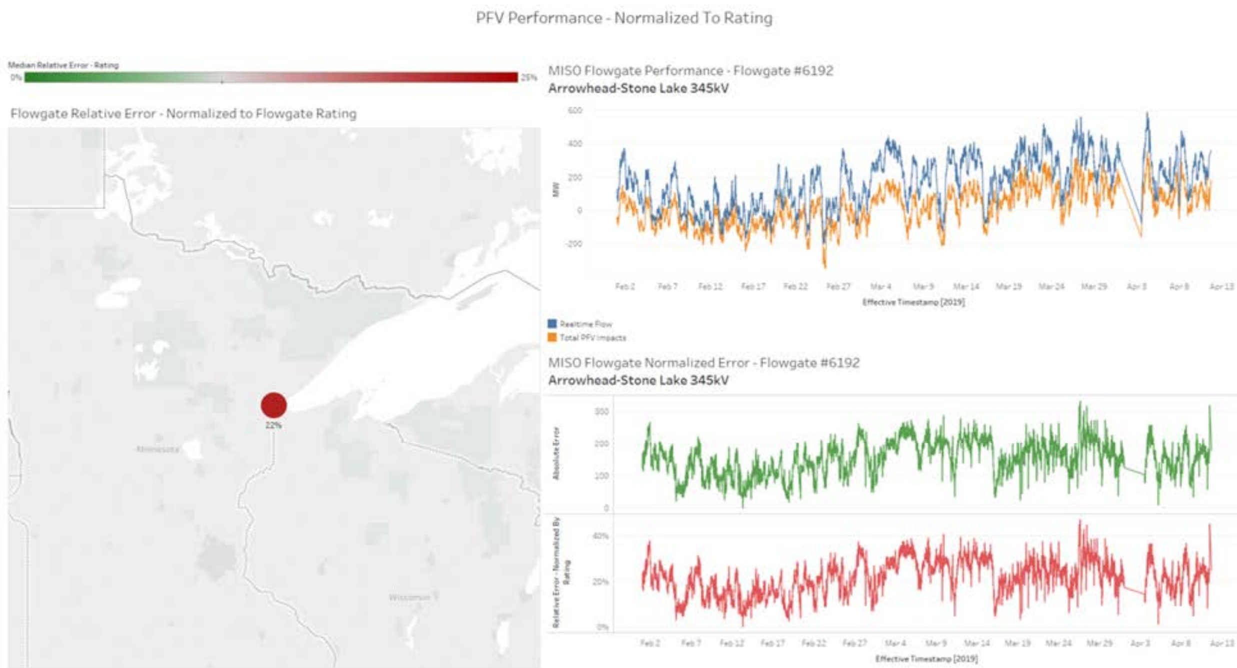
Flowgate is a tie interface between USA and CANADA and flowgate is owned by MHEB. MHEB GTL/MISO GTL and Tags affect this flowgate. This flowgate is performing well with an average unaccounted is around 5%.



6.7.19 MISO - 6147 - SUB 3451-RAUN 345KV

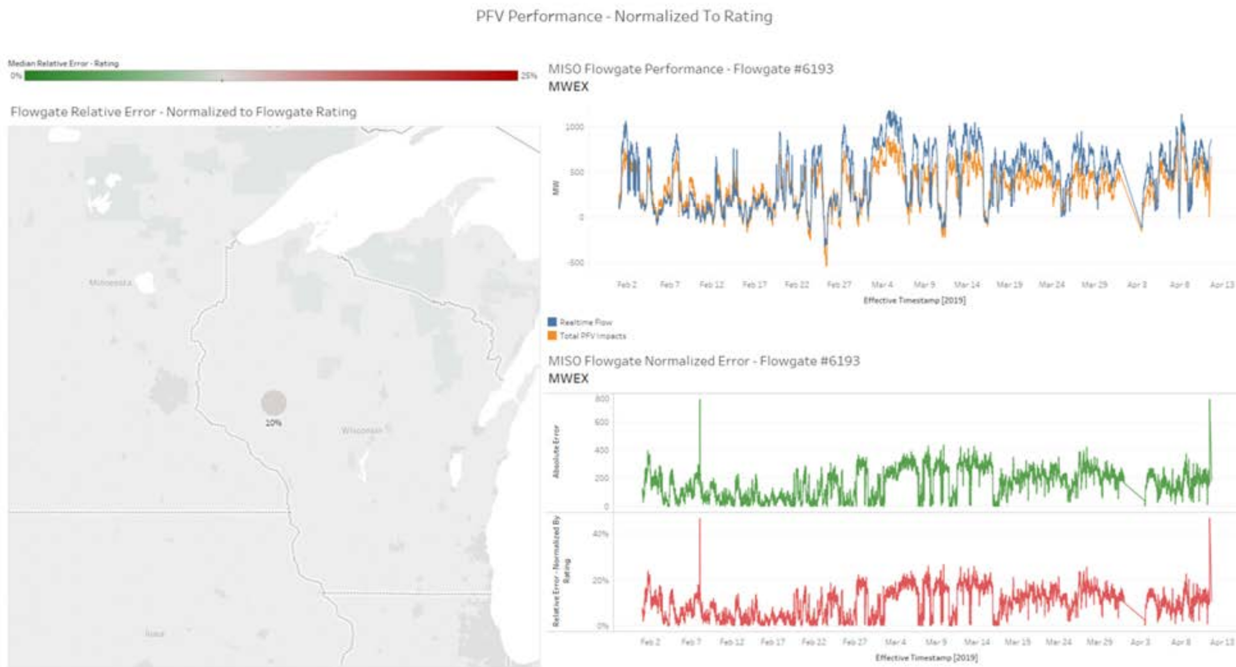


6.7.20 MISO - 6192 - ARROWHEAD-STONE LAKE 345KV

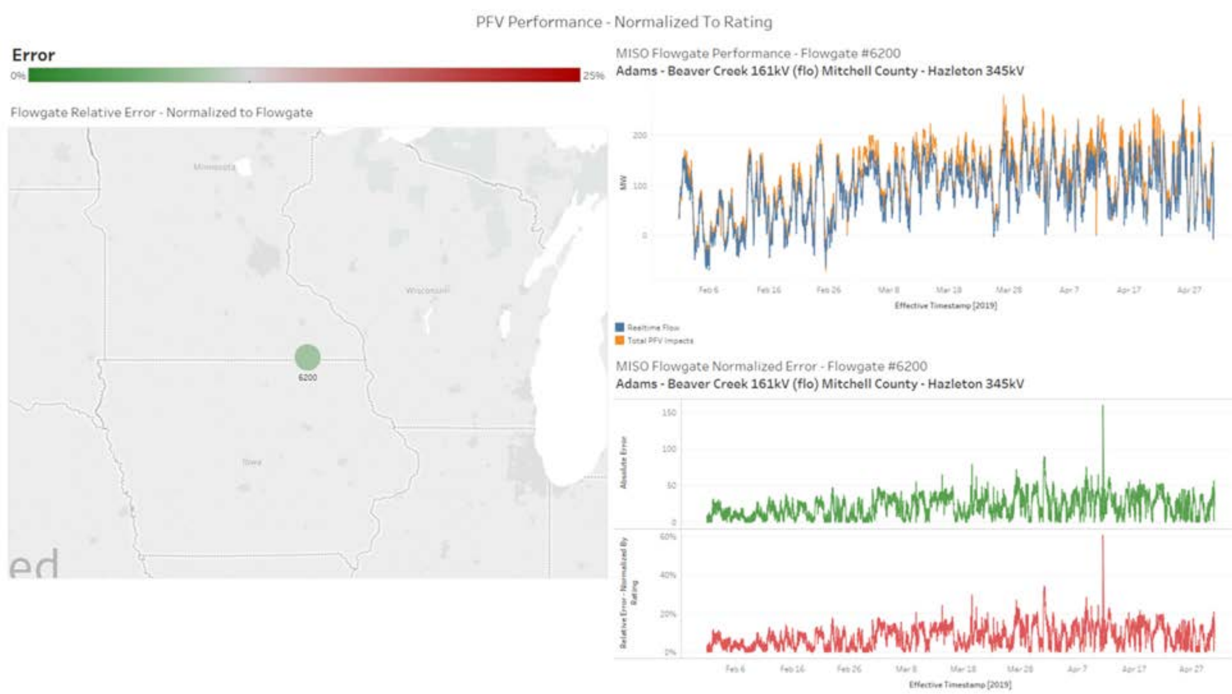


6.7.21 MISO - 6193 – MWEX

Flowgate tracks the export flows between Minnesota and Wisconsin. Both export flows from North Dakota and Manitoba into MISO east region impacts this flowgate. Overall, the flowgate is performing around 10% unaccounted flows. There is some unaccounted flow might be the result of how tags are currently modeled in IDC.

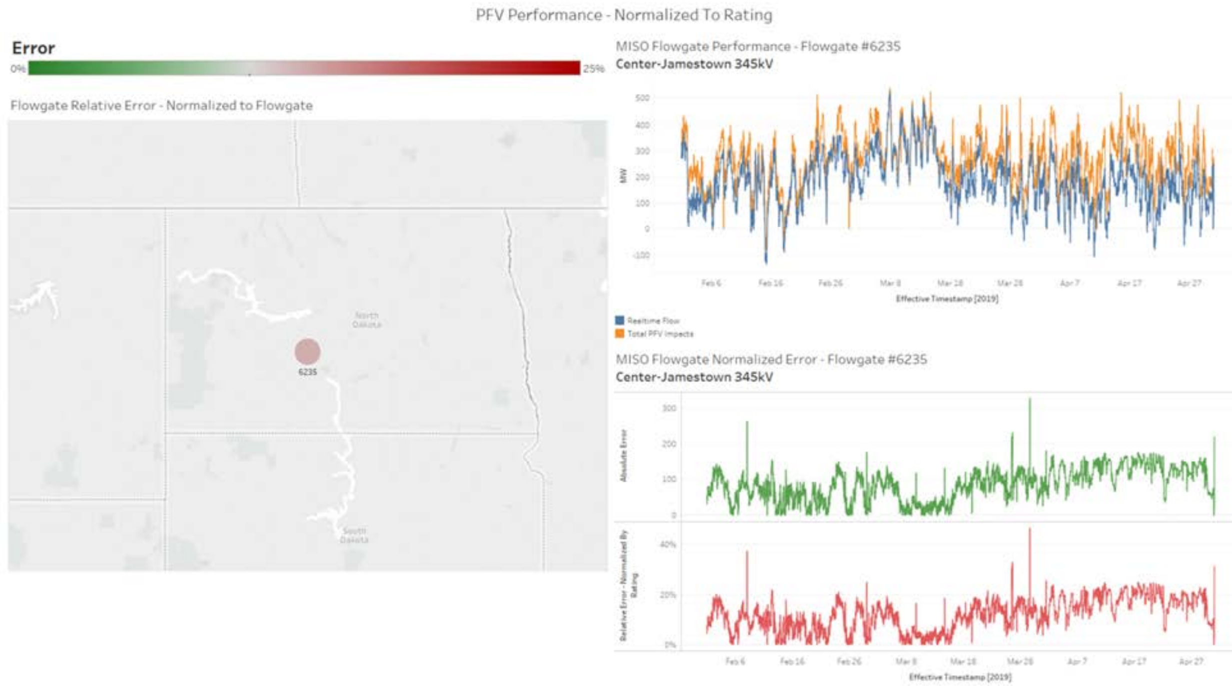


6.7.22 MISO - 6200 - ADAMS - BEAVER CREEK 161KV (FLO) MITCHELL COUNTY - HAZLETON 345KV

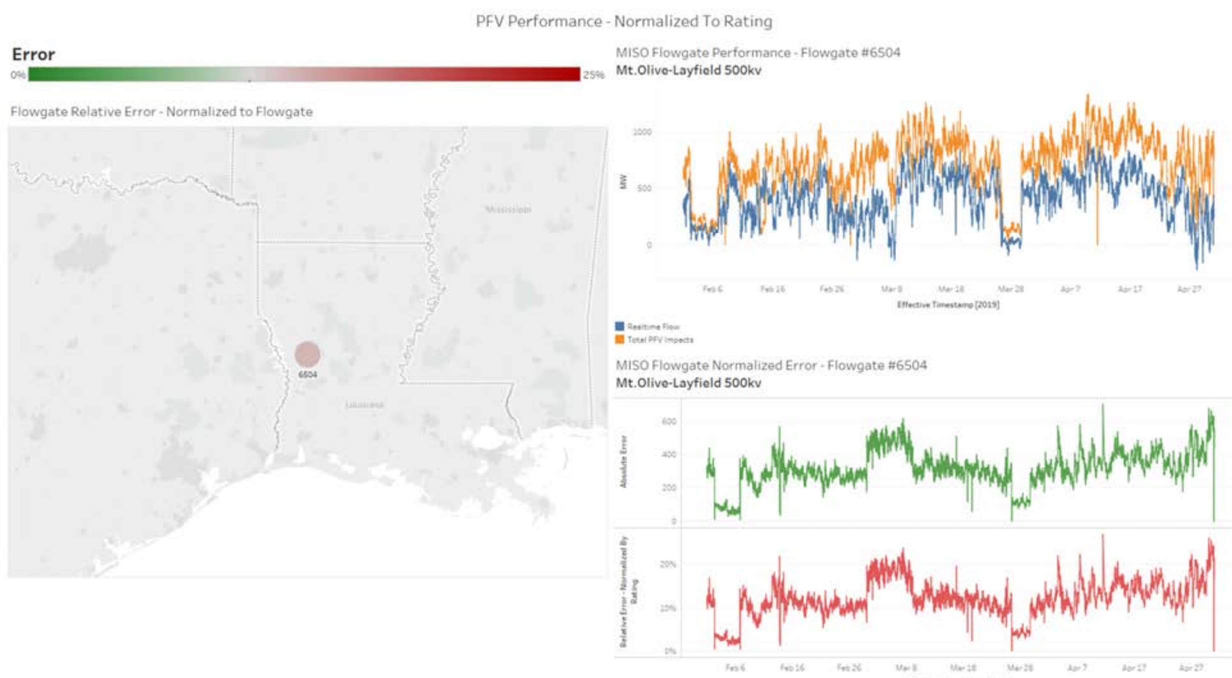


6.7.23 MISO - 6235 - CENTER-JAMESTOWN 345KV

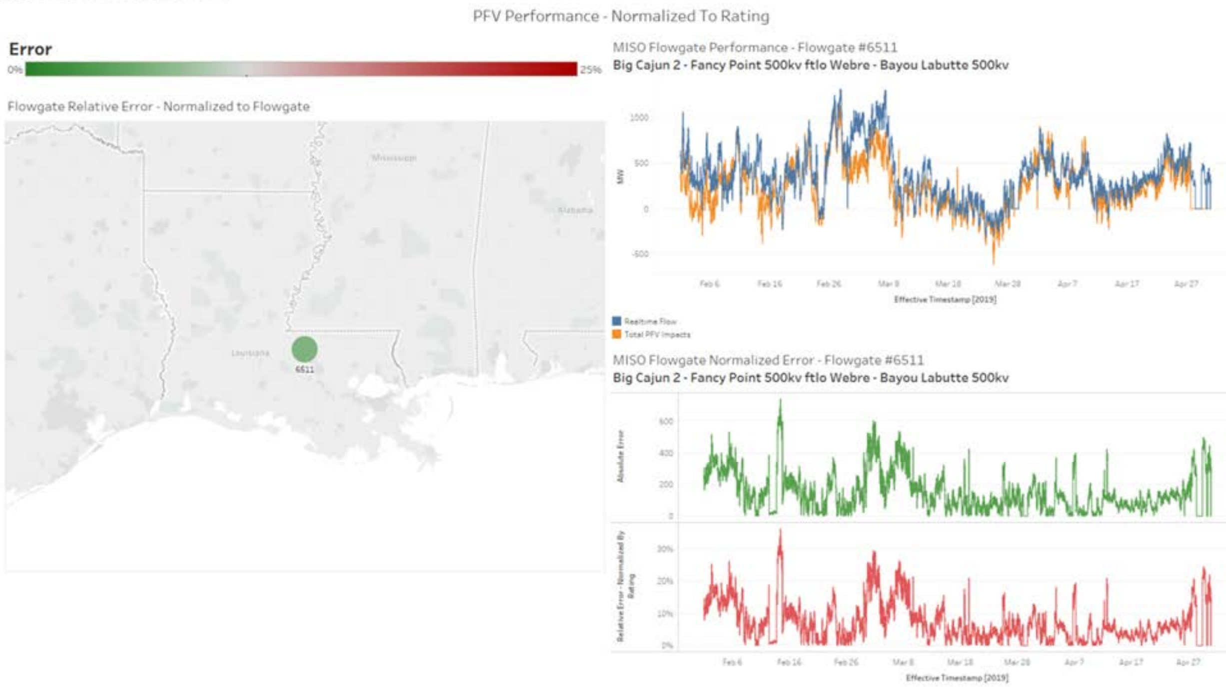
Flowgate is located in North Dakota. Flowgate is impacted by 2 DC lines that originate in the area.



6.7.24 MISO - 6504 - MT.OLIVE-LAYFIELD 500KV

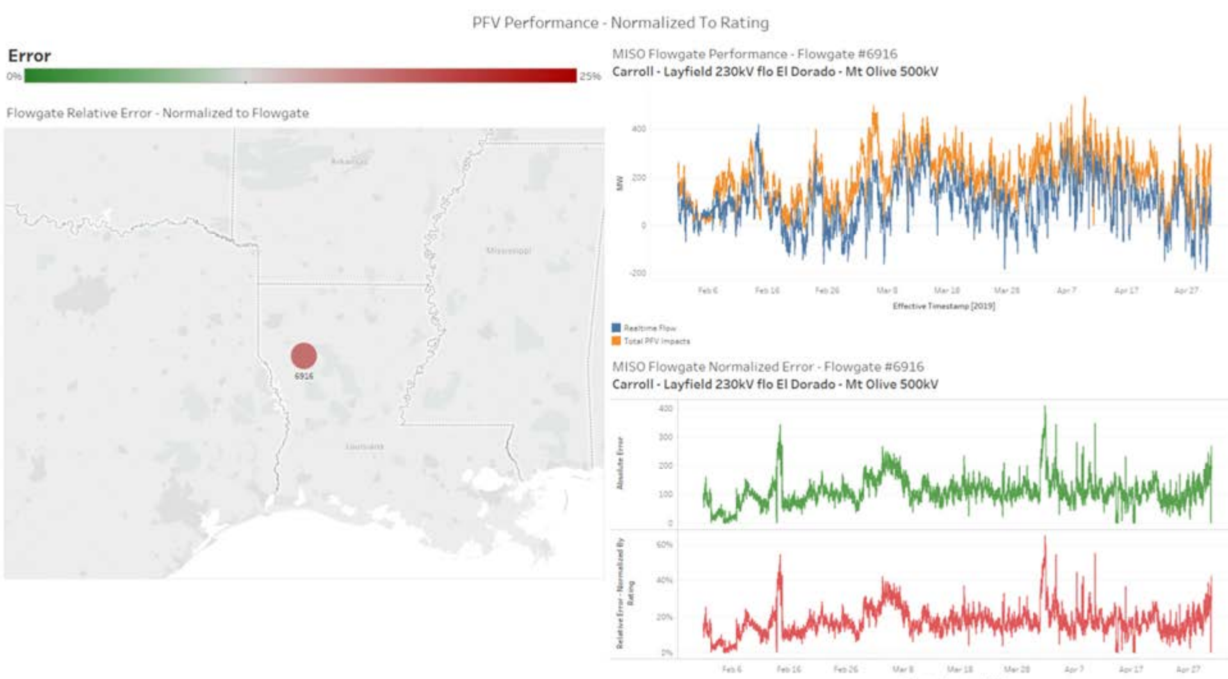


6.7.25 MISO - 6511 - BIG CAJUN 2 - FANCY POINT 500KV FTLO WEBRE - BAYOU LABUTTE 500KV

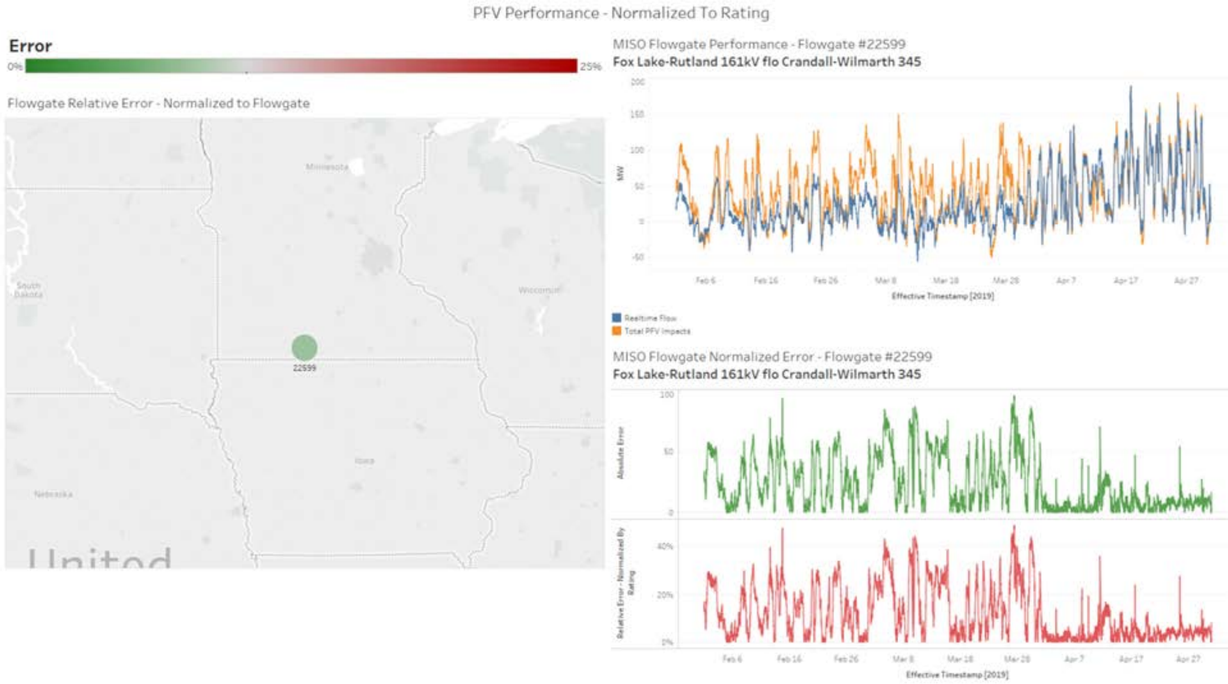


6.7.26 MISO - 6916 - CARROLL - LAYFIELD 230KV FLO EL DORADO - MT OLIVE 500KV

Flowgate is located in Louisiana and is owned by Cleco. Flowgate is not performing well. PFV is calculating higher impacts than real time flow.

