Queue Scope

Geospatial User Interface

“Take a Tour”

Prepared by:
PJM System Planning
As Of: 7/26/2024

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Official Tool Name: **Queue Scope Geospatial UI**

DESCRIPTION: The screening tool enables users to evaluate placement of future generators even before formally entering the PJM interconnection process. The tool screens potential points of interconnection (POI) on the PJM system by assessing grid impacts based on the amount of MW injection or withdrawal at a given POI.

Tool Functionality

Capabilities

- Provides the ability to assess Injection and Withdrawal applications
- Leverages results from PJM TARA Generator Deliverability analysis
- Provides facility loading impacts and headroom (MW) by POI
- Provides map overlays for transmission facility loading, transmission lines, new service requests and generator deactivations
- 6000+ POI buses available to users within the PJM footprint
- Select between Transmission Planning or Queue/Cycle Study cases

Limitations

- No short circuit, voltage or stability analysis. Thermal overloads are the typical constraint.
- Currently limited to Summer Peak analysis. Future plans to include Light Load & Winter Peak analysis.

Tool Workflow Overview

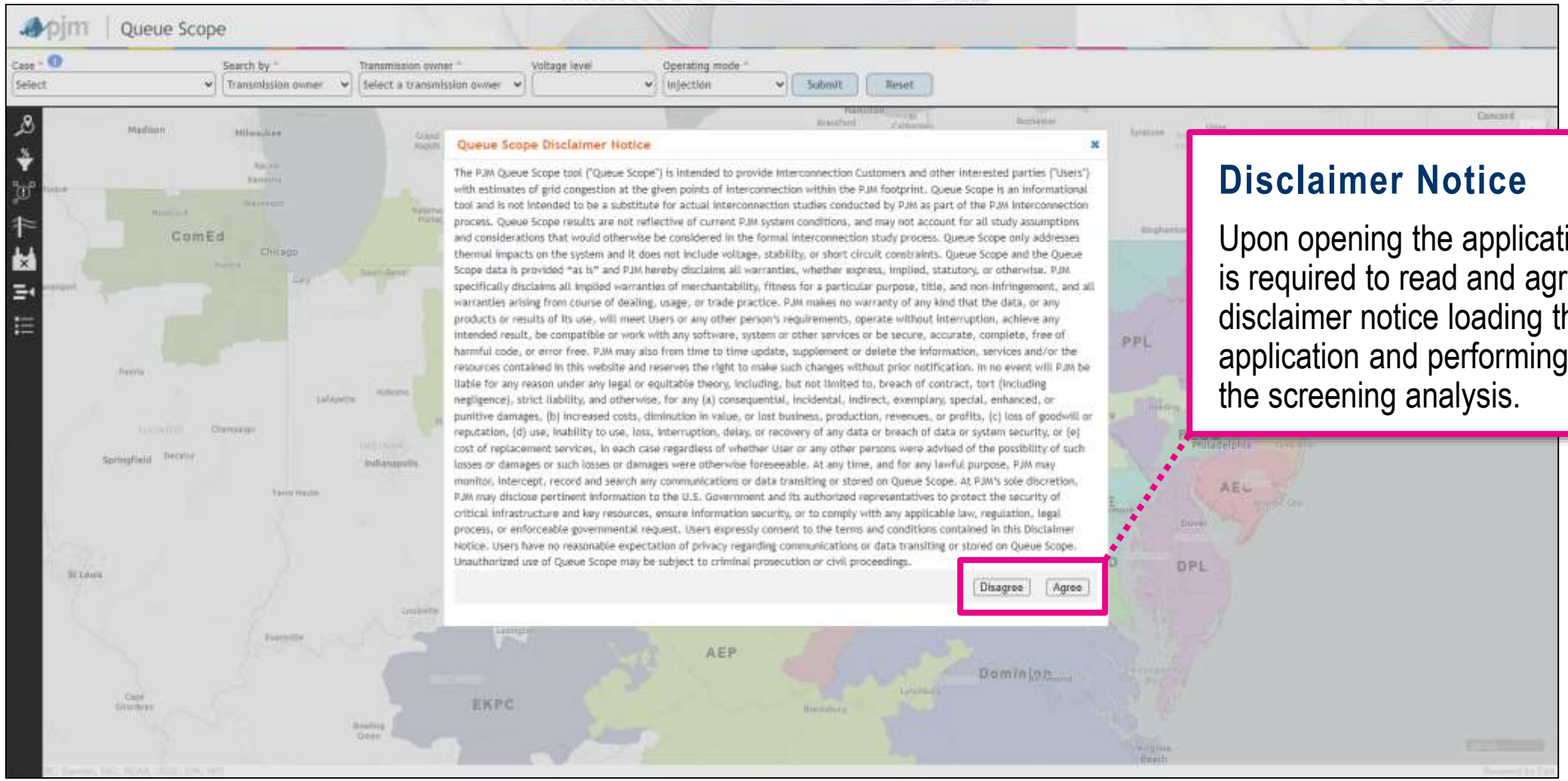
DESCRIPTION:

The following workflow covers how a user will generally interact with the Queue Scope application to run the generator POI analysis.

Workflow Overview

- **Disclaimer Notice**
- **User Inputs**
  - Case Selection
  - "Search By" Feature
  - Transmission Owner
  - Voltage
  - Voltage Level
  - Bus Name/Bus Number
  - Operating Mode
  - Select Buses for Study
  - Selected Buses
  - Run Study
- **Output Results**
  - Evaluation Results
  - Export Results
- **Additional Features**
  - Navigate to Coordinates
  - Pre-Loading Status Filter
  - Congestion Overlay
  - Transmission Lines
  - Generator Deactivations
  - New Service Requests

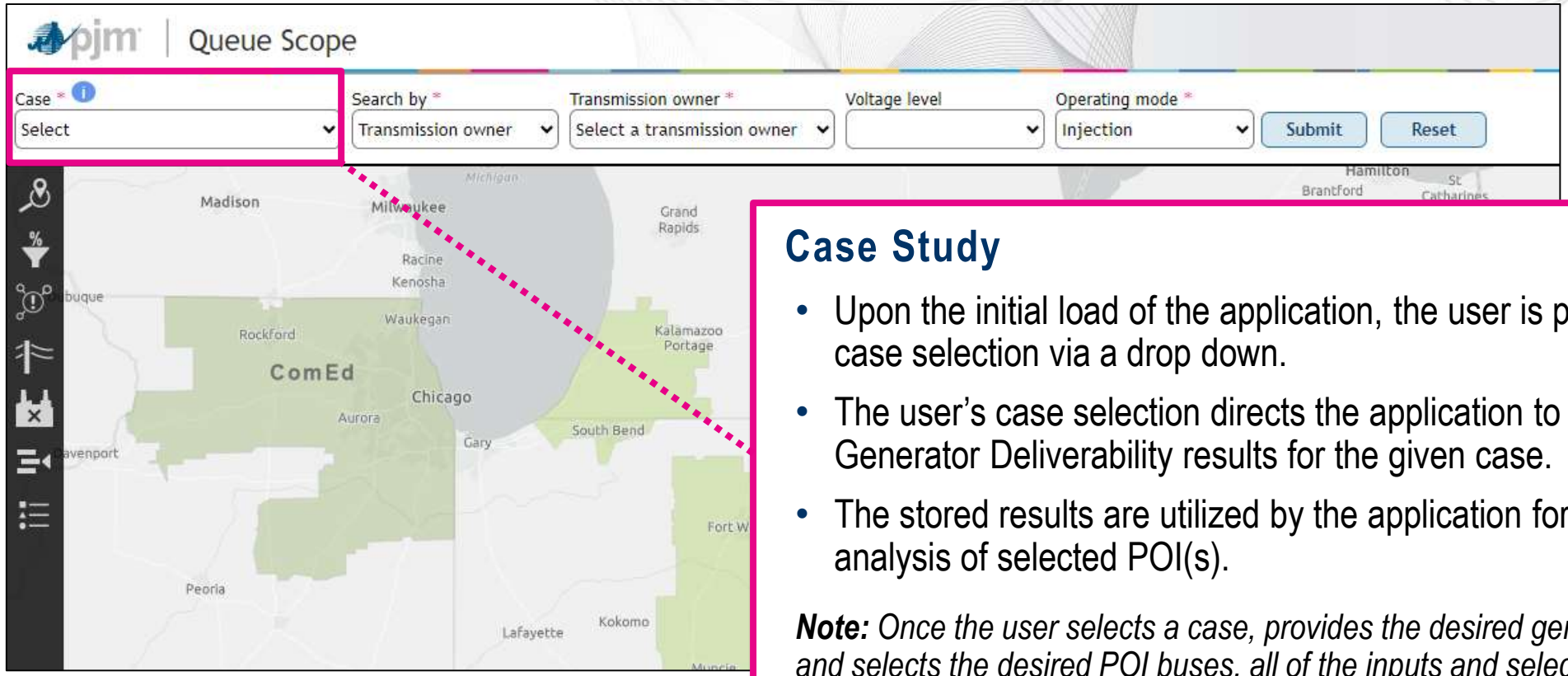
Disclaimer Notice



Disclaimer Notice

Upon opening the application, the user is required to read and agree to the disclaimer notice loading the full application and performing the screening analysis.