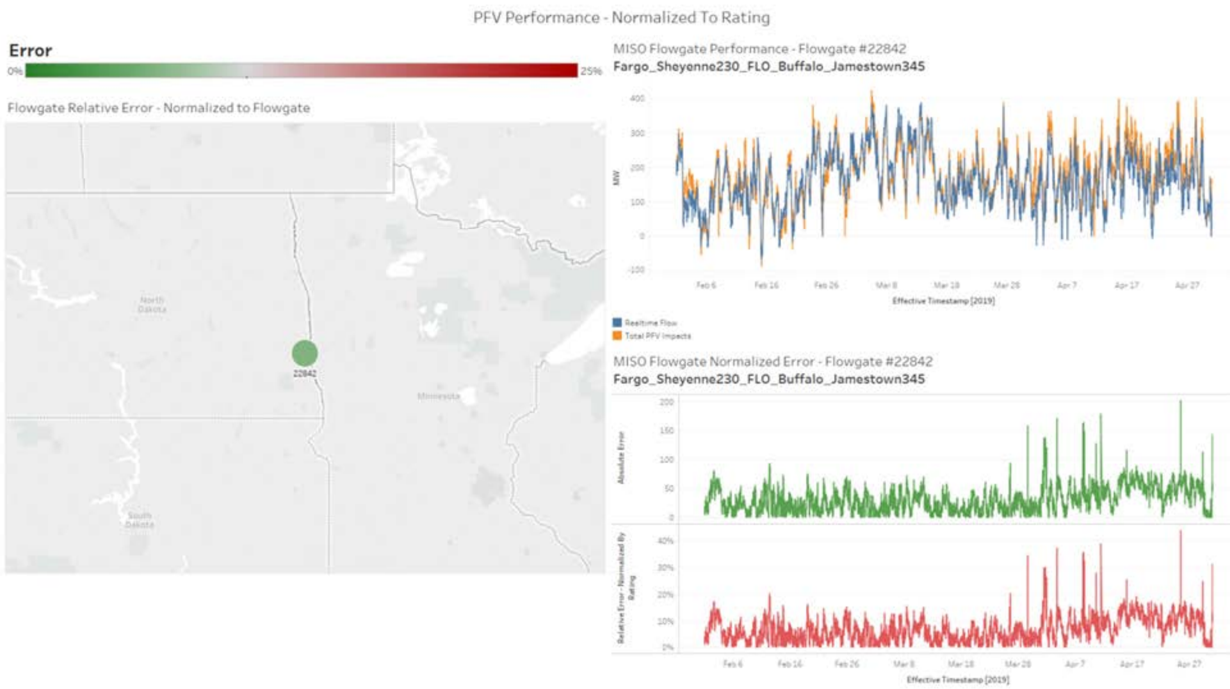


6.7.27 MISO 22599 - FOX LAKE-RUTLAND 161KV FLO CRANDALL-WILMARTH 345



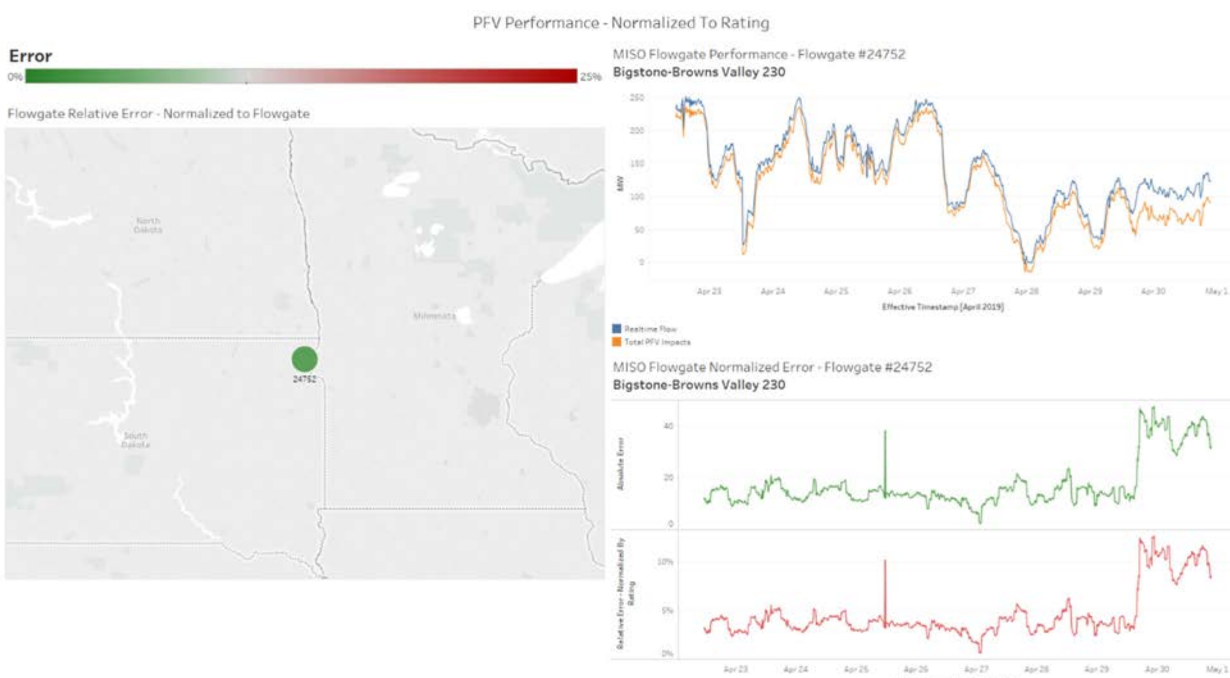
6.7.28 MISO 22842 - FARGO_SHEYENNE230_FLO_BUFFALO_JAMESTOWN345

Flowgate is located in North Dakota and captures both MISO GTL and SPP GTL. Flowgate is performing well with unaccounted flow impacts under 10%.



6.7.29 MISO 24752 - BIGSTONE-BROWNS VALLEY 230

Flowgate is located in North Dakota and captures both MISO GTL and SPP GTL. Flowgate is performing well with unaccounted flow impacts under 10%.

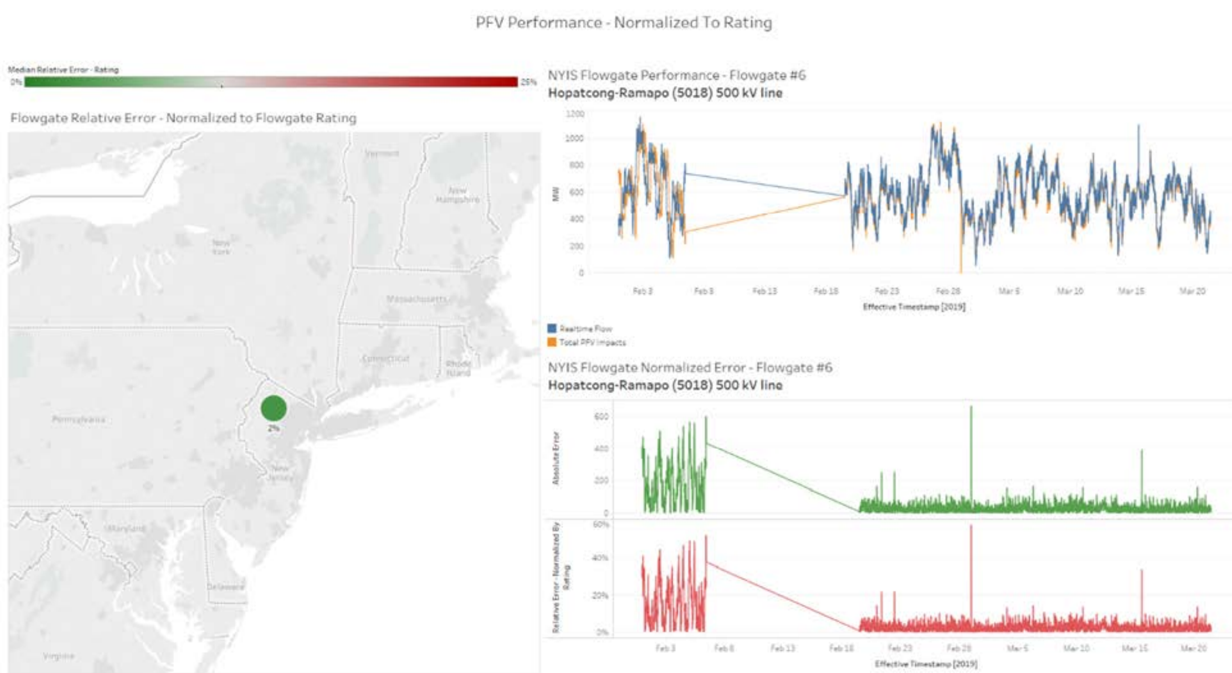


6.8 NYISO

6.8.1 NYIS - 6 - HOPATCONG-RAMAPO (5018) 500 KV LINE

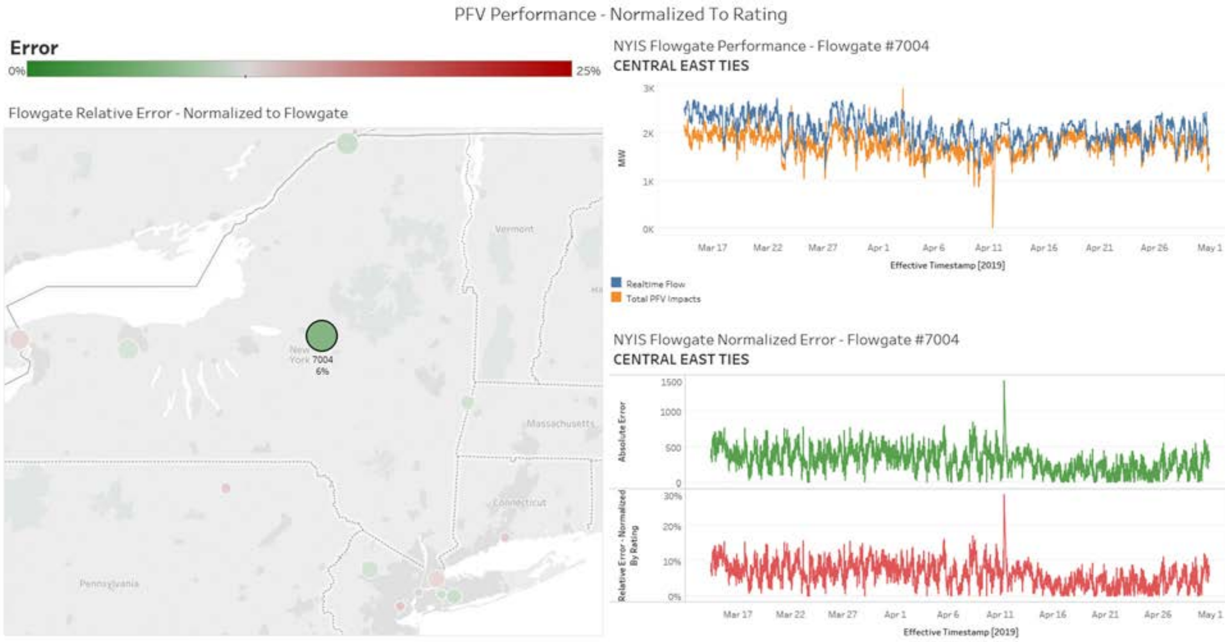
The flowgates in New York are not automatically monitored in PFV and must be manually set to monitor each month. As such, there are some gaps in monitoring data, most noticeable from February 8th to the 18th of the same month.

Flowgate 6 monitors a 500 kV regulated PAR controlled tie line between New York and PJM. The flowgate exhibits very good performance, which is to be expected since the impact calculation is solely dependent on the real-time flow submitted for the regulating PAR. A data submission issue was corrected in mid-February which improved performance over the early February data.



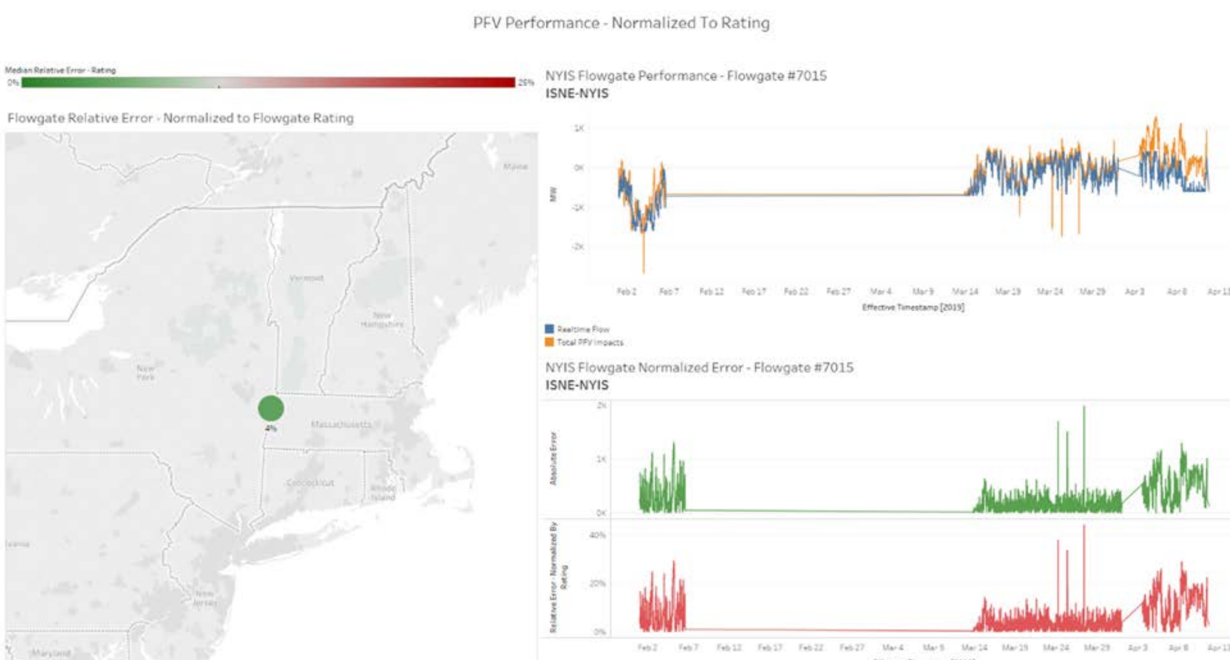
6.8.2 NYIS - 7004 - CENTRAL EAST TIES

Flowgate 7004 monitors the Central-East interface which cuts north-south through the center of New York. Performance of this flowgate is OK, however it could be better if settings on regulating PARs in neighboring regions were kept on schedule either through real-time submissions or active operator monitoring. Good performance, acceptable for use in operations, would require ratings normalized errors <5%.



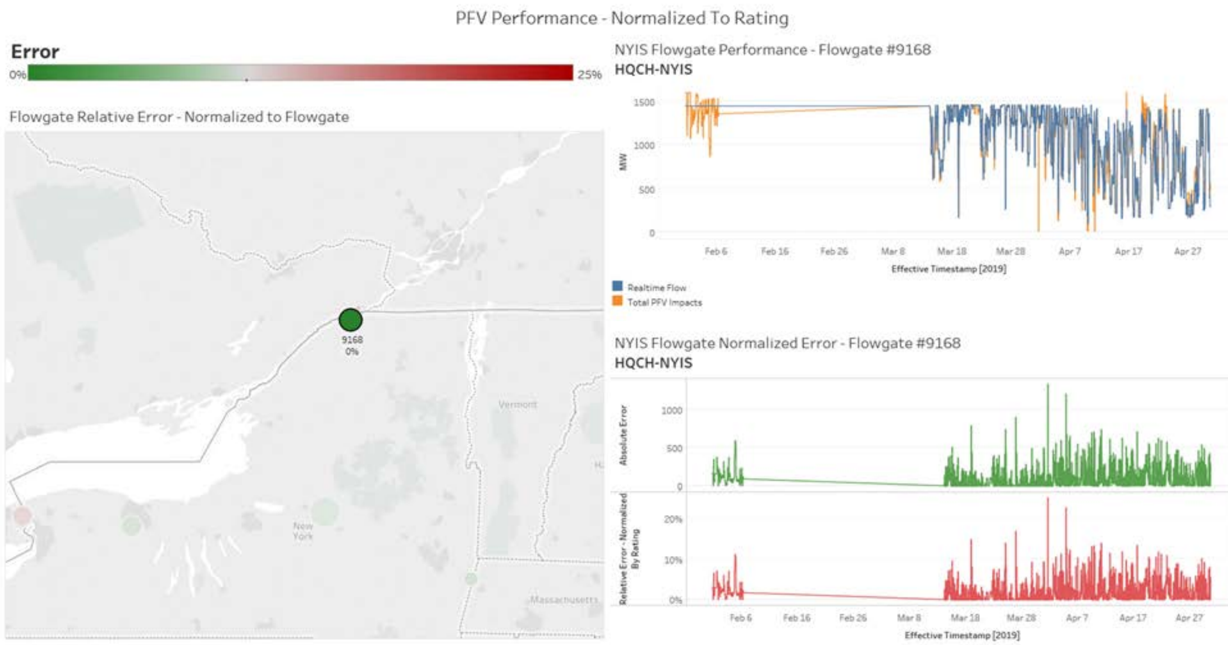
6.8.3 NYIS - 7015 - ISNE-NYIS

Flowgate 7015 monitors the New York interface with ISO New England. The calculated impact of this flowgate is entirely driven by tag data and regulating PAR impacts. As a result it exhibits good performance. Performance in April was poor due to an issue mapping tags to their appropriate lines. That issue has since been corrected and average error has returned to levels observed in March.



6.8.4 NYIS - 9168 - HQCH-NYIS

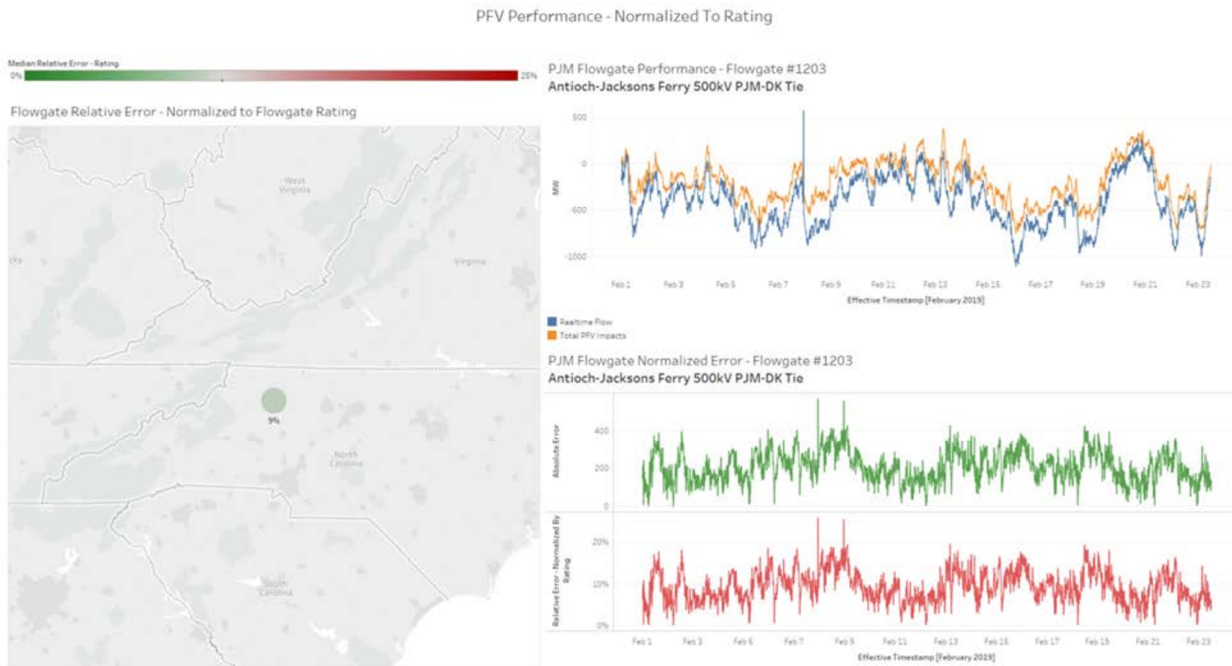
FG 9168 represents a 765 kV tie line with Hydro Québec. The tie is supplied by an HVDC line and large hydro generation in Québec. The flowgate impact is entirely driven by tag data and as a result performance is very good.



6.9 PJM

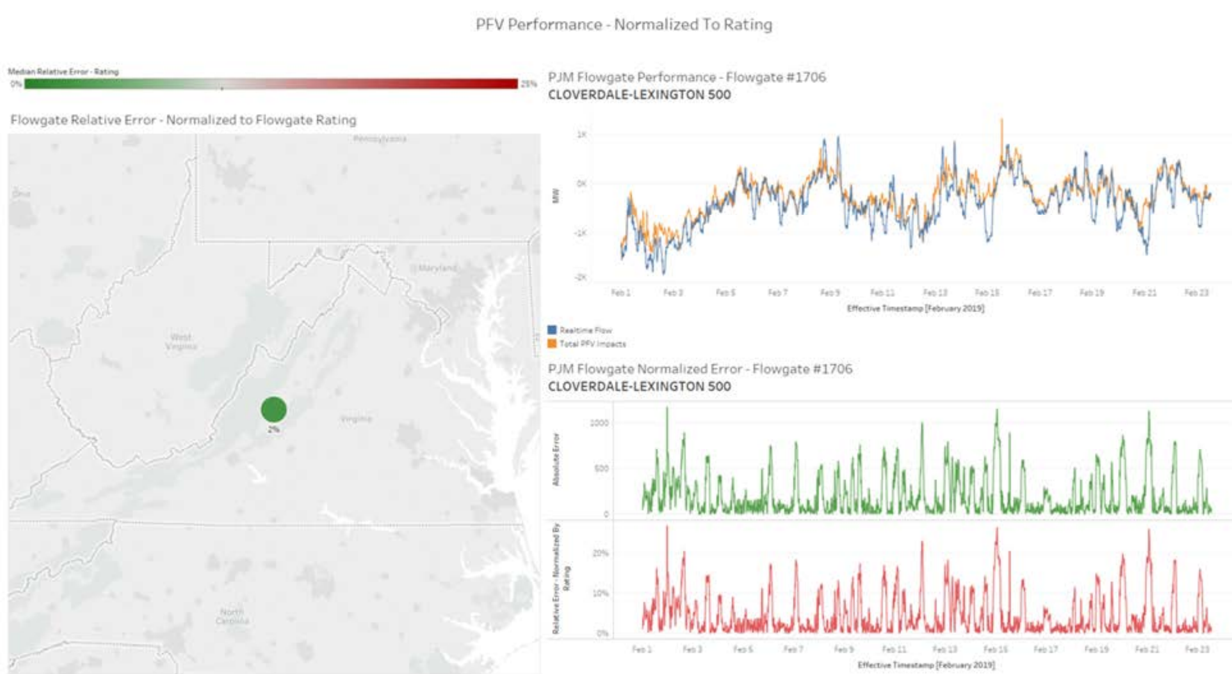
6.9.1 PJM - 1203 - ANTIOCH-JACKSONS FERRY 500KV PJM-DK TIE

This flowgate is trending relatively well, with a consistent bias of around 200 MW between the calculated and reported flows. A larger facility, this bias could be due to a number of small contributing factors.



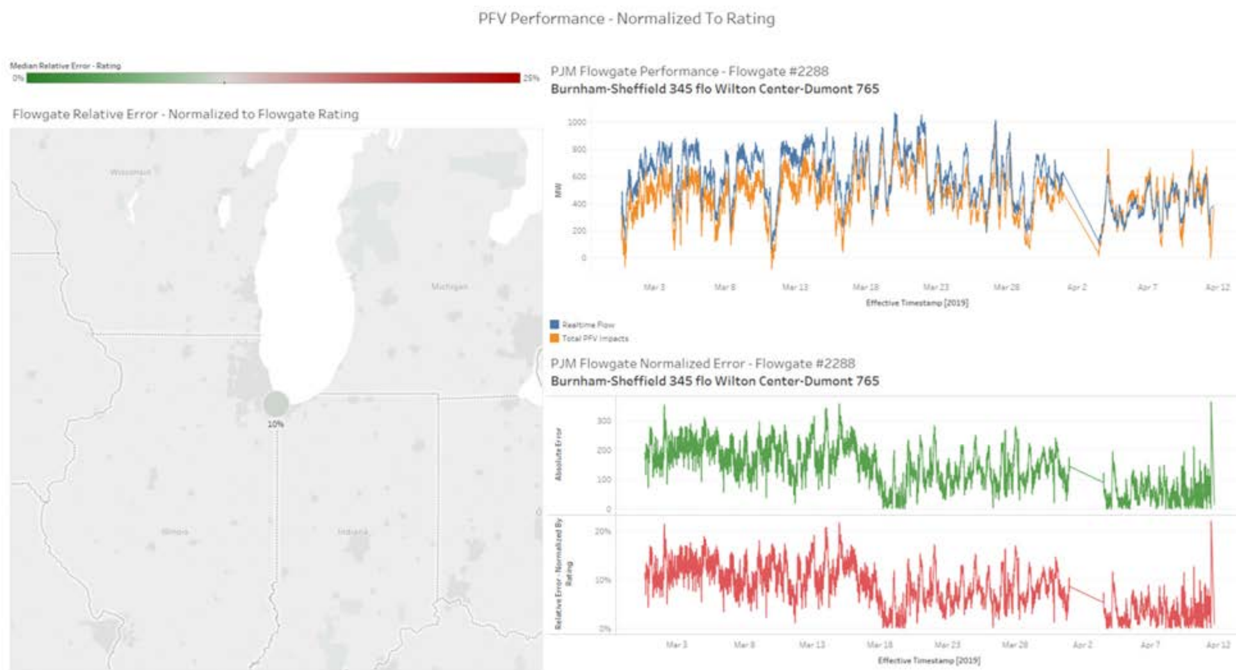
6.9.2 PJM - 1706 - CLOVERDALE-LEXINGTON 500

An interesting phenomena in either the PFV calculation or real-time data flow submission. While this flowgate general trends well, there are periods where the submitted flow and calculated impact diverge. Those periods occur on a persistent and almost regular basis. This flowgate is being reviewed.



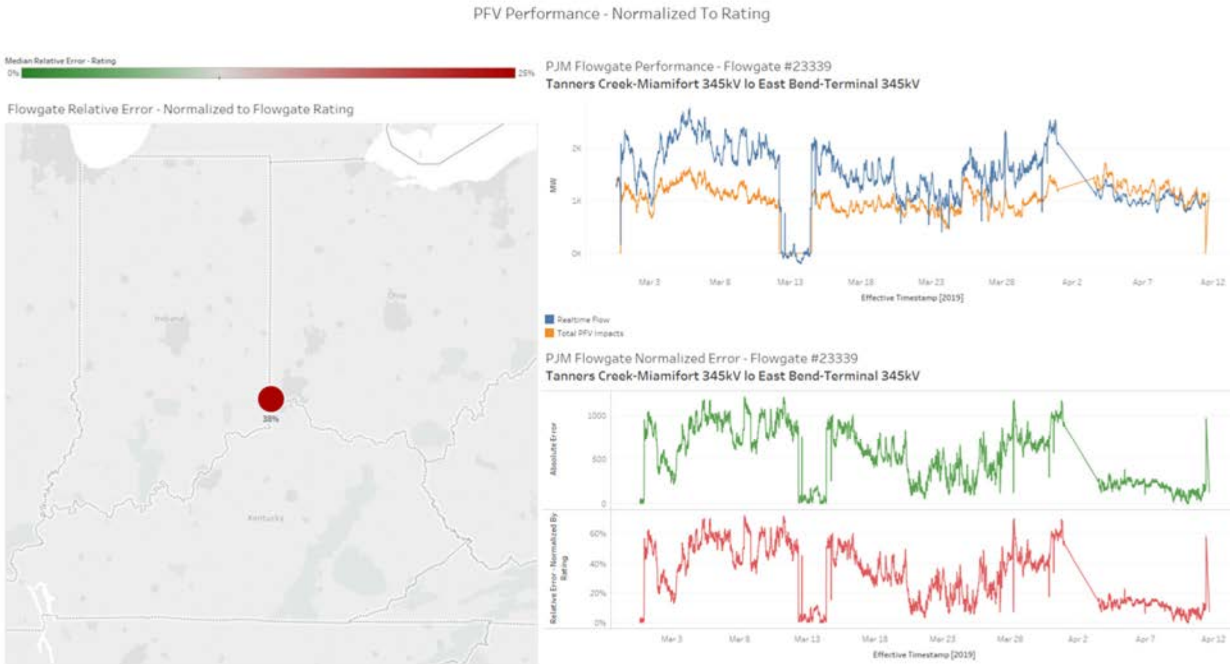
6.9.3 PJM - 2288 - BURNHAM-SHEFFIELD 345 FLO WILTON CENTER-DUMONT 765

Although generally good trending, this flowgate has been on the cusp of being a poor performer, and the error bias has not been consistent. More recent data shows better performance after some smaller generator submissions corrections were made.



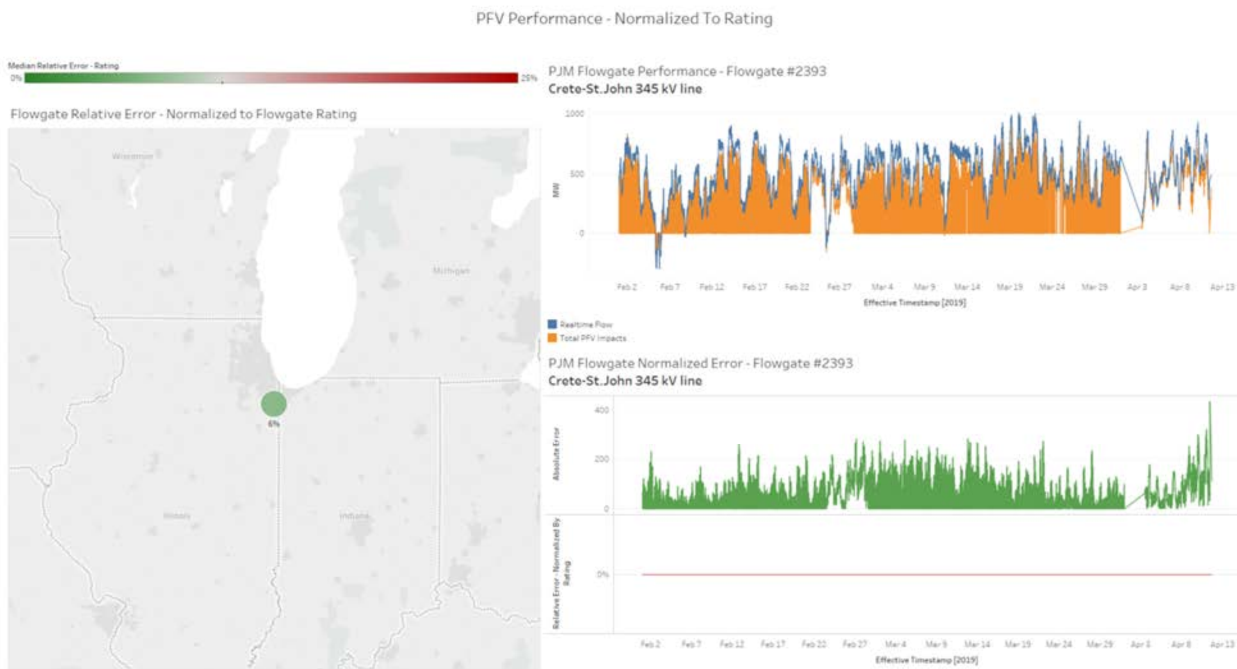
6.9.4 PJM - 23339 - TANNERS CREEK-MIAMIFORT 345KV LO EAST BEND-TERMINAL 345KV

A submission issue was pulling the flows from two transmission lines and submitting the sum of those two lines as the flow over this monitored element. This mapping issue was corrected at the beginning of April, and the result is much better performance, but there still is room for improvement here.



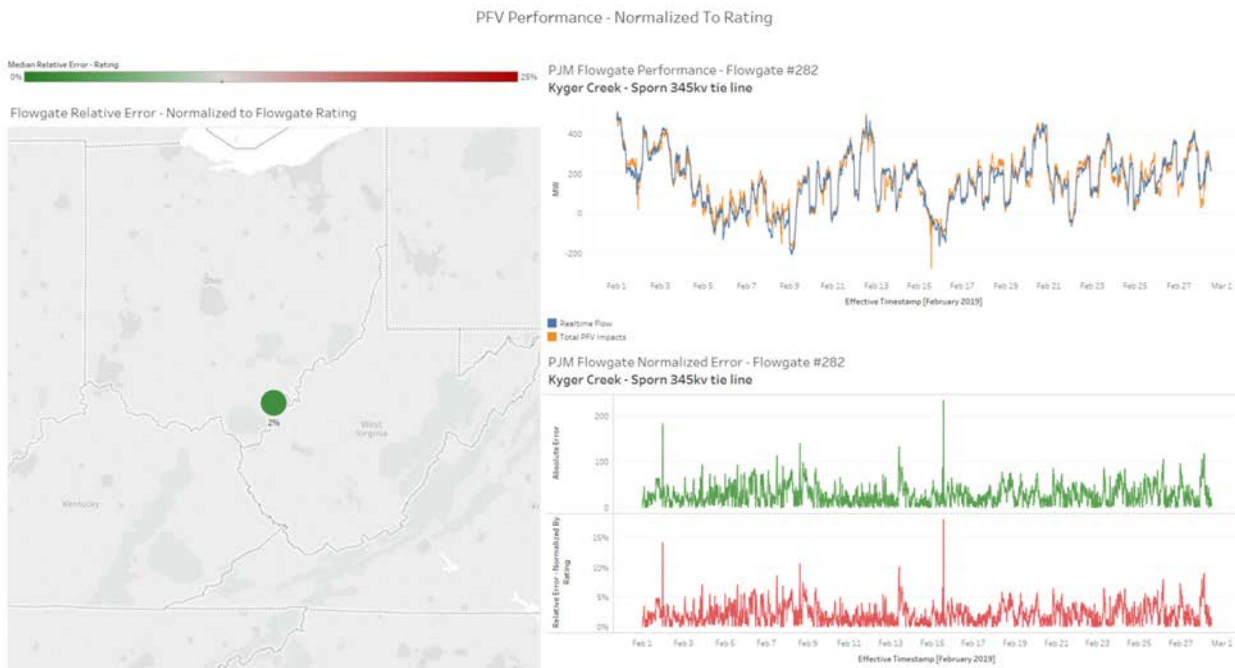
6.9.6 PJM - 2393 - CRETE-ST.JOHN 345 KV LINE

The thick orange on the top chart is the result of both MISO and PJM submitting data as the primary entity. Performance on this flowgate is good, it trends well and in most cases has a low error.



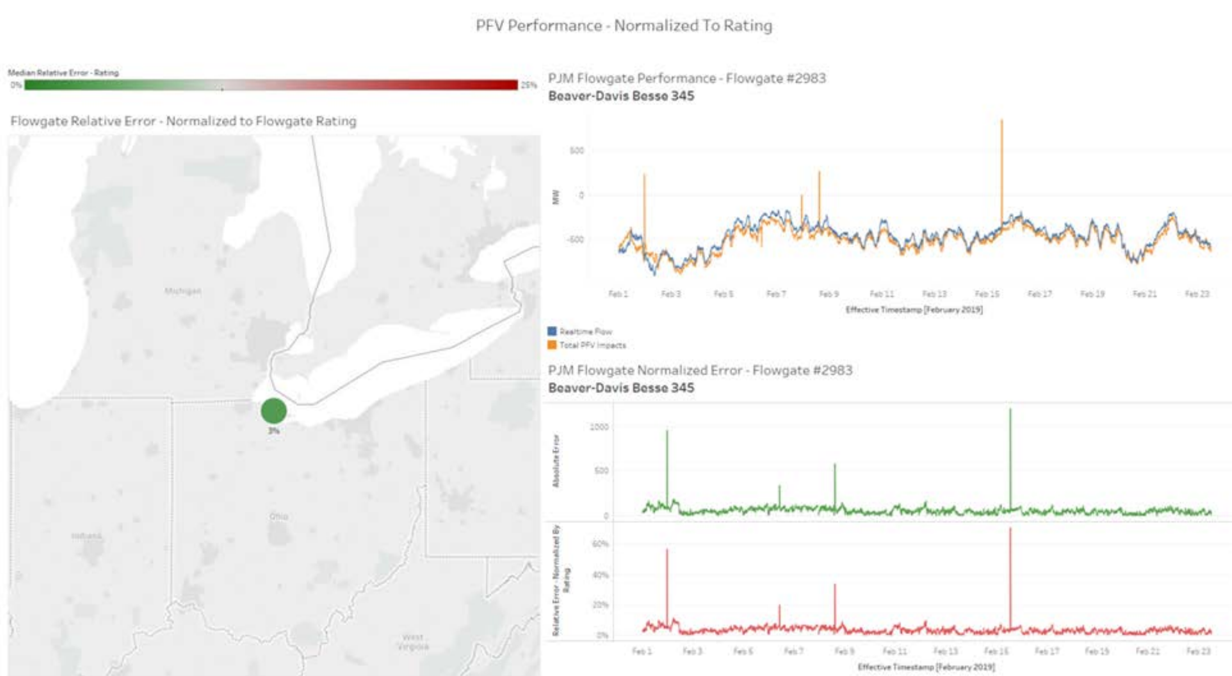
6.9.8 PJM - 282 - KYGER CREEK - SPORN 345KV TIE LINE

This flowgate is performing very well, trending with a very low error bias.



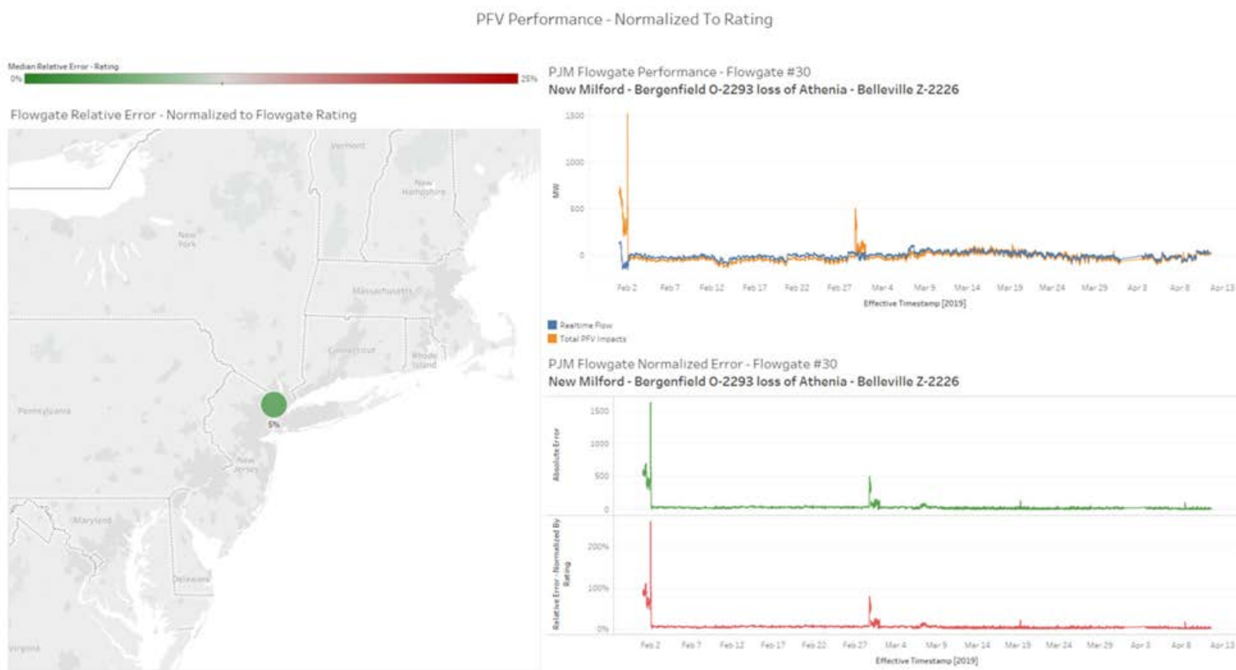
6.9.9 PJM - 2983 - BEAVER-DAVIS BESSE 345

This flowgate is performing very well, trending with a very low error bias.



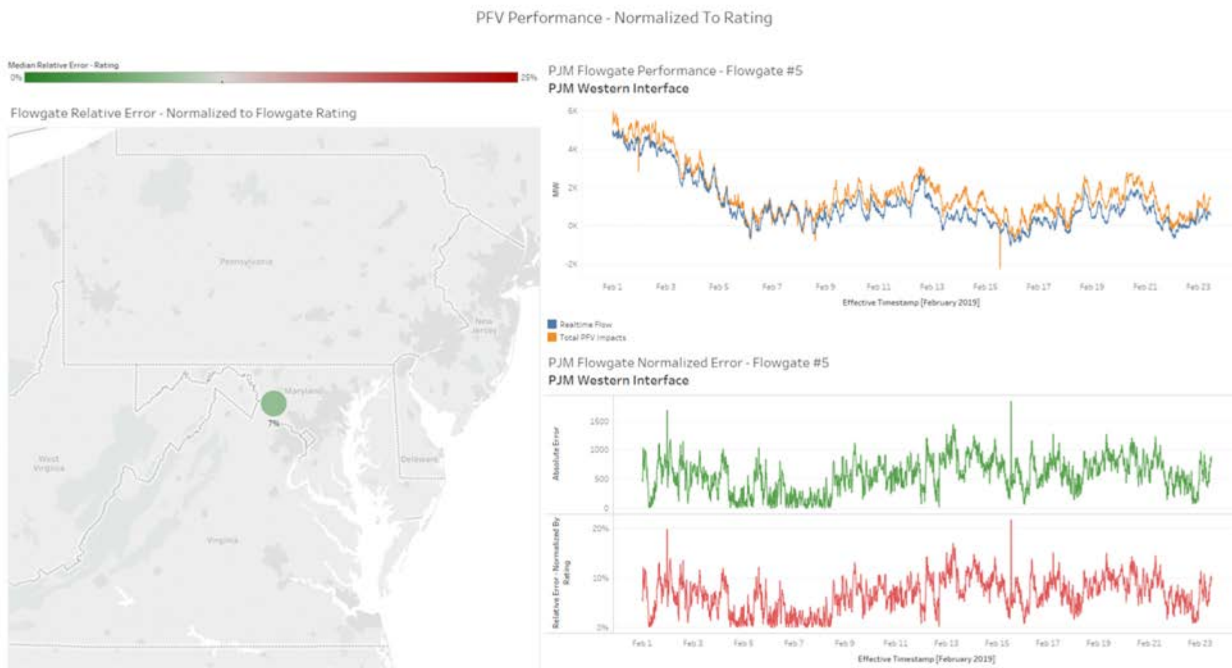
6.9.10 PJM - 30 - NEW MILFORD - BERGENFIELD O-2293 LOSS OF ATHENIA - BELLEVILLE Z-2226

This flowgate is performing very well, trending with a very low error bias.



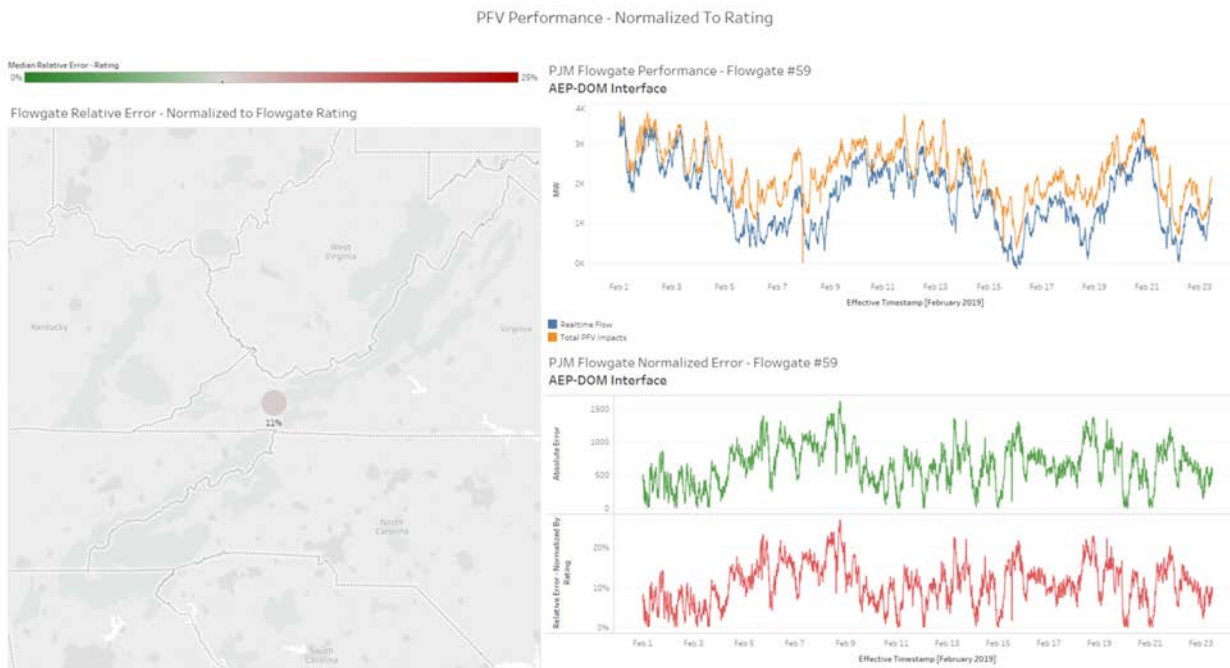
6.9.12 PJM - 5 - PJM WESTERN INTERFACE

An IROL facility, this flowgate is performing well, generally trending okay with room for improvement. Such a large flowgate will have larger absolute error. This flowgate is most certainly going to be affected by sub-zonal load profile inaccuracies, and the sum of small impacting generation from all nearby RC footprints.