Case Selection

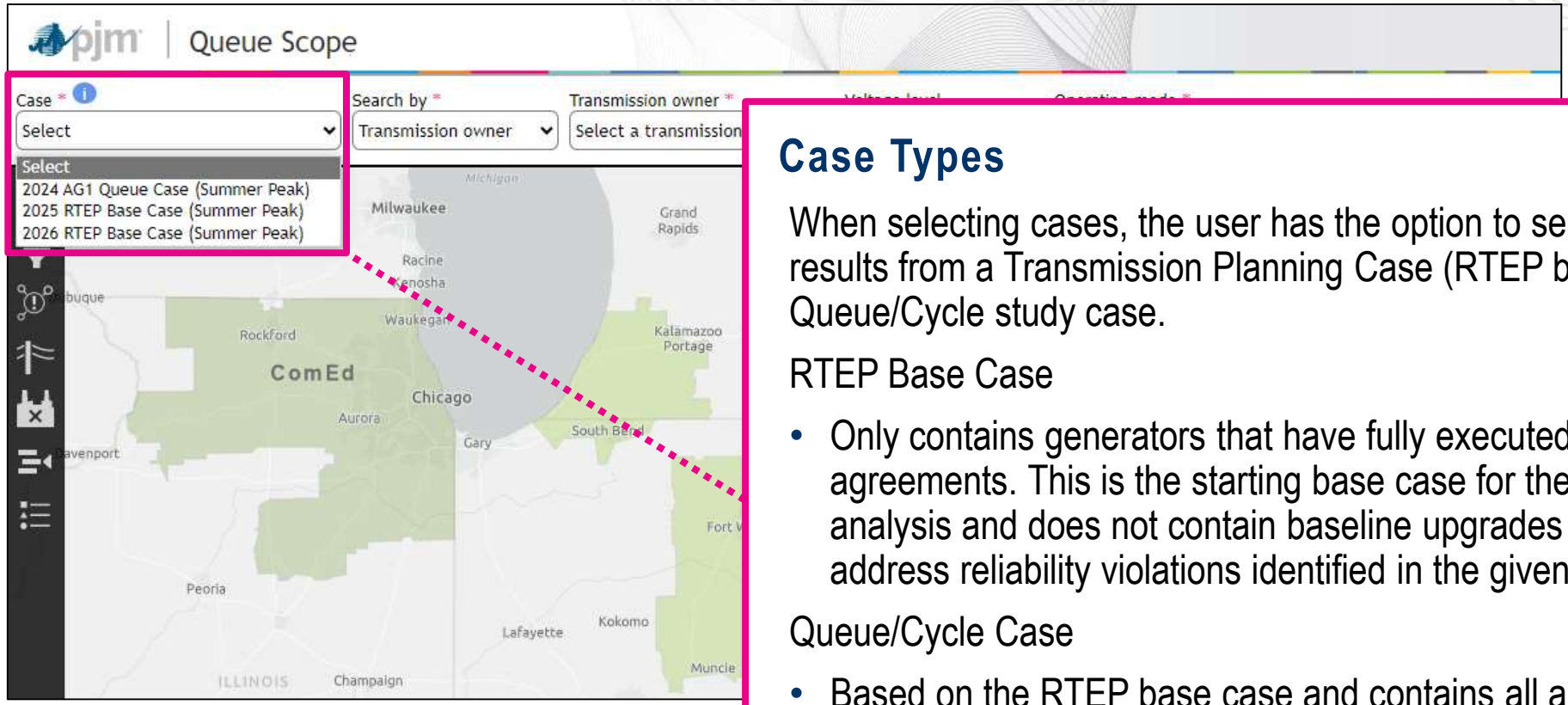


Case Study

- Upon the initial load of the application, the user is prompted to make a case selection via a drop down.
- The user's case selection directs the application to load a set of stored Generator Deliverability results for the given case.
- The stored results are utilized by the application for the generator analysis of selected POI(s).

Note: *Once the user selects a case, provides the desired generator input parameters, and selects the desired POI buses, all of the inputs and selections made within the application will be reset if a different case is then loaded.*

Case Selection (cont.)