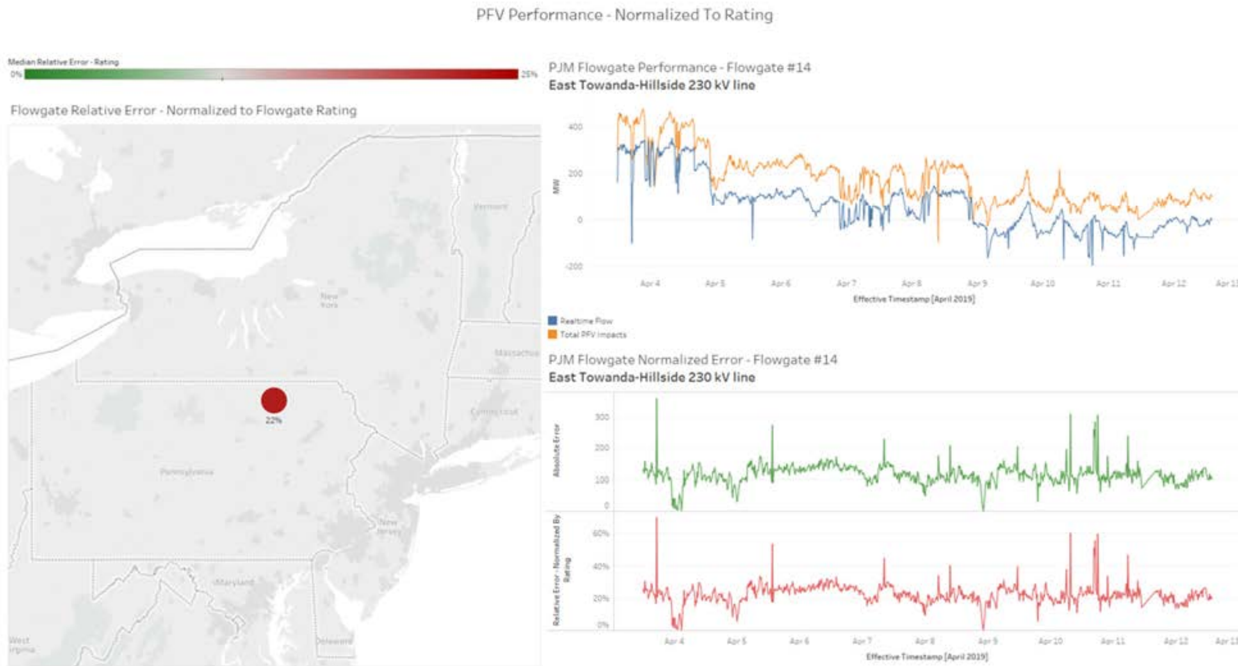
6.9.14 PJM - 59 - AEP-DOM INTERFACE

An IROL facility located closer to the southern seam with VACAR and TVA , this flowgate is generally trending okay, but there is definitely room for improvement. This flowgate is most certainly going to be affected by sub-zonal load profile inaccuracies, and the sum of small impacting generation from all nearby RC footprints.



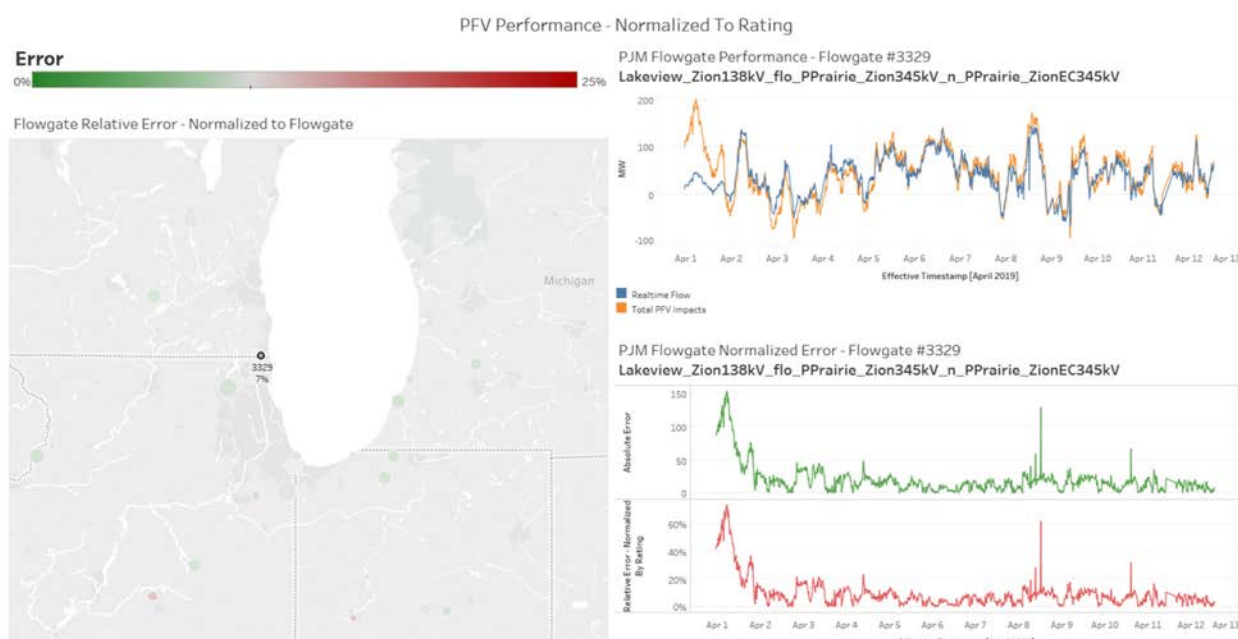
6.9.15 PJM – 14 – EAST TOWANDA-HILLSIDE 230 KV LINE

This flowgate is a poor performer. Investigation into Phase Angle Regulator modeling and local load profiles are underway as likely causes. The likely largest contribution is the that PJM does not model PARs as auto regulating, and is currently developing its PAR tap position/angle submission for use in PFV. This is targeted Q3 2019.



6.9.16 PJM – 3329 – LAKEVIEW_ZION 138KV L/O PLEASANT PRAIRIE-ZION EC 345KV

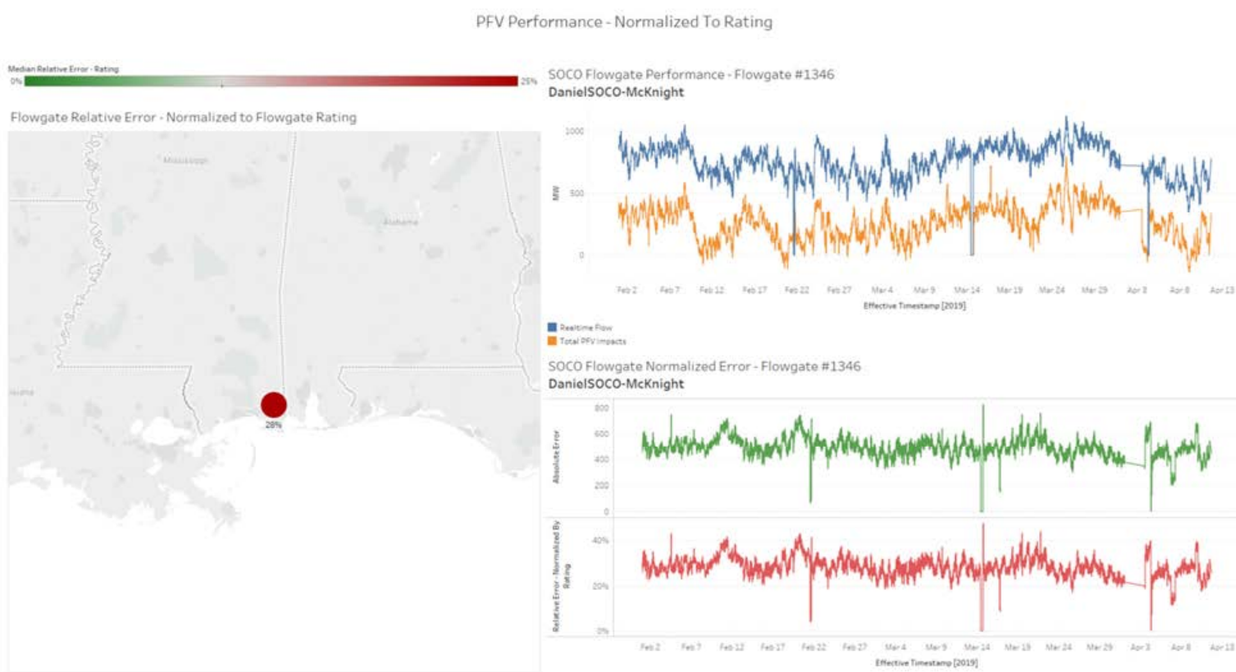
This flowgate is performing well, located on the northern part of ComED that borders Wisconsin. Transfer component of marketflows could affect this flowgate due to its location and the proximity of short RTO load.



6.10 SOCO

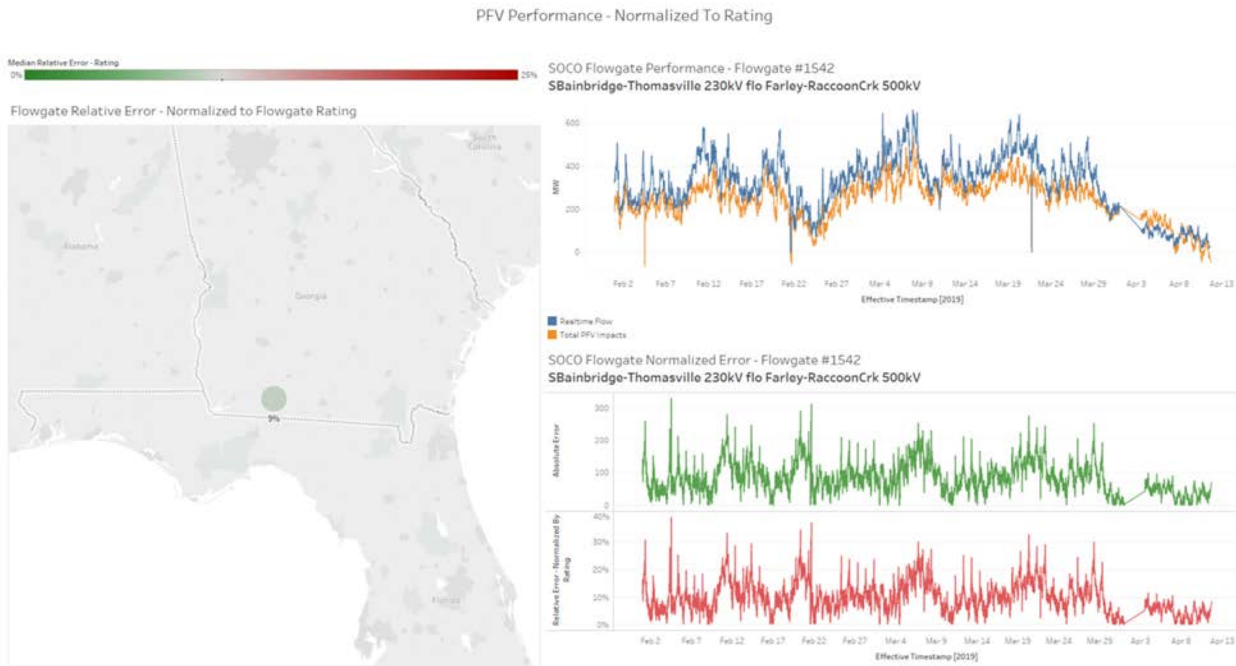
6.10.1 SOCO - 1346 - DANIELSOCO-MCKNIGHT

Flowgate 1346 (Daniel-McKnight 500kV) is a tie between SOCO and MISO. This flowgate has a large error that generally runs around 500 MWs. It is believed that this error is caused by a PAR that is connected in series to the Daniel line which generally forces around 500 MWs, or the size of one Daniel unit, flow into Entergy's area at all times. It is thought that the PAR may be modelled incorrectly in PSSE, however this is yet to be determined. Since we believe we know what is wrong with this flowgate and also since the error is more or less constant at any given time, a bias was being considered in order to reduce this error. But that idea has not been finalized or agreed upon. Things to note, in this flowgates on date 2/21/19 @1300 there were data submission issues and 3/14/19 0930 the Daniel-McKnight line was placed out of service for a few hours.



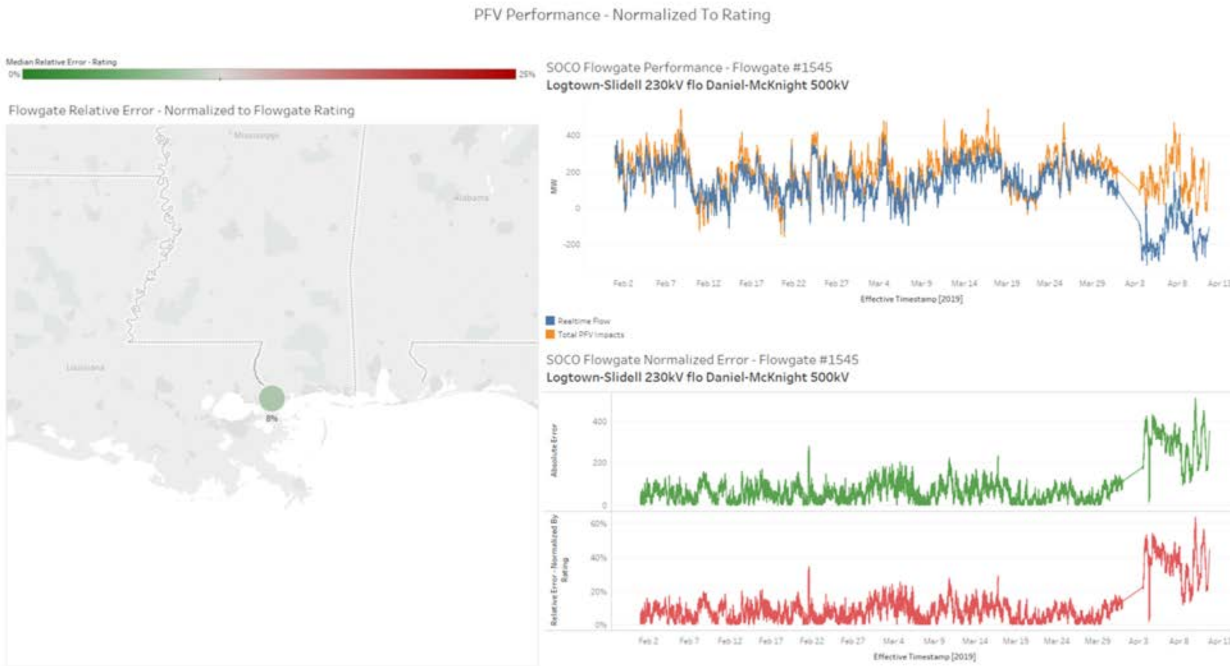
6.10.2 SOCO - 1542 - SBAINBRIDGE-THOMASVILLE 230KV FLO FARLEY-RACCOONCRK 500KV

Flowgate 1542 (South Bainbridge-Thomasville 230kV flo Farley-Racoon Creek) is an flowgate within SOCO and is not a seam with any other RC. This flowgates' Impact Calculation generally under preforms at MW levels between 25 MWs to 325 MW. The trend is generally the same but it is clear that it is showing higher tags impacts than desired. Tag impacts may be the issue but this is not confirmed. Things to note, in this flowgates on date 2/21/19 @1300 and 3/21/19 1745 there were data submission issues.



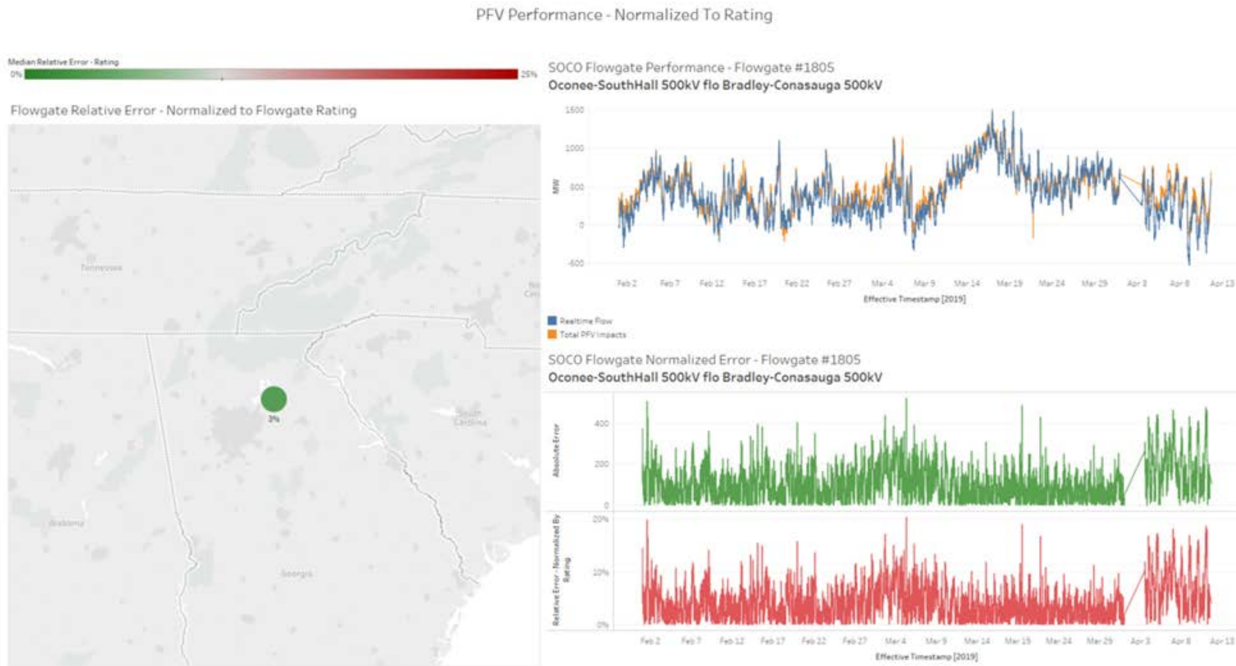
6.10.3 SOCO - 1545 - LOGTOWN-SLIDELL 230KV FLO DANIEL-MCKNIGHT 500KV

Flowgate 1545 (Logtown-Slidell 230kV flo Daniel-McKnight 500kV) is a connection between SOCO and MISO. This flowgate generally behaves well over time. In this case the Impact Calculation is greater than the RT flow which isn't ideal but it is an tolerable. Meaning that if an RC does take action on this flowgate they have a higher probablity of cutting more MWs than necessary to relieve congestion. This is better than cutting to little and having to cut generation more than once on an affected flowgate. An error was introduced to this flowgate after the April 2 winter base case upgrade however. Cause of this error is unknown. Things to note, in this flowgates on date 2/21/19 @1300 there were data submission issues. Also, on dates 2/8/19 0045, 3/1/19 0045 and 3/2/19 0500 there were Impact Calculation issues.



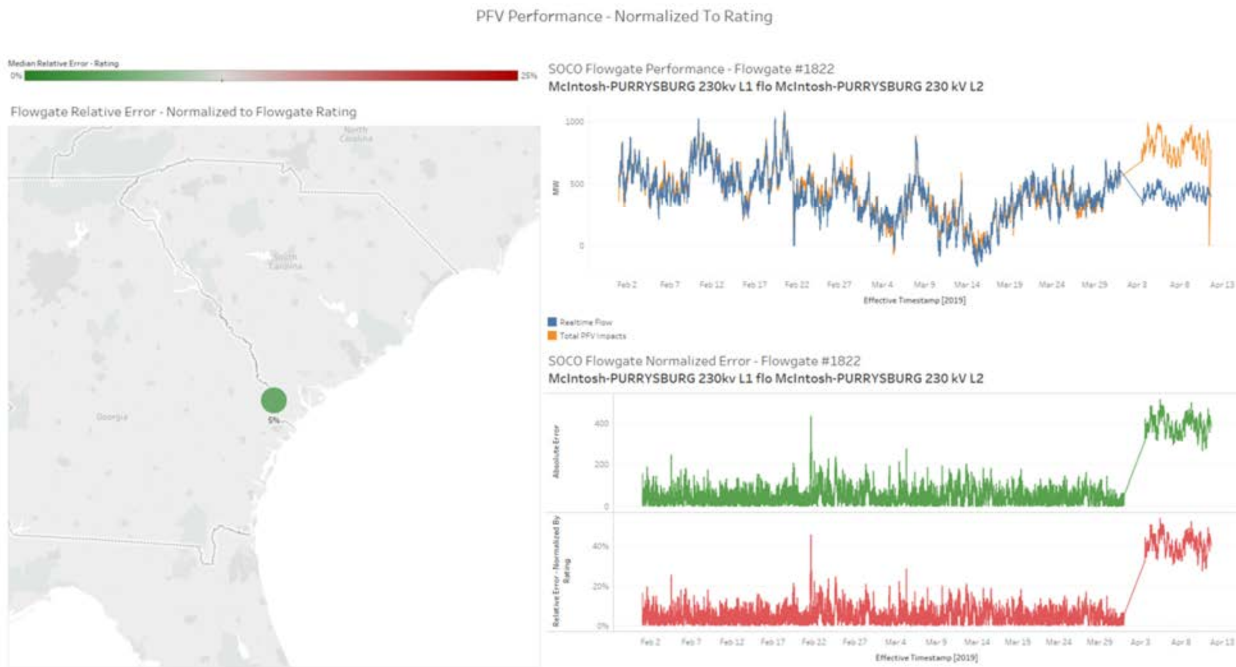
6.10.4 SOCO - 1805 - OCONEE-SOUTHHALL 500KV FLO BRADLEY-CONASAUGA 500KV

The flowgate 1805 (Oconee-South Hall flo Bradley-Conasauga 500kV) is a flowgate between SOCO and VACAR. Again, like other flowgates the trend of the flowgate is accurate but the error suggests that there is unaccounted generation in the area affecting it or higher than desired tag impacts. Things to note, in this flowgates on date 2/21/19 @1300 and 3/21/19 1745 there were data submission issues.

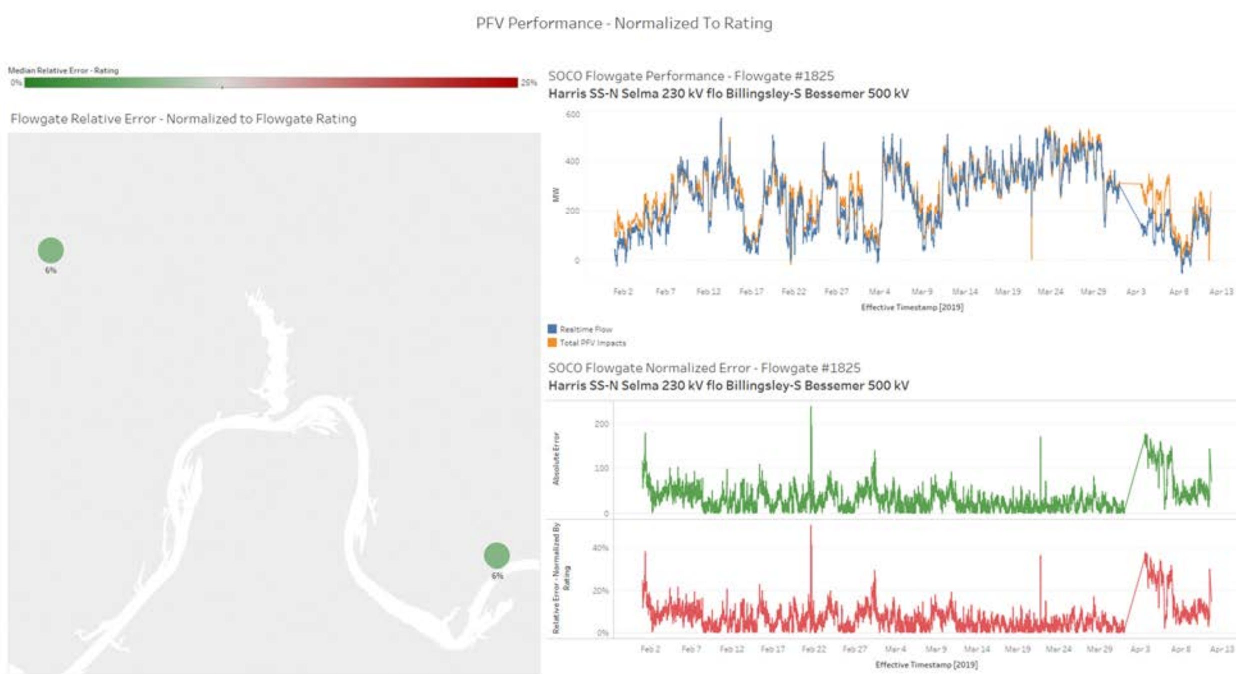


6.10.5 SOCO - 1822 - MCINTOSH-PURRYSBURG 230KV L1 FLO MCINTOSH-PURRYSBURG 230 KV L2

The flowgate 1822 (McIntosh 230kV-Purrysburg 230kV L1 flo McIntosh 230kV-Purrysburg 230kV L2) is a constrained path connecting the SOCO and VACAR. Concerning the flowgates' performance, it is behaving fairly well when comparing real time Post Contingency Flow. An error was introduced after the April 2 winter base case upgrade however. Cause of this error is unknown. Things to note, in this flowgates on date 2/21/19 @1300, 3/13/19 1300 and 1845, and 3/16/19 0200 there were data submission issues. There were also some 'NULL' submissions during 4/8 7:15.



6.10.6 SOCO - 1825 - HARRIS SS-N SELMA 230 KV FLO BILLINGSLEY-S BESSEMER 500 KV

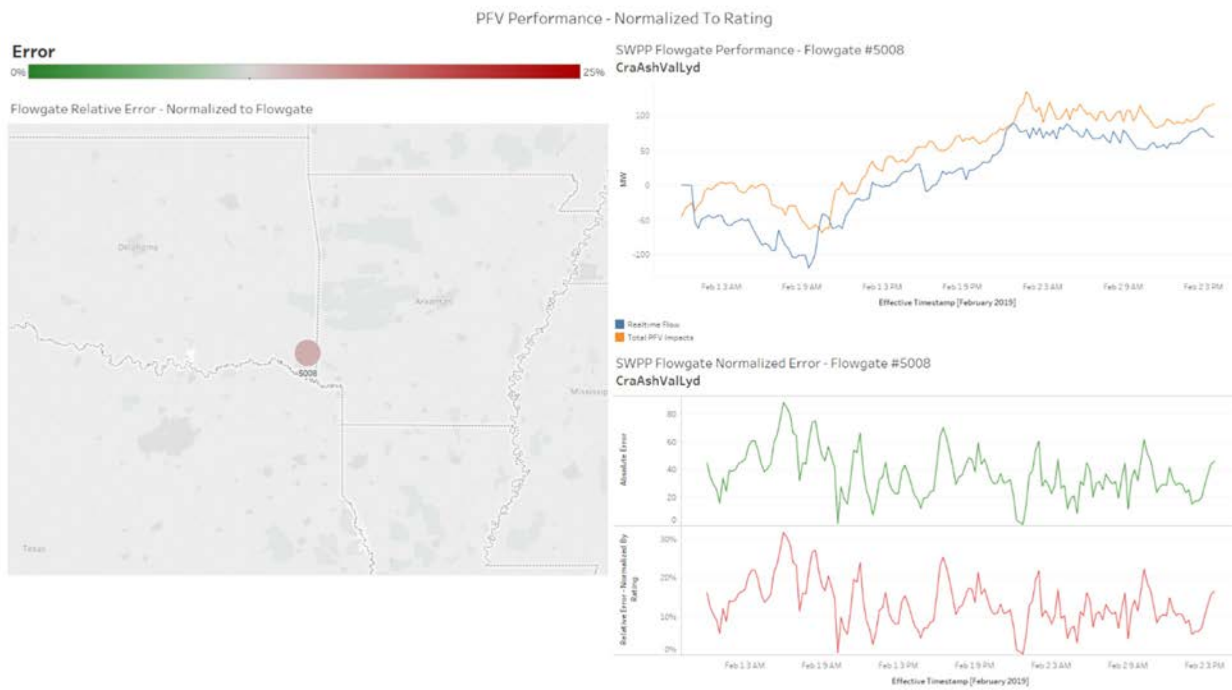


6.11 SWPP

SPP flowgates are generally performing well when measuring the error relative to the size of the flowgate in terms of MW ratings. In all of these metrics, you will observe calculation samples that are volatile due to system errors, calculation failures and modeling discrepancies. Note dates in February, March 27th and April 12th where data error due to system errors was an issue. It is worth noting that during the April model upload, systems were not calculating impacts. After this upload, some modeling discrepancies were introduced that caused a few of the flowgate to be more erroneous starting this time frame.

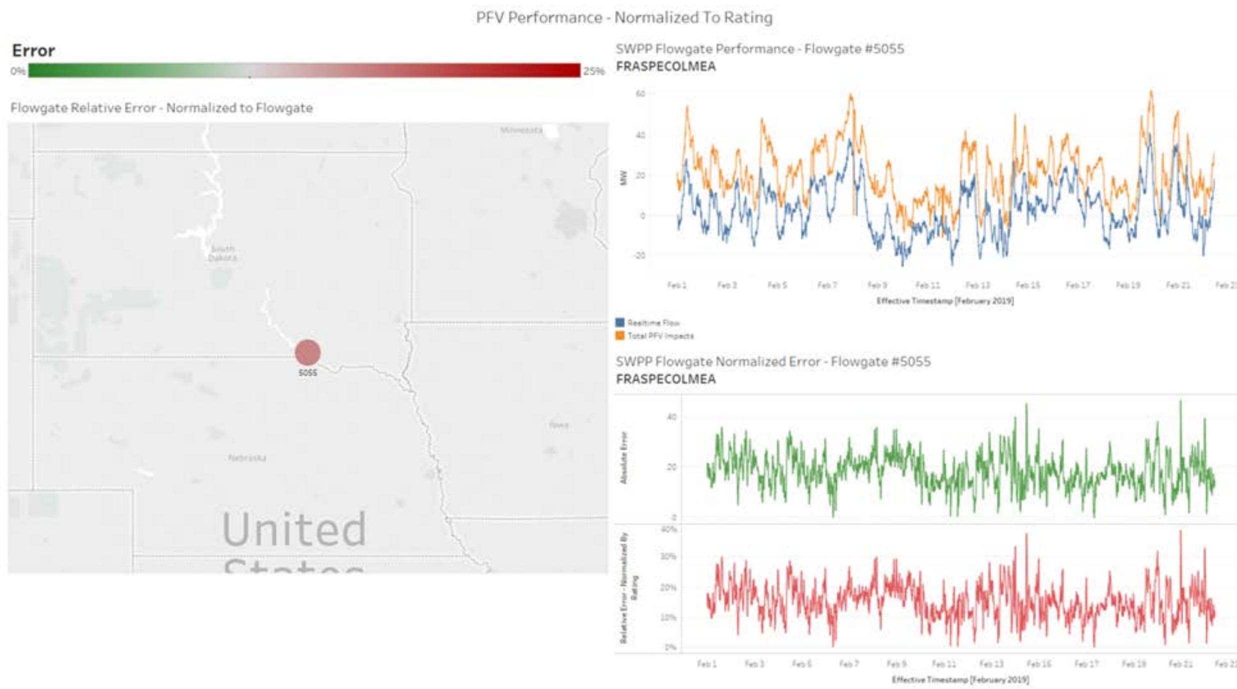
6.11.1 SWPP - 5008 – CRAASHVALLYD

This flowgate is located around the Arkansas/Oklahoma/Texas border. During the time this flowgates was activated for monitoring, calculation has tracked well with the flowgate calculated post-contingent based real-time flows. A MW bias between the accounted for MWs and the calculated post-contingent exists.



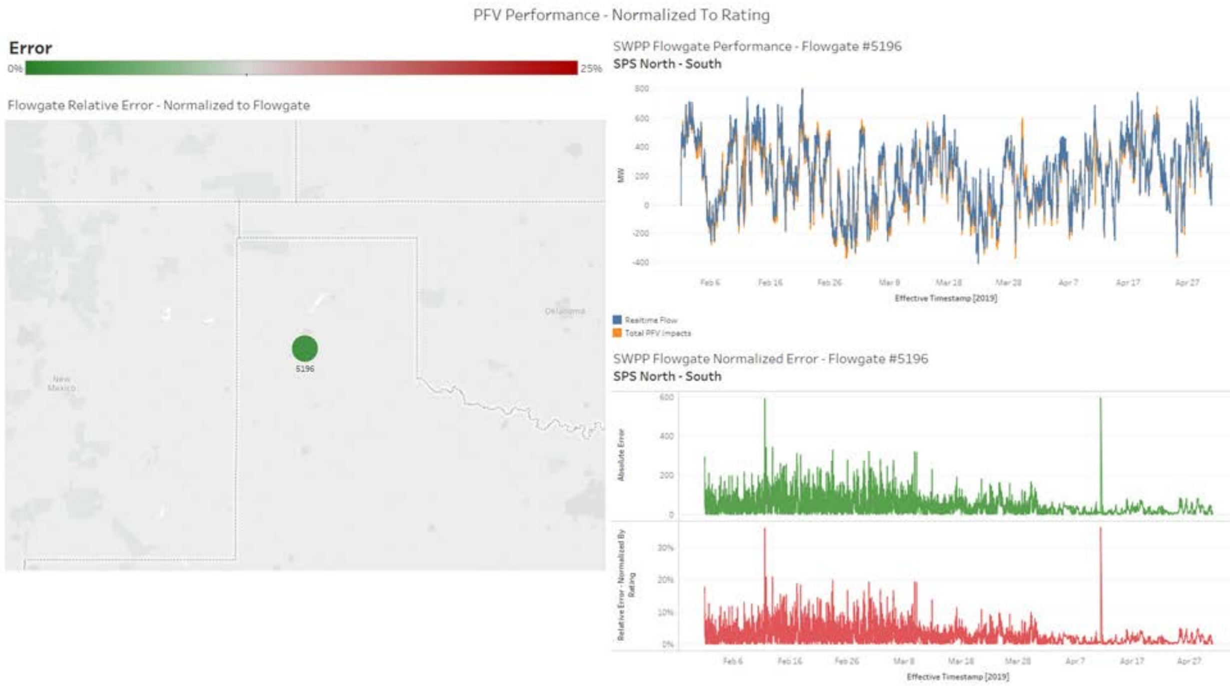
6.11.2 SWPP - 5055 – FRASPECOLMEA

This flowgate is located on the South Dakota/Nebraska Border. This flowgate is primarily driven by SPP's GTL. A MW bias between the accounted for MWs and the calculated post-contingent exists, otherwise, the shape and the trend between he calculated impacted and the calculated post-contingent flow on the flowgate strongly correlate. On average the bias account for 15% of flowgate MW rating, this is outside of the reasonability range set forth by the IDCWG.



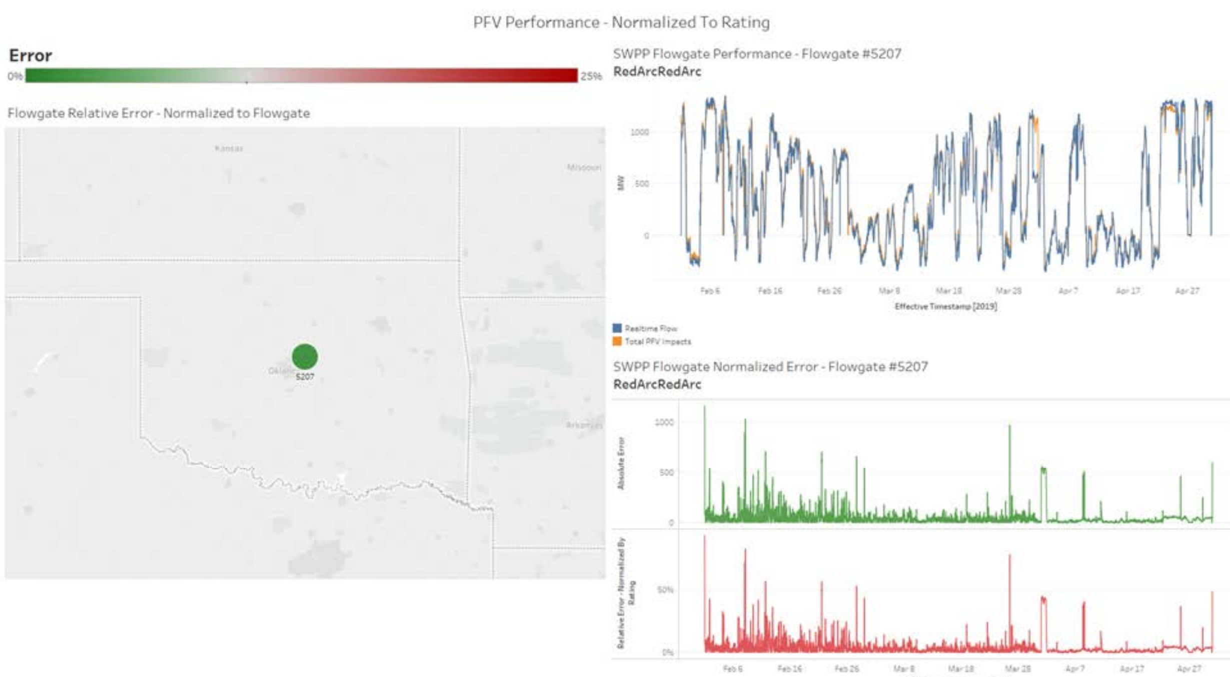
6.11.3 SWPP - 5196 - SPS NORTH – SOUTH

This flowgate is located in north Texas. It monitors the interface between the north and south areas of SPS. This flowgates is overwhelmingly impacted by SPP's GTL. The performance of this flowgate is reasonable. This interface can be volatile in MW changes over time which PFV calculated impacts seem to adjust for.



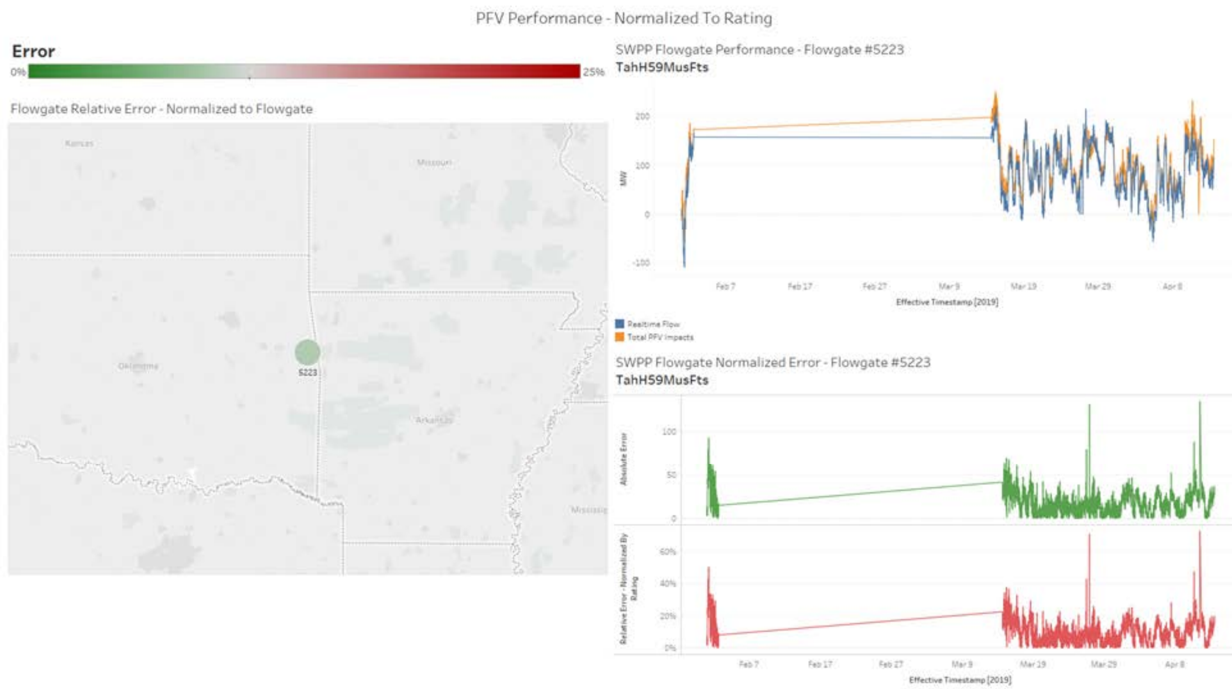
6.11.4 SWPP - 5207 – REDARCREDARC

Located in near Oklahoma City, this flowgate represents flows into and out of the city. This flowgate has consistently performed well. It is not influenced by tag impacts. April 8th timeframe shows a deviation due to system's GTL engine pausing due to system issues.



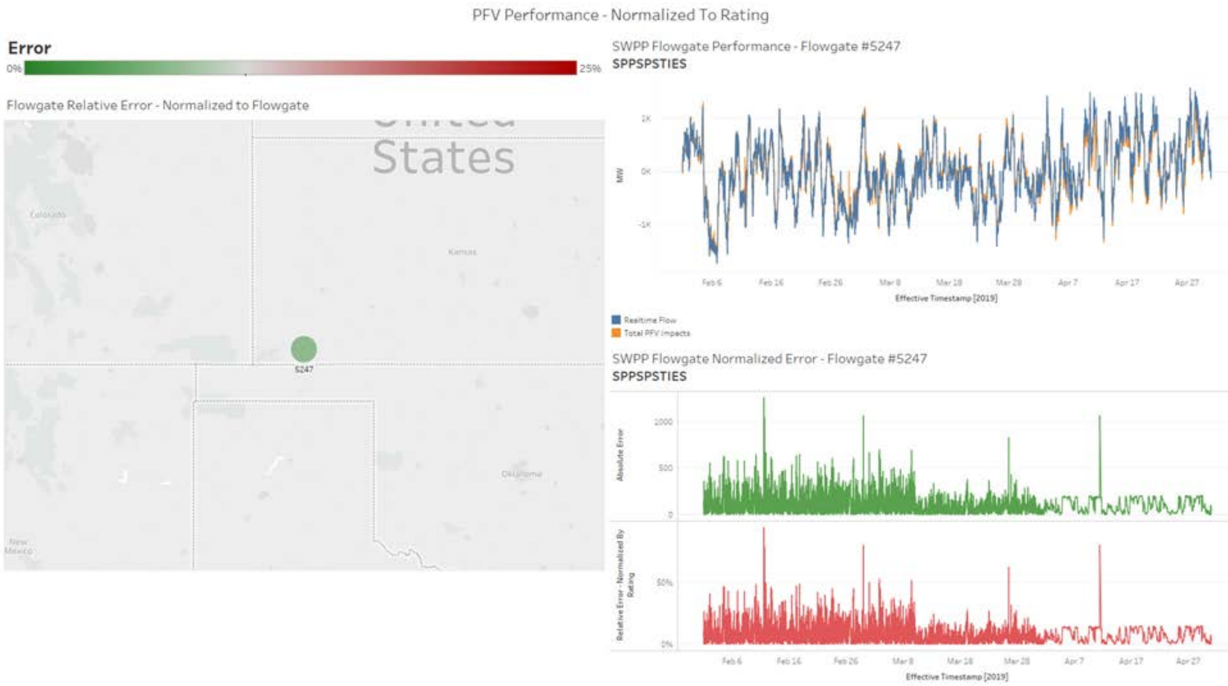
6.11.5 SWPP - 5223 - TAHH59MUSFTS

This flowgate is located on the Arkansas/Oklahoma border. It was not monitored between 2/2/2019 and 3/14/19 and thus the trend being flat during this time period. This flowgate is near the Seams between SPP and MISO. This flowgates is impacted by tags and high north-south transfers.



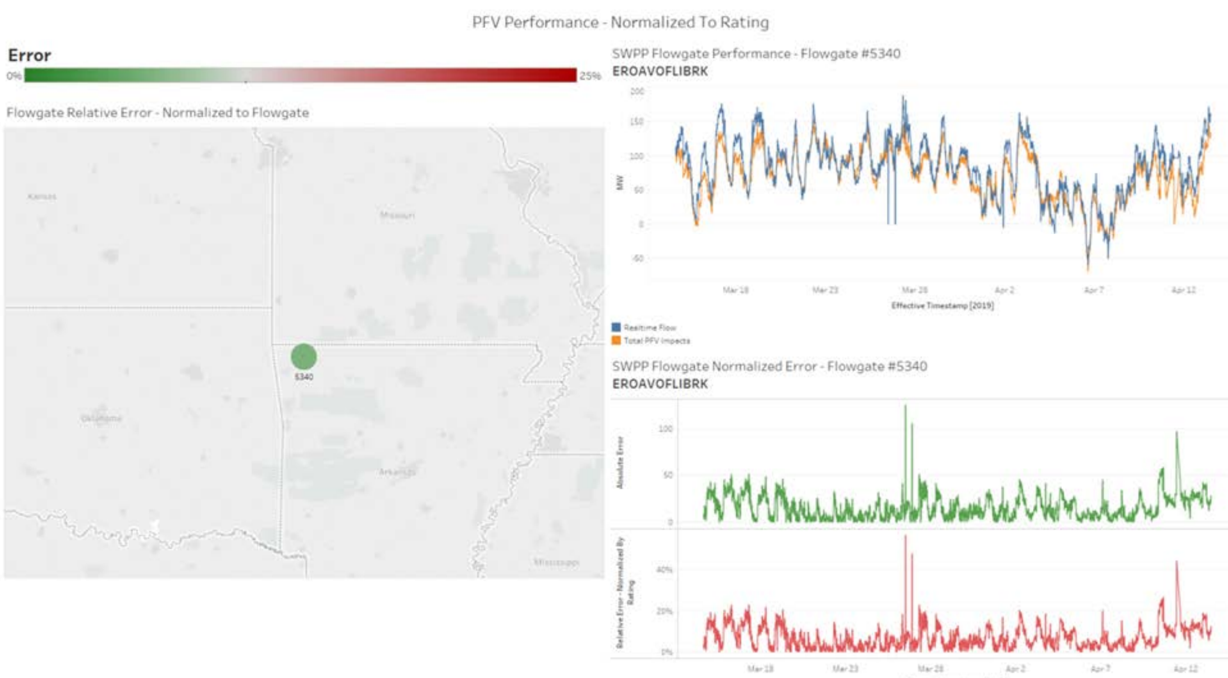
6.11.6 SWPP - 5247 – SPPSPSTIES

This flowgate is located in the Texas panhandle. It monitors the interface between SPS and the rest of SPP. This flowgate is impacted by SPP's transfer to SPS (one of SPP's LBAs). This interface is largely impact by SPP BA GTL.



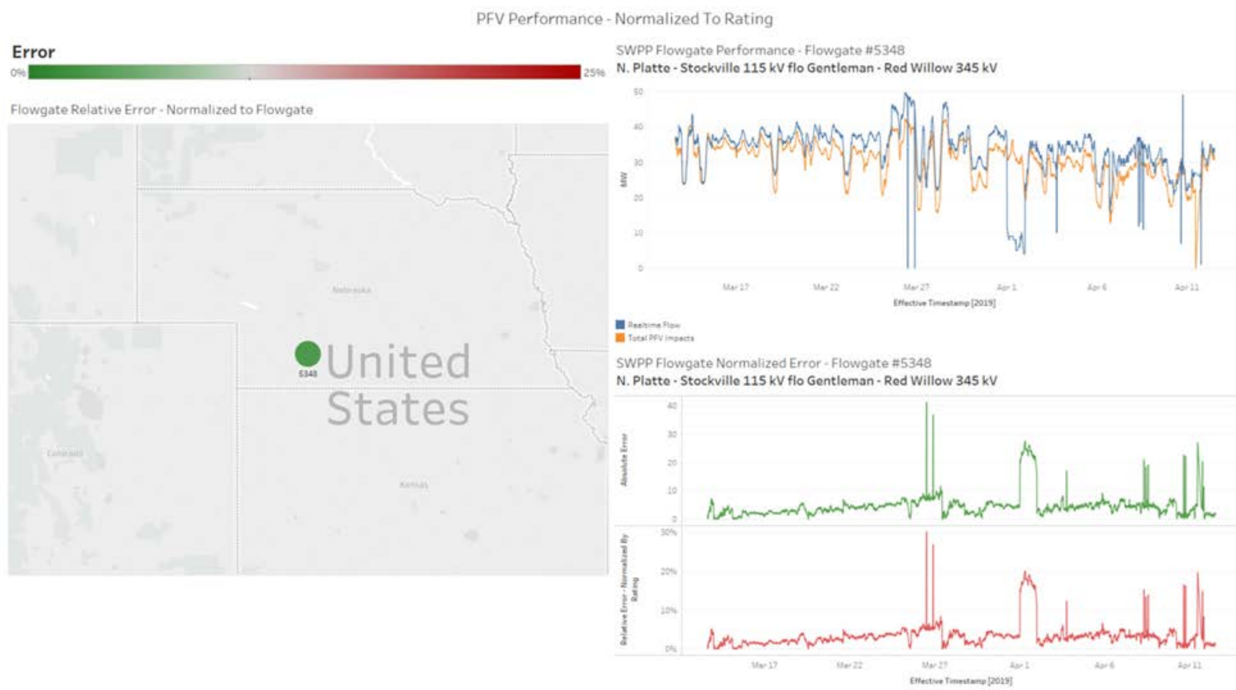
6.11.7 SWPP - 5340 – EROAVOFLIBRK

This flowgate is on the Arkansas/Missouri border. This is on SPP's Seam with MISO and AECI. This flowgate is impacted by some of MISO but largely SPP's GTL.



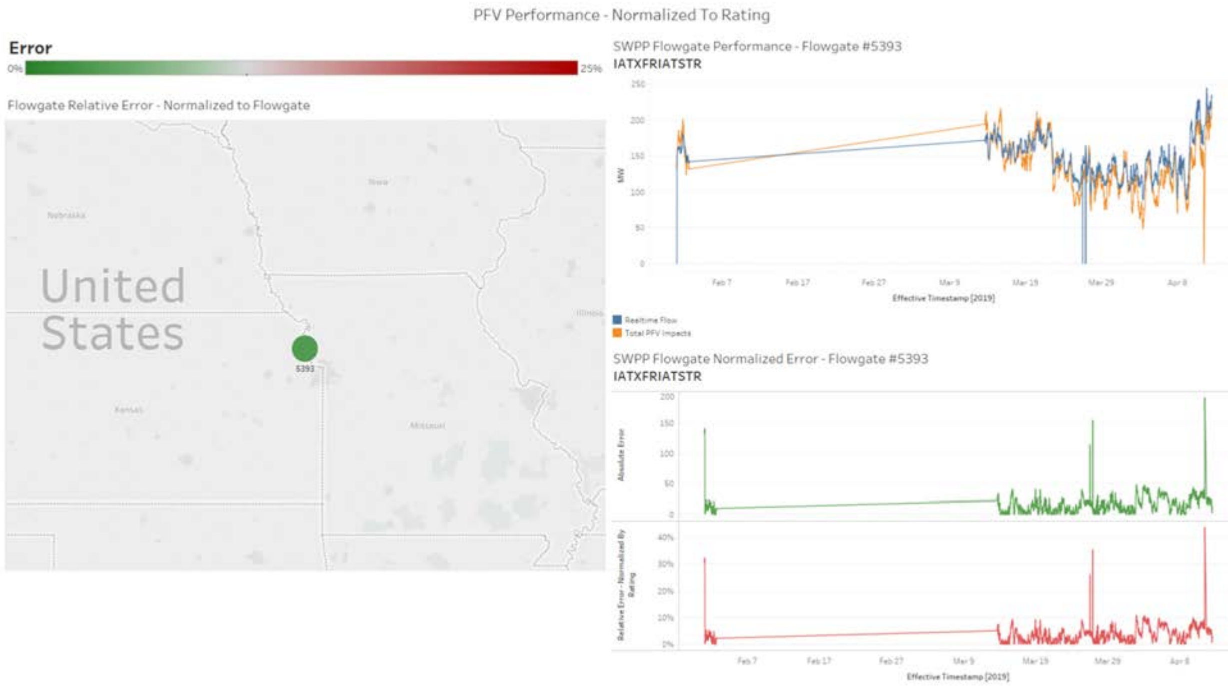
6.11.8 SWPP - 5348 - N. PLATTE - STOCKVILLE 115 KV FLO GENTLEMAN - RED WILLOW 345 KV

This flowgate is located in west Nebraska. Starting with the April model, the performance of this flowgate degraded when comparing post-contingent calculated flows and the calculated impacts. Based on this trend, it is thought that the model introduced an inaccuracy in equipment that highly impact the flowgate or topology in the area.



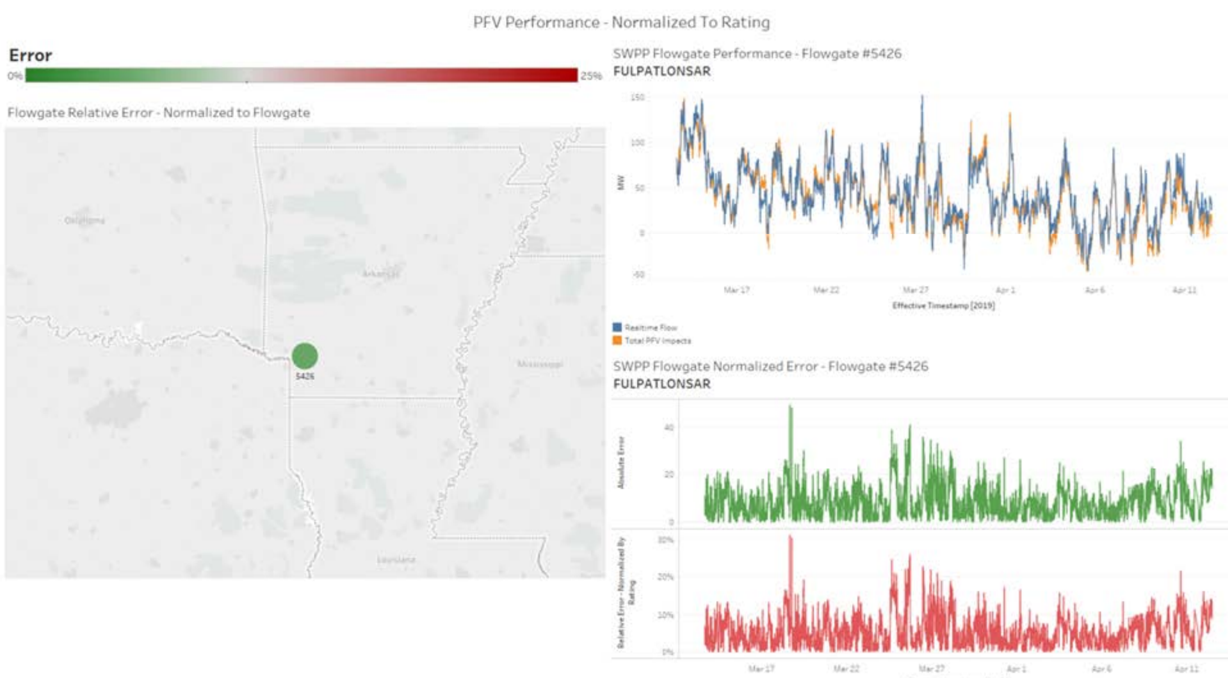
6.11.9 SWPP - 5393 – IATXFRIATSTR

This flowgate is located on the Missouri/Kansas border. The flowgate is primarily impacted by SPP's GTL. The flowgates tracks well with the exception of calculation anomalies.



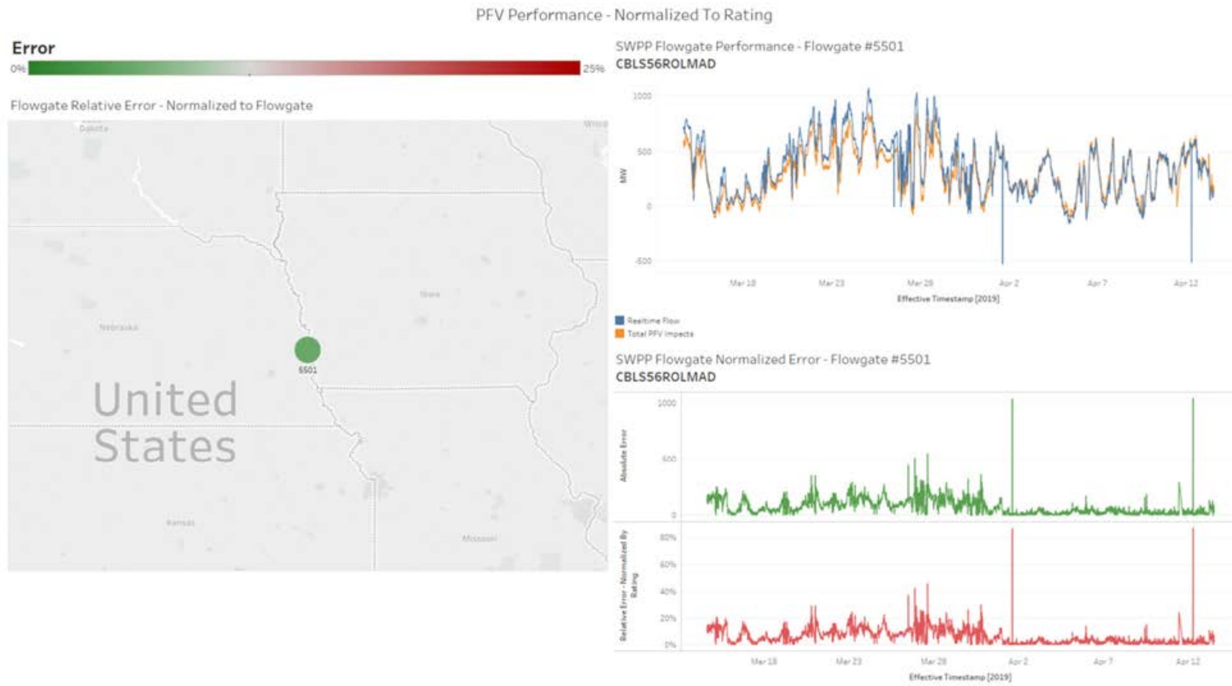
6.11.10 SWPP - 5426 – FULPATLONSAR

This flowgate is located on the Arkansas/Louisiana border, which is the MISO (Entergy) and SPP (CSWS) Seam. This flowgate is primarily impacted by MISO and SPP GTL.



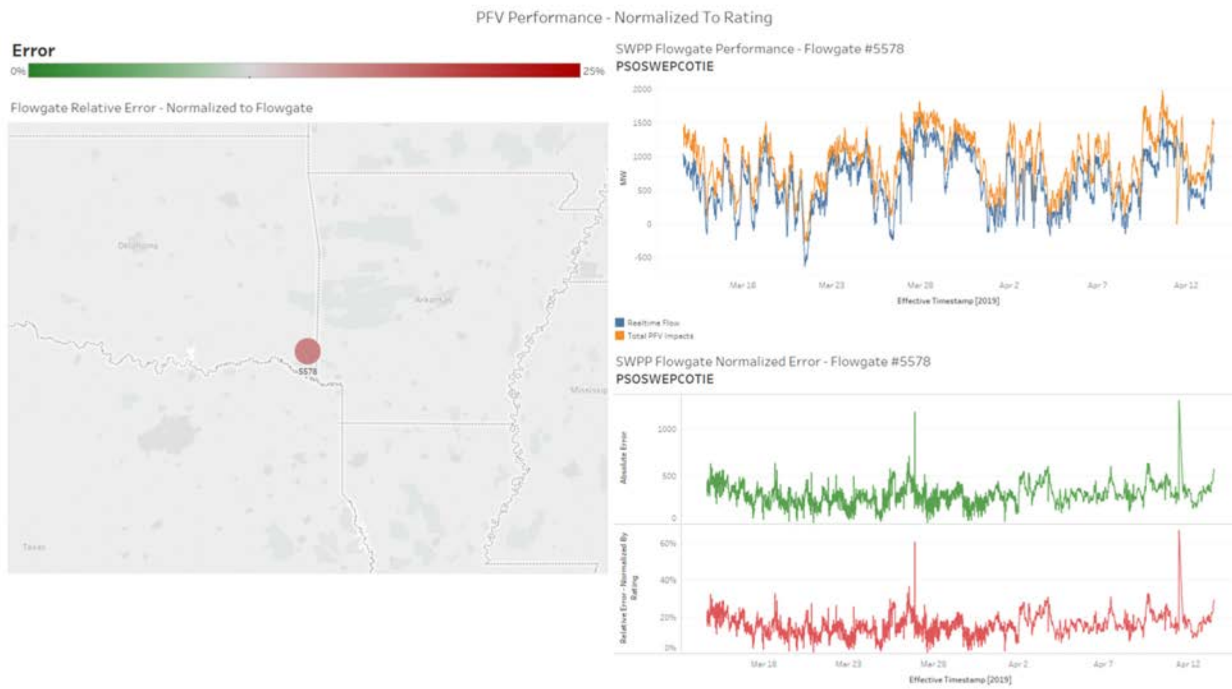
6.11.11 SWPP - 5501 - CBLS56ROLMAD

This flowgate is on the border of Iowa and Nebraska. It is at the MISO (MEC) and SPP (OPPD) Seam. This flowgate is primarily impacted by MISO GTL and some SPP GTL.



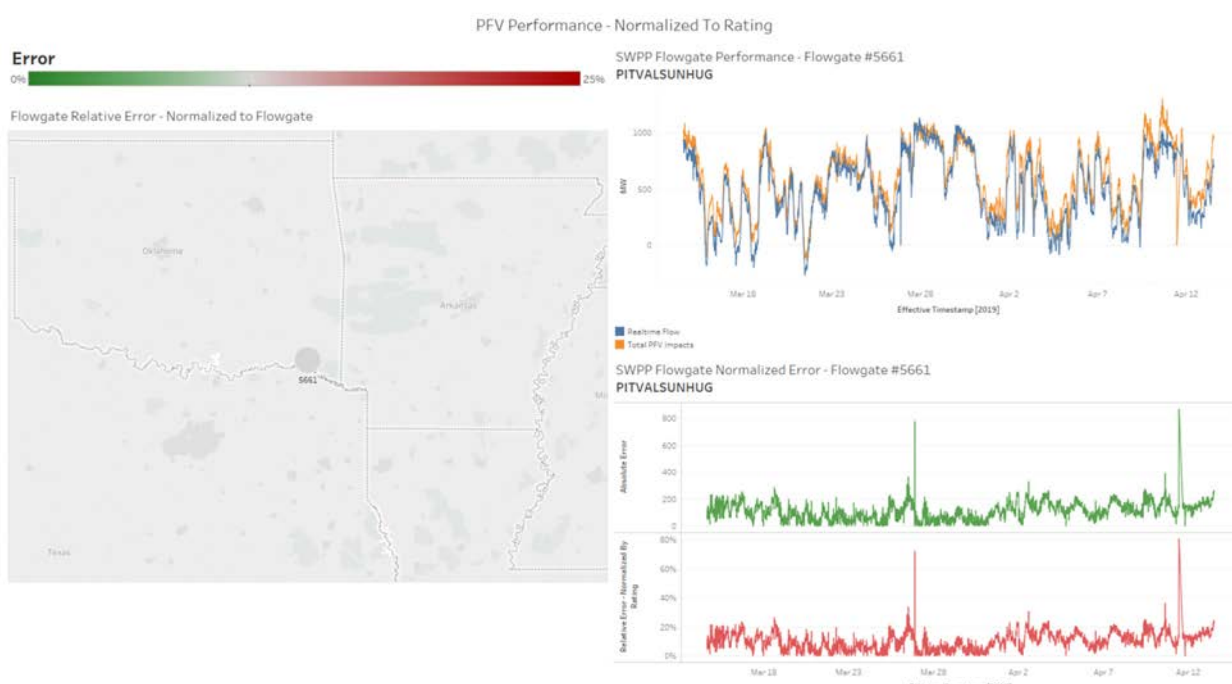
6.11.12 SWPP - 5578 – PSOSWEPCOTIE

This flowgate is located on the Arkansas/Oklahoma/Texas border. It is monitoring the import limitation between PSO and SWEPCO. Impacted by both GTL and Tags.



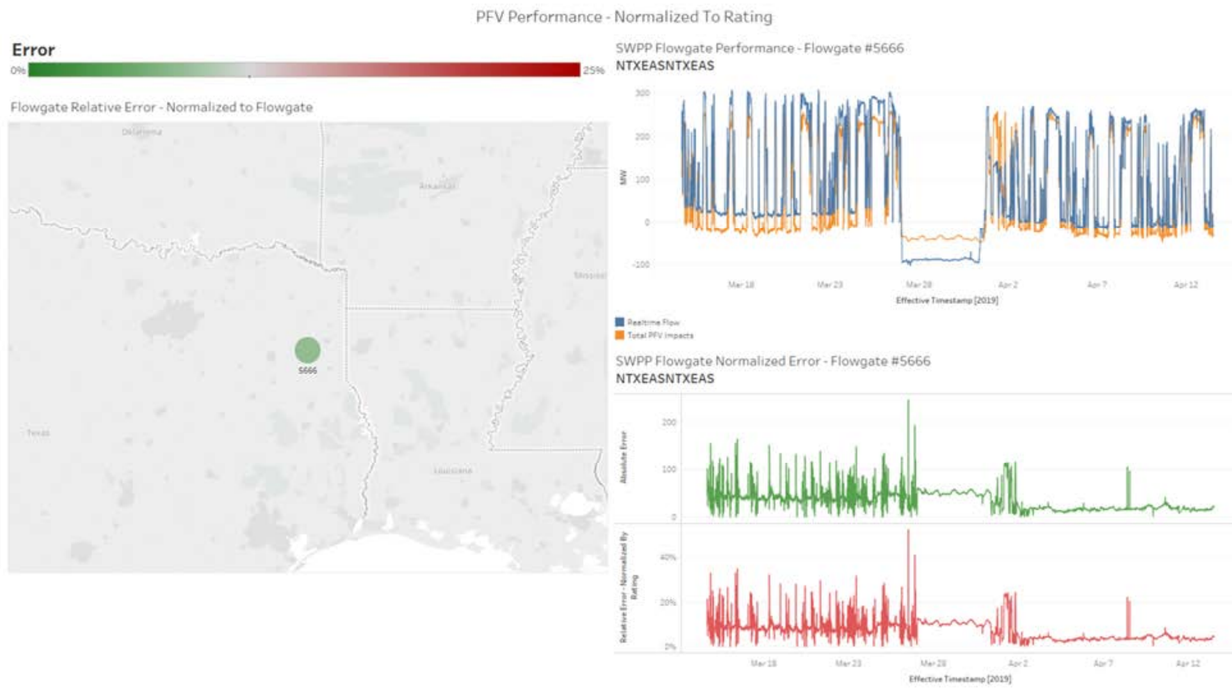
6.11.13 SWPP - 5661 – PITVALSUNHUG

This flowgate is located in southern Oklahoma. The flowgate is impacted by SPP GTL and Tag MW as well some north-south transfer from MISO.



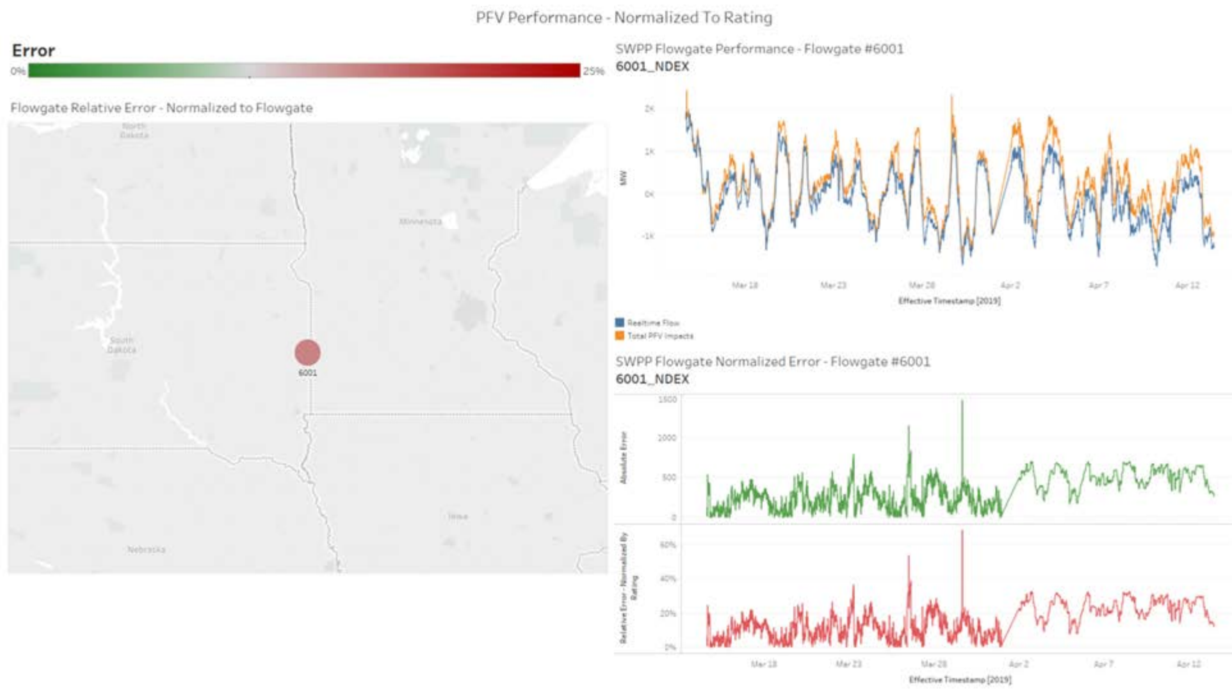
6.11.14 SWPP - 5666 – NTXEASNTXEAS

This flowgate is located in east Texas. Only impacted by Eastman unit. The unit is not being scaled so it is impacting GTL calculation incorrectly. CSWS LSF on FG 5666 is 0.9%, due to a load on the FROM side of the monitored element, so when this is applied to all units in CSWS, the incremental MWs sum to around 40MW, which provides the offset. This is purely a modeling discrepancy, which when resolved, the flowgate would track very well.



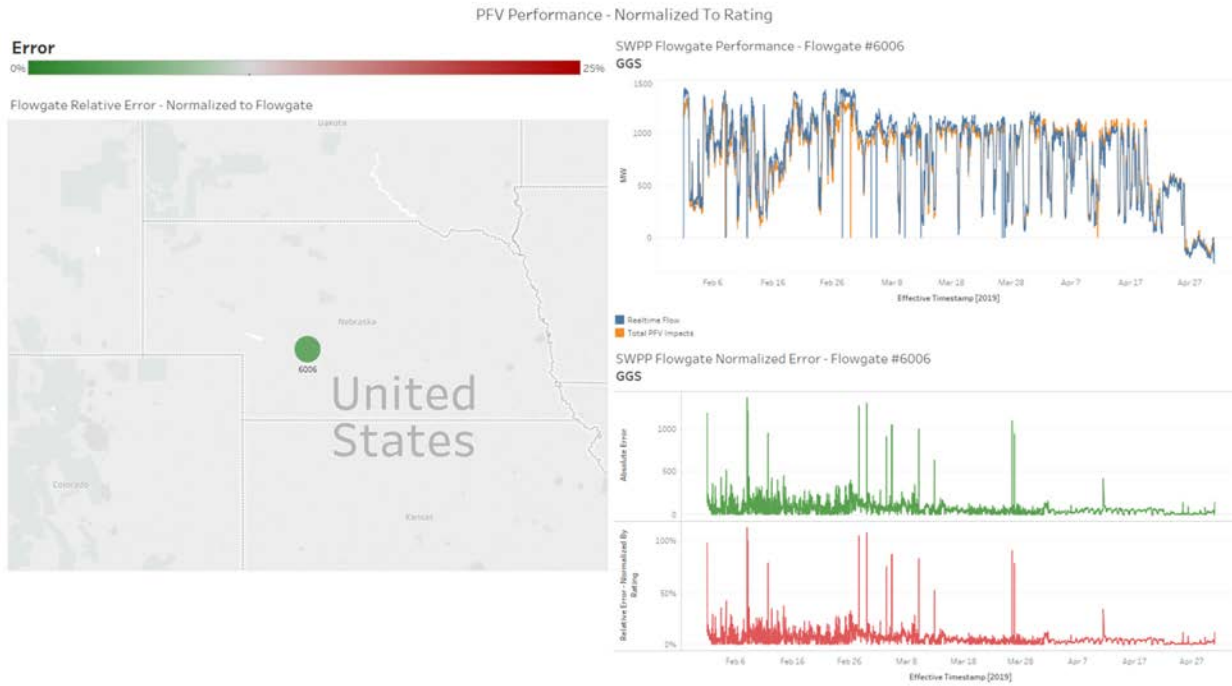
6.11.15 SWPP - 6001 - 6001_NDEX

This flowgate consists of 22 transmission lines in northern South Dakota, western Minnesota and ties to Manitoba Hydro. Primarily impacted by GTL. The interface tracks fairly well considering the flowgate's rating relative error.



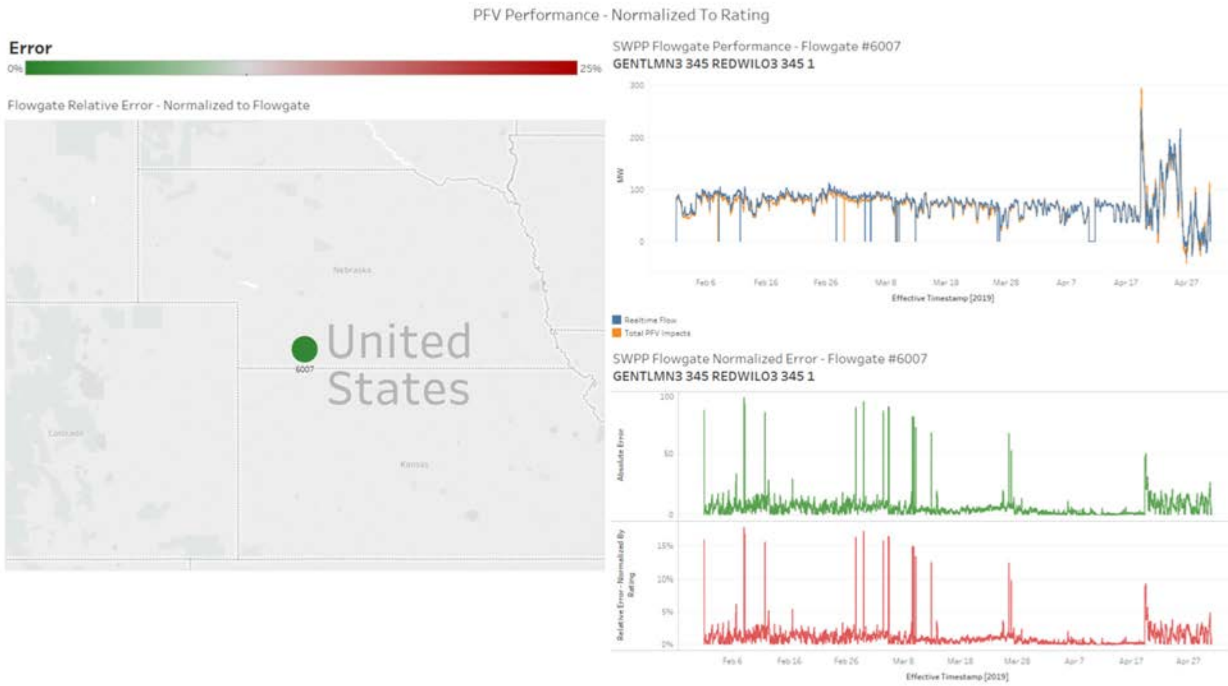
6.11.16 SWPP - 6006 – GGS

This flowgate is located in west Nebraska, on the western side of SPP's footprint. It is primarily impacted by SPP GTL, with significant generation at the Gerald Gentleman Station, and some tag impacts from the Sidney and Stegall DC Ties. The flowgate tracks well with the exception of certain samples that were volatile to data input errors and calculations sample errors that caused large erroneous samples.



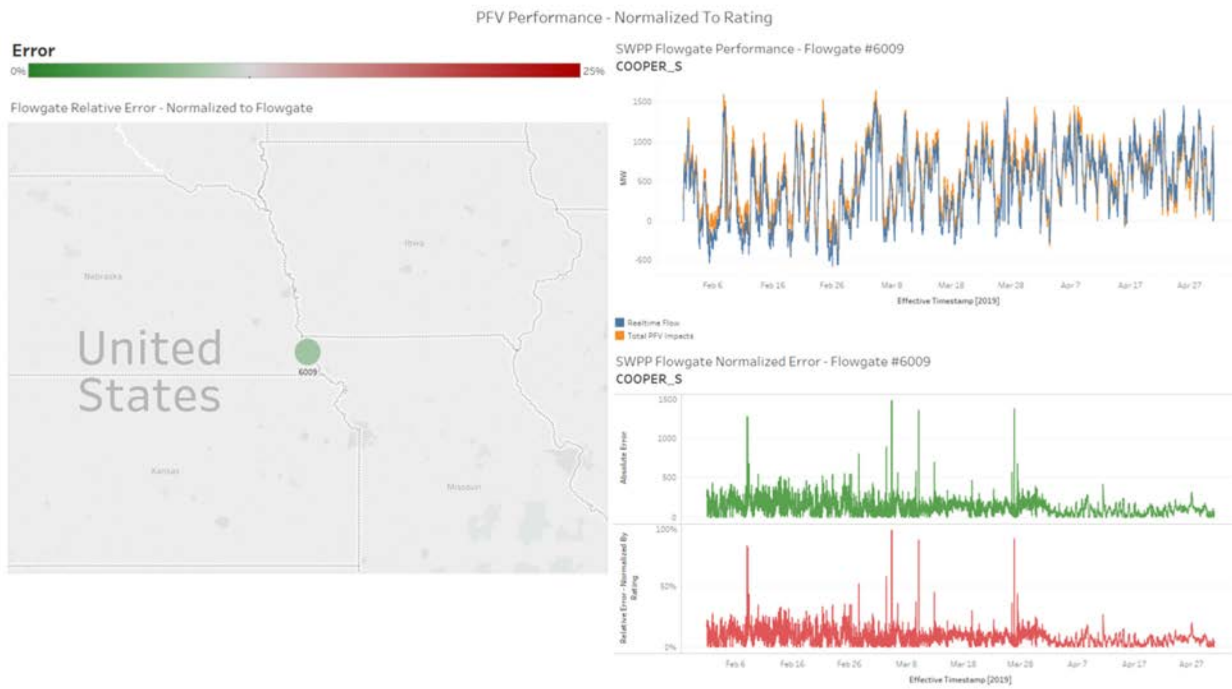
6.11.17 SWPP - 6007 - GENTLMN3 345 REDWILO3 345

This flowgate is located in southwest Nebraska, on the western side of SPP's footprint. It is primarily impacted by SPP GTL, with significant generation at the Gerald Gentleman Station, and some tag impacts from the Sidney and Stegall DC Ties. The flowgate tracks well with the exception of certain samples that were volatile due to data input errors and calculations sample errors that caused large erroneous samples.



6.11.18 SWPP - 6009 - COOPER_S

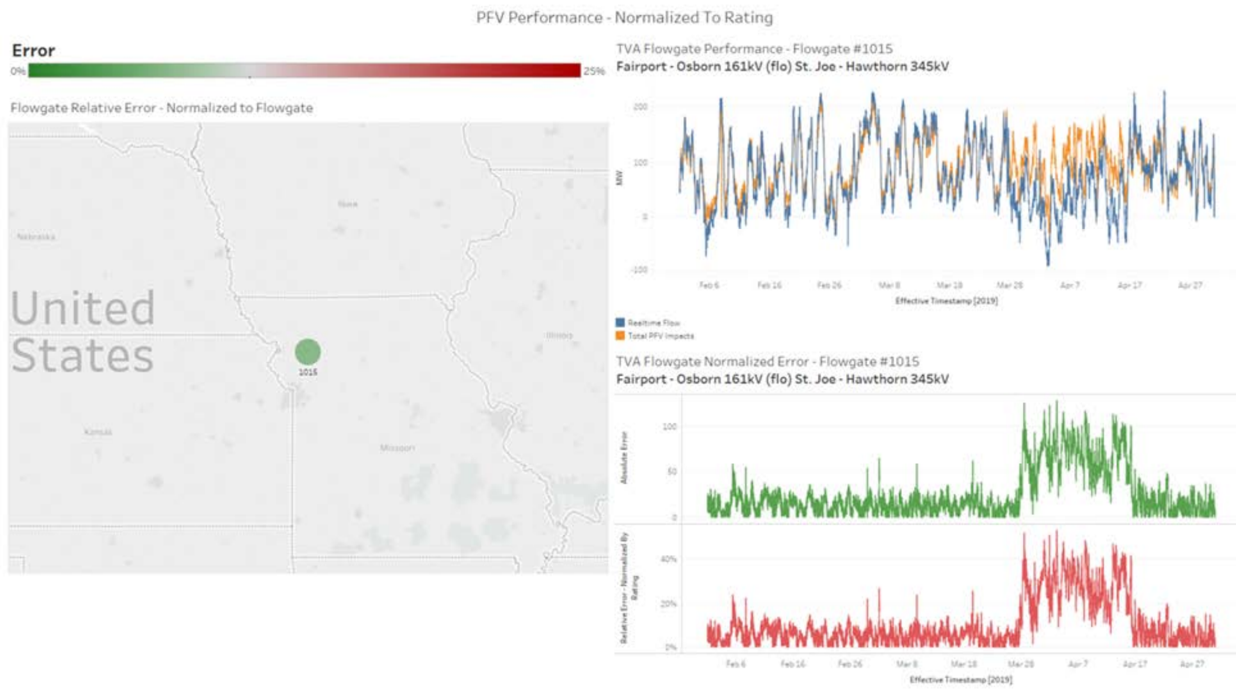
This flowgate is located in northwest Missouri. It is a frequently congested path between SPP and MISO, with AECI, TVA and PJM also being reciprocal entities through the CMP. Heavily impacted by GTL and MW transfers. The flowgate tracks well with the exception of certain samples that were volatile due to data input errors and calculations sample errors that caused large erroneous samples.



6.12 TVA

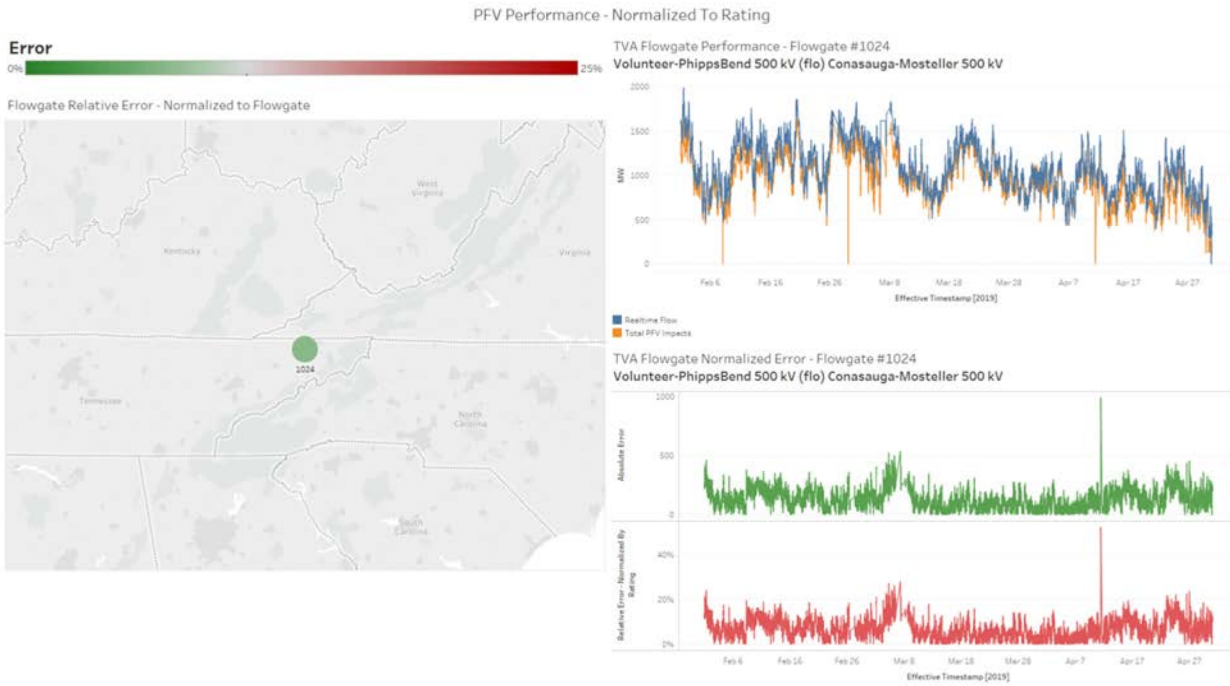
6.12.1 TVA - 1015 - FAIRPORT - OSBORN 161KV (FLO) ST. JOE - HAWTHORN 345KV

Flowgate is located in the AECI area near its border with SPP and MISO. The calculation was very close to the real-time except for two weeks near the end of the data set. The discrepancy had corrected by the end of the data set.



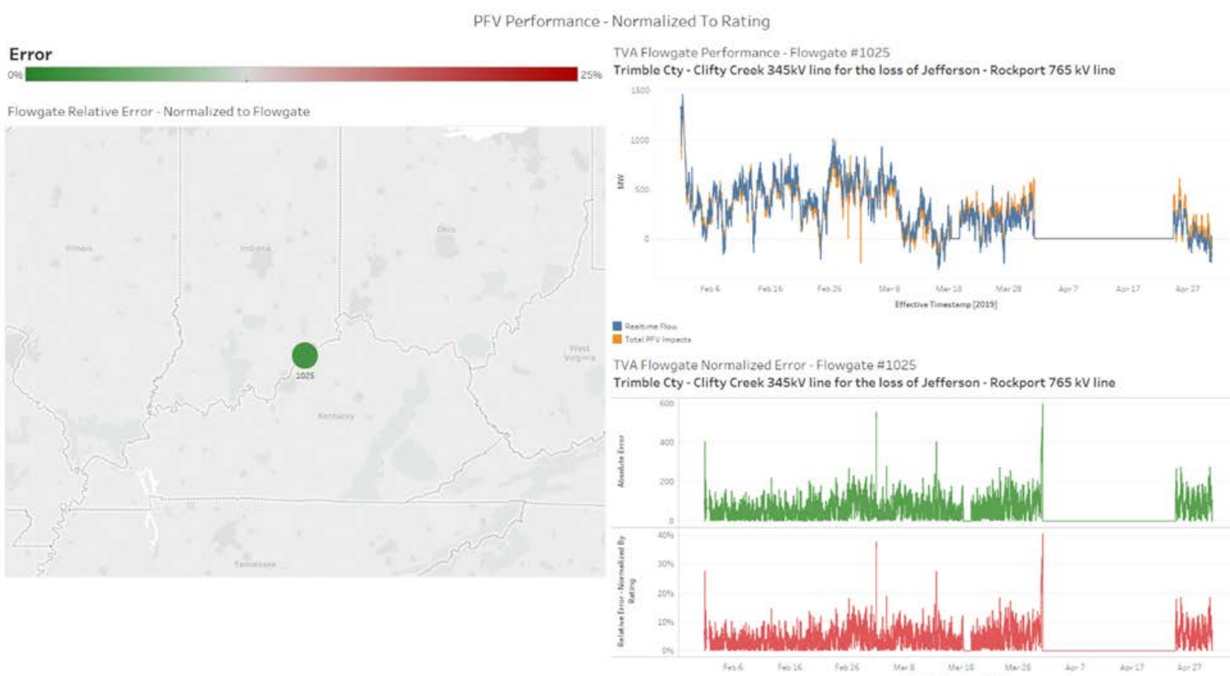
6.12.2 TVA - 1024 - VOLUNTEER-PHIPPSBEND 500 KV (FLO) CONASAUGA-MOSTELLER 500 KV

Flowgate is one of TVA flowgates with the most TLR activity. It is located in east Tennessee. The flowgate is impacted by heavy south to north flows because of its location on the 500kV system and close proximity to AEP's 765kV facilities. The calculations tracked well and were consistently around 10% lower than real-time flow. The flowgate continually has a high tag impact and the consistent under calculation vs. real-time flows is likely due to tags to/from BAs with a large footprint around the flowgate. The few large spikes in calculation error were due to data submittal issues on the TVA side.



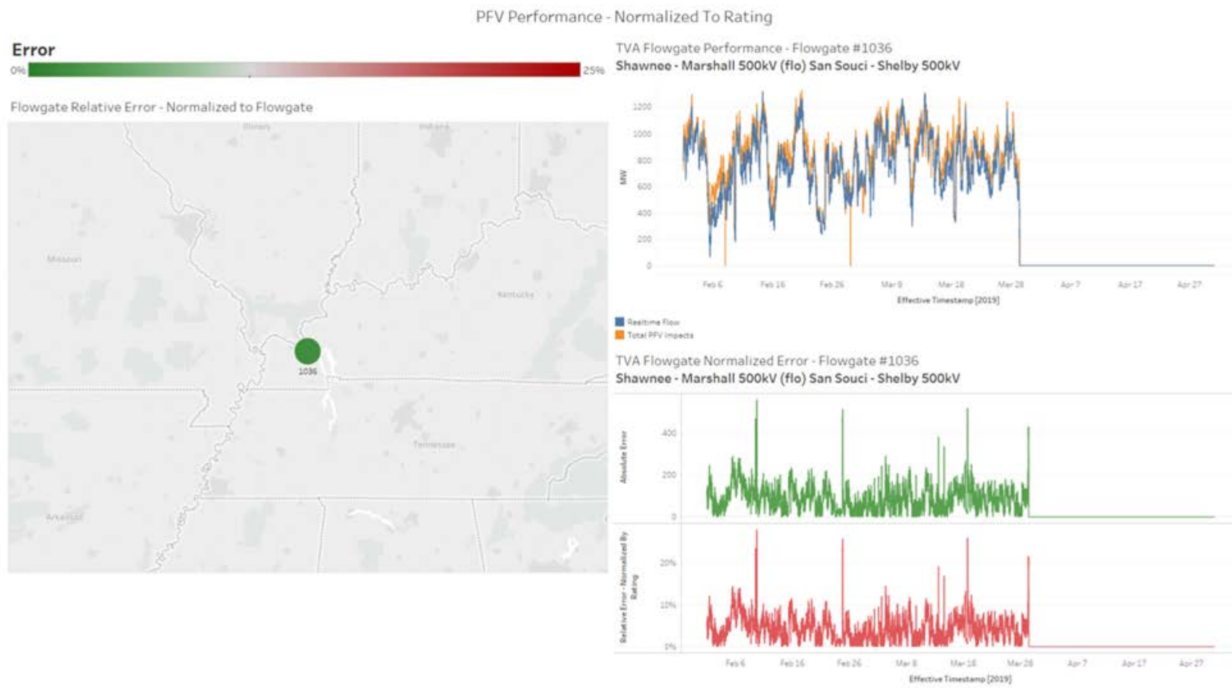
6.12.3 TVA - 1025 - TRIMBLE CTY - CLIFTY CREEK 345KV LINE FOR THE LOSS OF JEFFERSON - ROCKPORT 765 KV LINE

Flowgate is a tie line between LGE/KU and OVEC at the Kentucky/Indiana border. This flowgate tracked very well with an average error less than 5%.



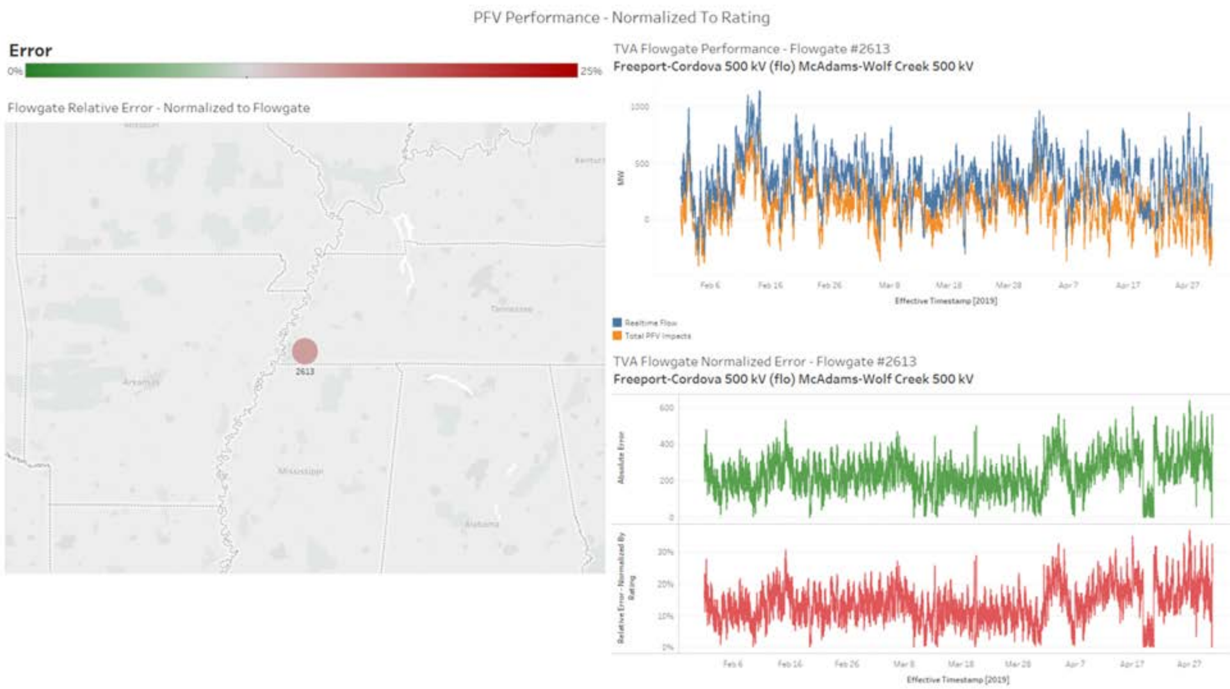
6.12.4 TVA - 1036 - SHAWNEE - MARSHALL 500KV (FLO) SAN SOUCI - SHELBY 500KV

Flowgate is in Western Kentucky near TVA's border with Ameren Illinois. The flowgate tracked very well with only a few spikes in error which were due to data submission issues on TVA's side. Average error was below 5%.



6.12.5 TVA - 2613 - FREEPORT-CORDOVA 500 KV (FLO) MCADAMS-WOLF CREEK 500 KV

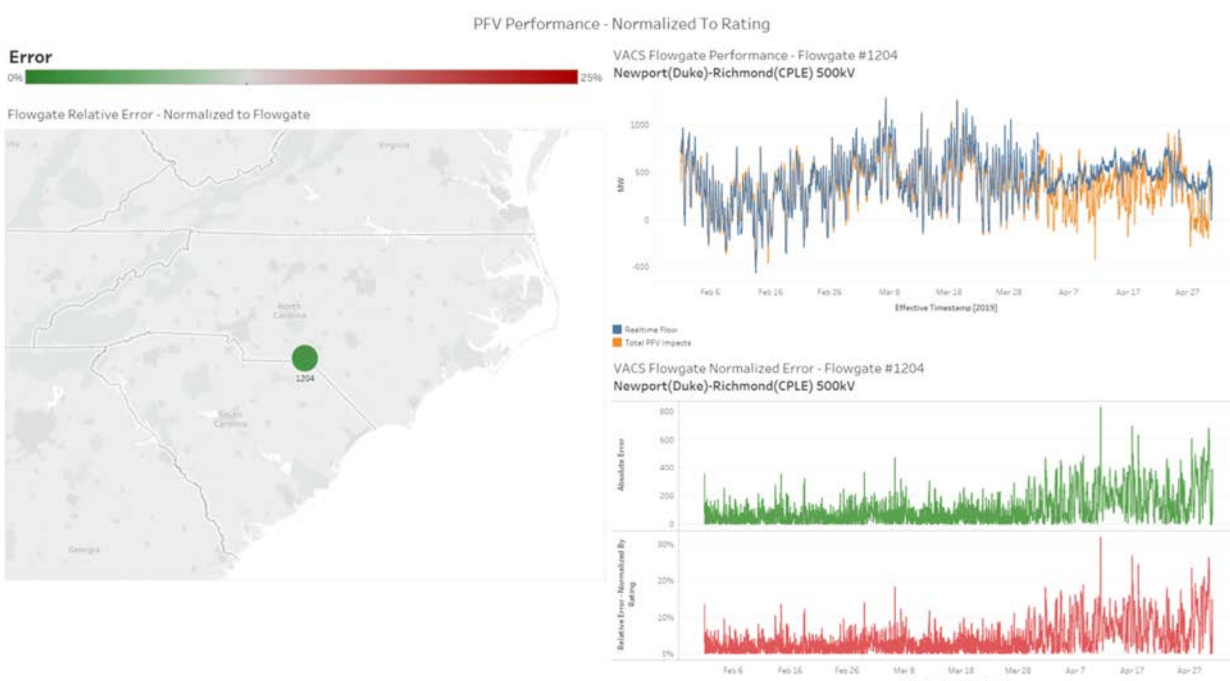
Flowgate is in West Tennessee near TVA's border with Entergy and MISO's southern area. This flowgate trended well but PFV consistently under-calculated flows. This is likely due to the flowgates location between the MISO north and south area and mismatches in calculating tag impacts on the flowgate.



6.13 VACS

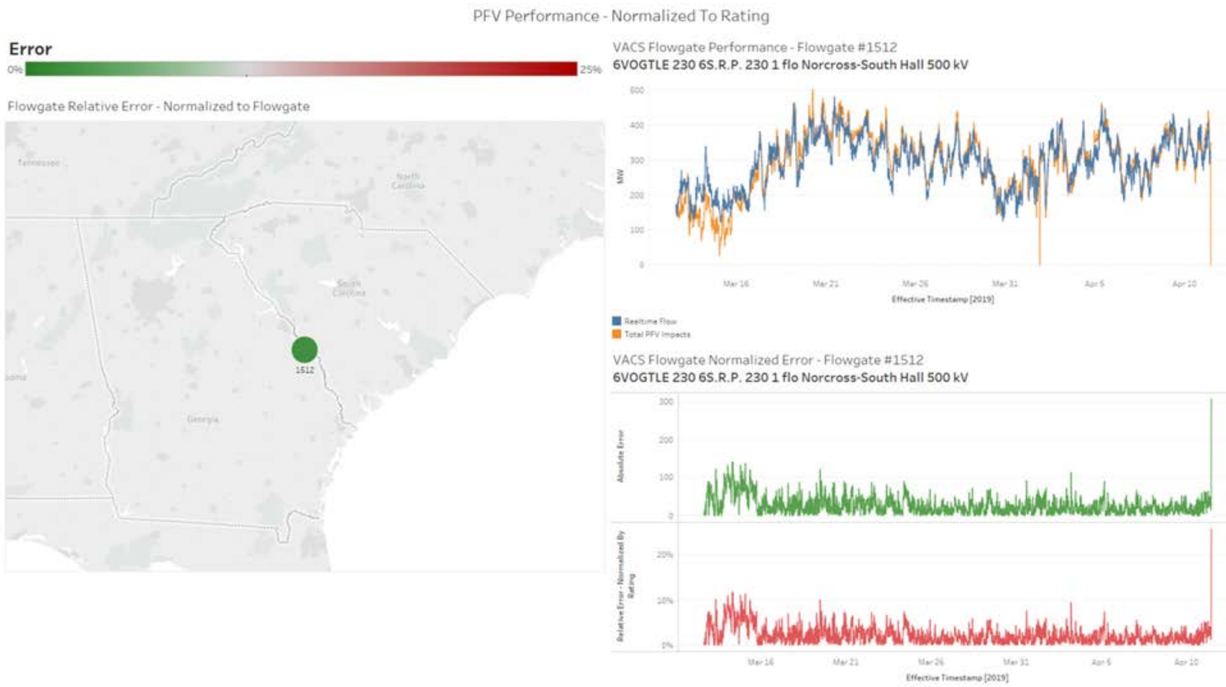
6.13.1 VACS - 1204 - NEWPORT(DUKE)-RICHMOND(CPLE) 500KV

Flowgate #1204 – Newport – Richmond 500kV line is a monitored line between Duke Energy Carolinas and CPLE. The calculated aligns with the real-time submitted values.



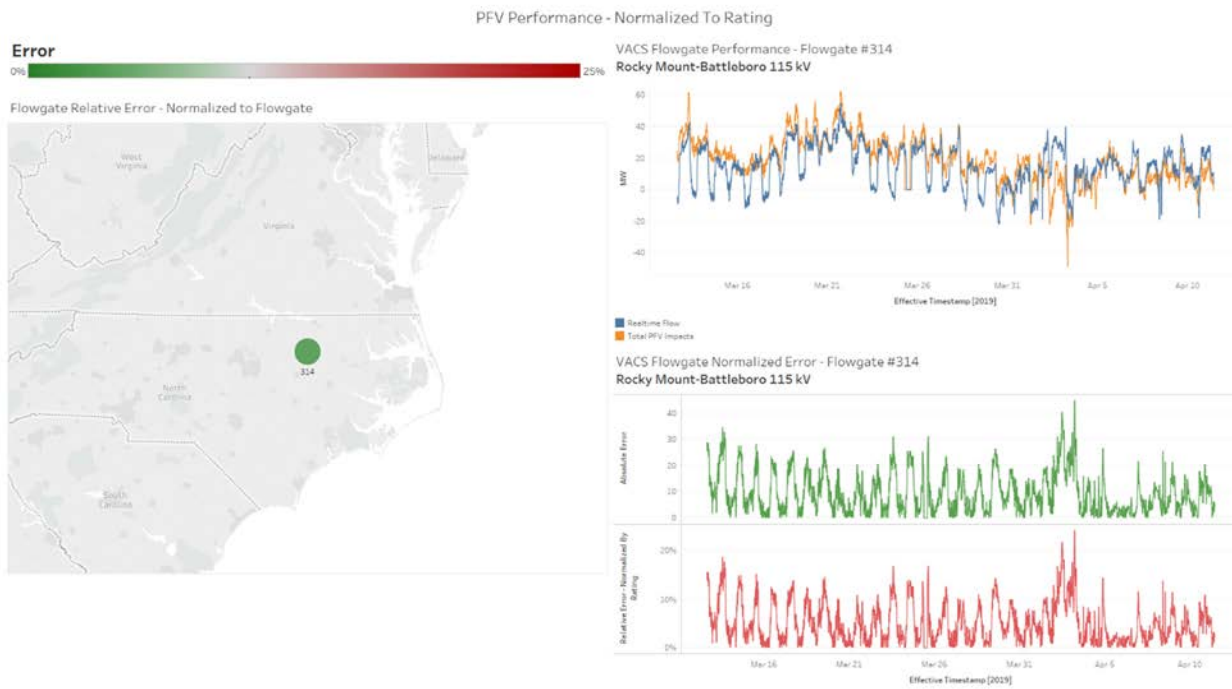
6.13.2 VACS - 1512 - 6VOGTLE 230 6S.R.P. 230 1 FLO NORCROSS-SOUTH HALL 500 KV

Vogtle-SRS flo Norcross-South Hall 500kV line is a facility on the SOCO-VACS interface and the real-time values trend along with the calculated impacts for the monitoring period.



6.13.3 VACS - 314 - ROCKY MOUNT-BATTLEBORO 115 KV

Flowgate #314 – Rocky Mount – Battleboro 115kV calculated values shows a pattern of deviation from the real-time flows. The reason for this isn't clear, but due to the lower levels of flow, the resulting difference is due to distributed energy resources which aren't being captured in the calculations.



Parallel Flow Visualization Project Timeline

- 2006 – NERC began exploring potential improvements to the TLR Process.
- 2008 – NAESB added an item to its WEQ Annual Plan to develop standards complimentary to NERC's effort related to the TLR Process, including alternative congestion management procedures. The NAESB WEQ BPS began monitoring NERC's efforts.
- May 2009 – The NERC ORS passed a motion indicating support for and an intention to move forward with the NERC PFV Proposal being developed by the NERC IDC Working Group.
- June 2009 – The NAESB WEQ BPS began its efforts to develop PFV-related business practice standards to support and compliment the NERC PFV Proposal.
- November 2009 – The NERC ORS approved the NERC IDC Working Group's NERC PFV Proposal and announced a 12 – 18 month PFV field trial will begin in November 2010.
- January 21, 2010 – The FERC issued a Notice of Inquiry regarding the NERC TLR Process and the curtailment priorities in the *pro forma* OATT.
- July 2, 2010 – NERC sent a letter asking NAESB to choose an interim option to be in place before the PFV field trial.
- July 23, 2010 – The NAESB WEQ BPS approved a recommendation containing the standard modifications in support of the NAESB PFV Interim Solution while continuing to develop additional PFV-related WEQ Business Practice Standards.
- November 3, 2010 – The NAESB WEQ Executive Committee approved the standards comprising the NAESB PFV Interim Solution.
- November 2010 – NERC initiated the PFV Interim Solution Field Trial.
- February 2011 – NERC informed NAESB the PFV Interim Solution Field Trial was suspended due to lack of participation.
- June 14, 2012 – FERC issued an order terminating the Notice of Inquiry, finding that the NERC TLR Process does not conflict with the curtailment priorities in the *pro forma* OATT.
- July 10, 2012 – The NAESB WEQ Executive Committee approved Minor Correction MC12025 to remove the standards related to the NAESB PFV Interim Solution from the NAESB WEQ Business Practice Standards as the purpose of these standards was to address concerns expressed by the Commission in the Notice of Inquiry.
- February 2013 – The NAESB WEQ BPS held an informal industry comment period on the proposed PFV-related NAESB WEQ Business Practice Standards. Informal comments were submitted by Basin Electric Power Cooperative, Duke Energy, Entergy, Florida Reliability Coordinating Council, ISO New England, Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company, MISO, New York Independent

System Operator ("NYISO"), North Carolina Electric Membership Corporation ("NCEMC"), Southern Company, Southwest Power Pool ("SPP"), Tennessee Valley Authority ("TVA"), We Energies, and Westar Energy, Inc.

- April 1, 2013 – Control and management of the IDC tool transitioned from NERC to the IDC Association. The IDC Working Group now reports to the IDC Association.
- January 2014 – The NAESB WEQ BPS held a second informal industry comment period on the proposed PFV-related NAESB WEQ Business Practice Standards. Informal comments were submitted by Associated Electric Cooperative, Inc., Duke Energy, Georgia Transmission Corporation, Manitoba Hydro, MISO, NYISO, NCEMC, PJM, Southern Company, SPP, and TVA.
- July 11, 2014 – NAESB filed the initial Status Report on the PFV Project with the Commission. The status report was drafted in coordination with NERC and the IDC Association.
- September 2014 – The NAESB WEQ BPS voted out the recommendation for PFV-related modifications to the NAESB WEQ Business Practice Standards for a formal industry comment period. Formal comments were submitted by the ISO/RTO Council, MISO, the NAESB WEQ Business Practices Subcommittee, the NAESB WEQ Standards Review Subcommittee, Southern Company, TVA, and Xcel Energy Operating Companies.
- October 21, 2014 – The NAESB WEQ Executive Committee considered the recommendation and established the NAESB WEQ Executive Committee PFV Task Force to address issues raised by the formal comments.
- January 2015 – The NAESB WEQ Executive PFV Task Force voted out the revised recommendation for PFV-related modifications to the NAESB WEQ Business Practice Standard for a formal industry comment period. Formal comments were submitted by Entergy, Independent Electricity System Operator ("IESO"), MISO, the NAESB WEQ Executive Committee PFV Task Force, the NAESB WEQ Standards Review Subcommittee, NYISO, Southern Company, and jointly by IESO, ISO New England, MISO, NYISO, PJM and SPP.
- January 28, 2015 – NAESB filed the second Status Report on the PFV Project with the Commission. The status report is drafted in coordination with NERC and the IDC Association.
- February 24, 2015 – The NAESB WEQ Executive Committee voted to adopt the recommendation of the NAESB WEQ BPS for the PFV-related modifications to the NAESB WEQ Business Practice Standards and initiate the full-staffing process. The standards will be held in abeyance for the entirety of the full-staffing period to allow for the IDC Association (now EIDSN) to conduct the PFV field trial.
- March 25, 2015 – NAESB filed the third Status Report on the PFV Project with the Commission. The status report is drafted in coordination with NERC and the IDC Association.
- March 2015 to December 2015 – The IDCWG performed its assessment on the PFV-related modifications to the NAESB WEQ Business Practice Standards and communicated its evaluation of the necessary changes to the IDC tool to OATI through a draft change order.
- December 2015 to February 2016 – OATI reviewed the IDCWG's assessment and evaluated the change order for the necessary modifications to the IDC tool.

- January 29, 2016 – NAESB filed the fourth Status Report on the PFV Project with the Commission. The status report is drafted in coordination with NERC and the IDC Association.
- February 9, 2016 – OATI presented the change order for PFV-related modifications to the IDC tool to the IDC Association Steering Committee for consideration.
- April 1, 2016 **–** The IDC Association transitioned management structure to EIDSN.
- April 29, 2016 – EIDSN executed the PFV-related change order for modifications to the IDC tool with OATI.
- May 2016 to February 2017 – OATI, working with the EIDSN IDCWG, developed the PFV-related modifications to the IDC tool. During this time period, the EIDSN IDCWG also created the test plan for the PFV field trial.
- October 17, 2016 – NAESB filed the fifth Status Report on the PFV Project with the Commission. The status report is drafted in coordination with NERC and EIDSN.
- February 2017 to September 2017 – OATI and the EIDSN IDCWG conducted acceptance testing on the implemented modifications to the IDC tool in preparation for the PFV field trial, making any necessary adjustments.
- September 28, 2017 – The eighteen-month PFV field trial began.
- October 2, 2017 – NAESB filed the sixth Status Report on the PFV Project with the Commission. The status report is drafted in coordination with NERC and EIDSN.
- September 14, 2018 – EIDSN made available the Parallel Flow Visualization Metrics Report to NAESB.
- November 1, 2018 – NAESB filed the seventh Status Report on the PFV Project with the Commission. The status report is drafted in coordination with NERC and EIDSN.
- May 1, 2019 – The PFV field trial ended, but EIDSN continues with parallel operations of the IDC tool. The parallel operations will continue until the PFV-related modifications to the IDC tool are implemented in production. The purpose is to continue to collect data and benchmark the results.
- June 25, 2019 **–** EIDSN submitted the Parallel Flow Visualization Metrics Report 2019 to NAESB. The report was prepared by the EIDSN IDCWG and endorsed by the EIDSN IDC Steering Committee.
- July 9, 2019 – The NAESB WEQ BPS met to initially review the EIDSN Parallel Flow Visualization Metrics Report 2019.
- September 4 – 5, 2019 – The NERC ORS will meet to review the EIDSN Parallel Flow Visualization Metrics Report 2019. The Chair of the EIDSN IDC Steering Committee intends to report the committee's endorsement of the report and conclusion that no modifications are needed to the PFV-related NAESB WEQ Business Practice Standards to address any reliability issues.
- September 10, 2019 – The NERC Operating Committee will meet. If the NERC ORS is in agreement with the EIDSN IDC Steering Committee's endorsement and conclusion, the Chair of the NERC ORS intends to present such information to the NERC Operating Committee. As the NERC ORS reports to the NERC Operating Committee, the committee is responsible for reviewing and approving any subcommittee recommendations or endorsements.

- October 15, 2019 – The NAESB WEQ Executive Committee will meet to review the EIDSN Parallel Flow Visualization Metrics Report 2019 and discuss the actions of EIDSN and NERC related to the reliability assessment of the PFV field trial. The committee will provide any needed guidance to the NAESB WEQ BPS regarding the completion of standards development.
- November 2019 – The NAESB WEQ BPS will reconvene to finish the review of the EIDSN Parallel Flow Visualization Metrics Report 2019, evaluate any needed modifications to the standards, and develop a recommendation based on the NAESB WEQ Executive Committee's direction. Assuming there are no reliability or commercial issues that require substantive modifications to the standards, the majority of revisions will likely be minor, and the NAESB WEQ BPS should be able to finalize and vote out a recommendation relatively quickly. Following this, the NAESB office will distribute the recommendation for a formal comment period.
- 1st Quarter, 2020 – NAESB anticipates the NAESB WEQ Executive Committee will meet to consider the recommendation. Should the NAESB WEQ Executive Committee adopt the recommendation, ending the full-staffing period, the standards will be submitted to NAESB WEQ membership for ratification. Any ratified standards will be incorporated into the next version of the NAESB WEQ Business Practice Standards and filed with the Commission.

Appendix C – NAESB Full-Staffing Process

Excerpt from the NAESB Operating Practices as approved via Board Resolution September 11, 2015 (Section C3)

Section C. Standards Development and Maintenance

3. Full Staffing

The NAESB practice of full staffing is to be employed when there are interdependencies in the development of standards that would require an iterative approach.

This process is applied when the technical standards developed to support business practices may require changes to the business practices, or it is impractical to implement the business practices without the supporting technical standards completed. The business practices are adopted by the applicable quadrant EC(s), but they are not ratified until the technical standards are complete. In this manner, there is an opportunity to change the business practices if needed, and an indication of industry support is attained through the EC vote on the business practices prior to undertaking the technical development.

Similarly, implementation of business practices that may be dependent on other organization's or other quadrant's work products can use the process of full staffing to approve the business practices yet begin the ratification process after the dependent activity is complete, thus providing an opportunity for the business practices to be modified to take into account the other organization's or quadrant's work products. By doing such, the standards development in NAESB may be more effectively coordinated and timed for release with other organization's or quadrant's work products.

For the applicable EC(s) to use the full staffing process, first there will be a simple majority vote to determine if full staffing is required, which would imply a delay of ratification until the interdependent development is completed. Following the full staffing vote, the business practice standard(s) would be adopted pursuant to a super majority vote. Prior to ratification, should it be determined that additional change(s) are required to the EC adopted standard(s), the change(s would follow the existing process for standards development. At any time, the applicable EC(s) can determine to stop the full staffing process and begin the ratification process through a simple majority vote.