Case Types

When selecting cases, the user has the option to select and load the results from a Transmission Planning Case (RTEP base case) or a Queue/Cycle study case.

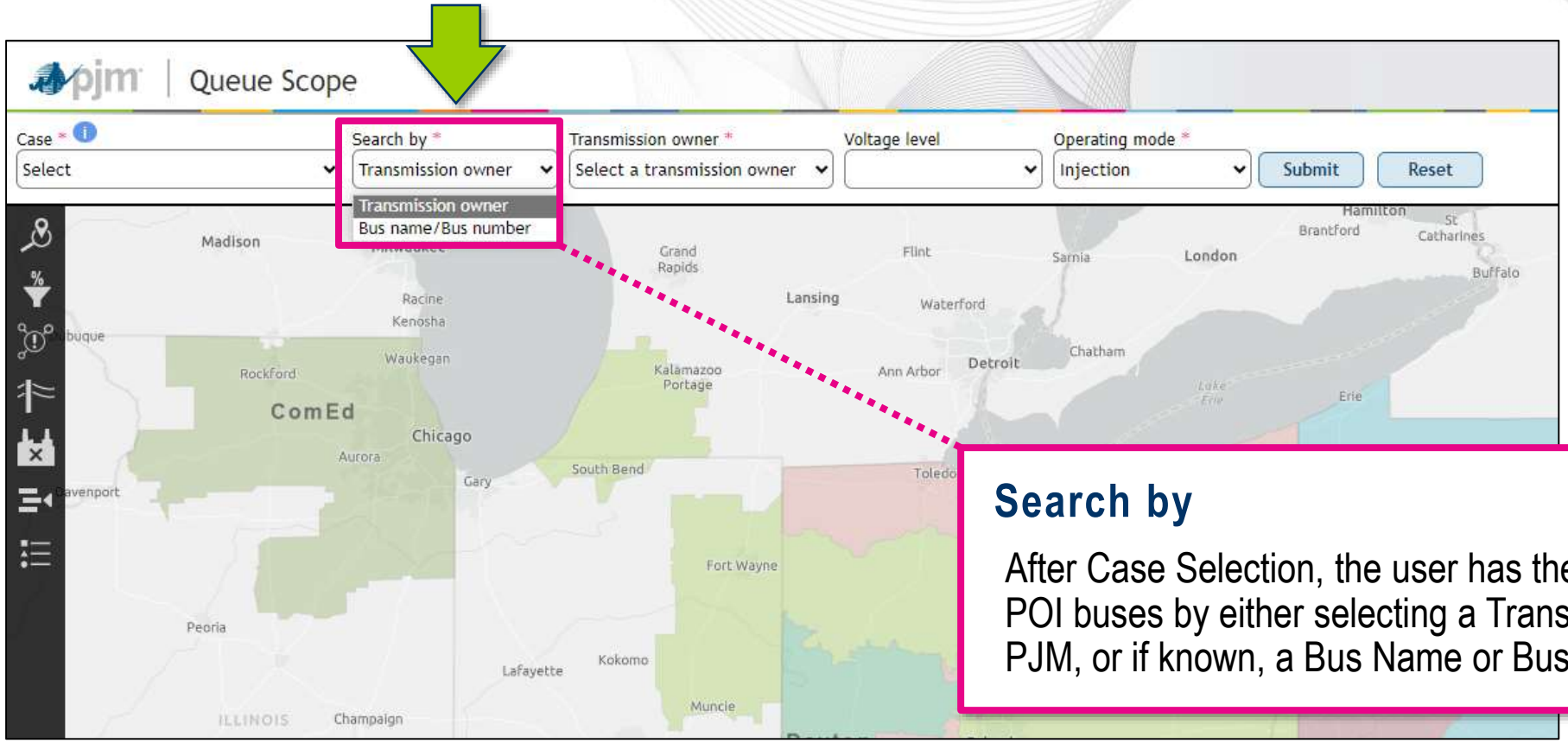
RTEP Base Case

- Only contains generators that have fully executed interconnection agreements. This is the starting base case for the annual RTEP analysis and does not contain baseline upgrades later approved to address reliability violations identified in the given annual RTEP study.

Queue/Cycle Case

- Based on the RTEP base case and contains all active generators up through the queue/cycle under study. Includes the modeling of baseline upgrades with projected in-service dates up through the base case year. This case is used to conduct PJM's interconnection studies.

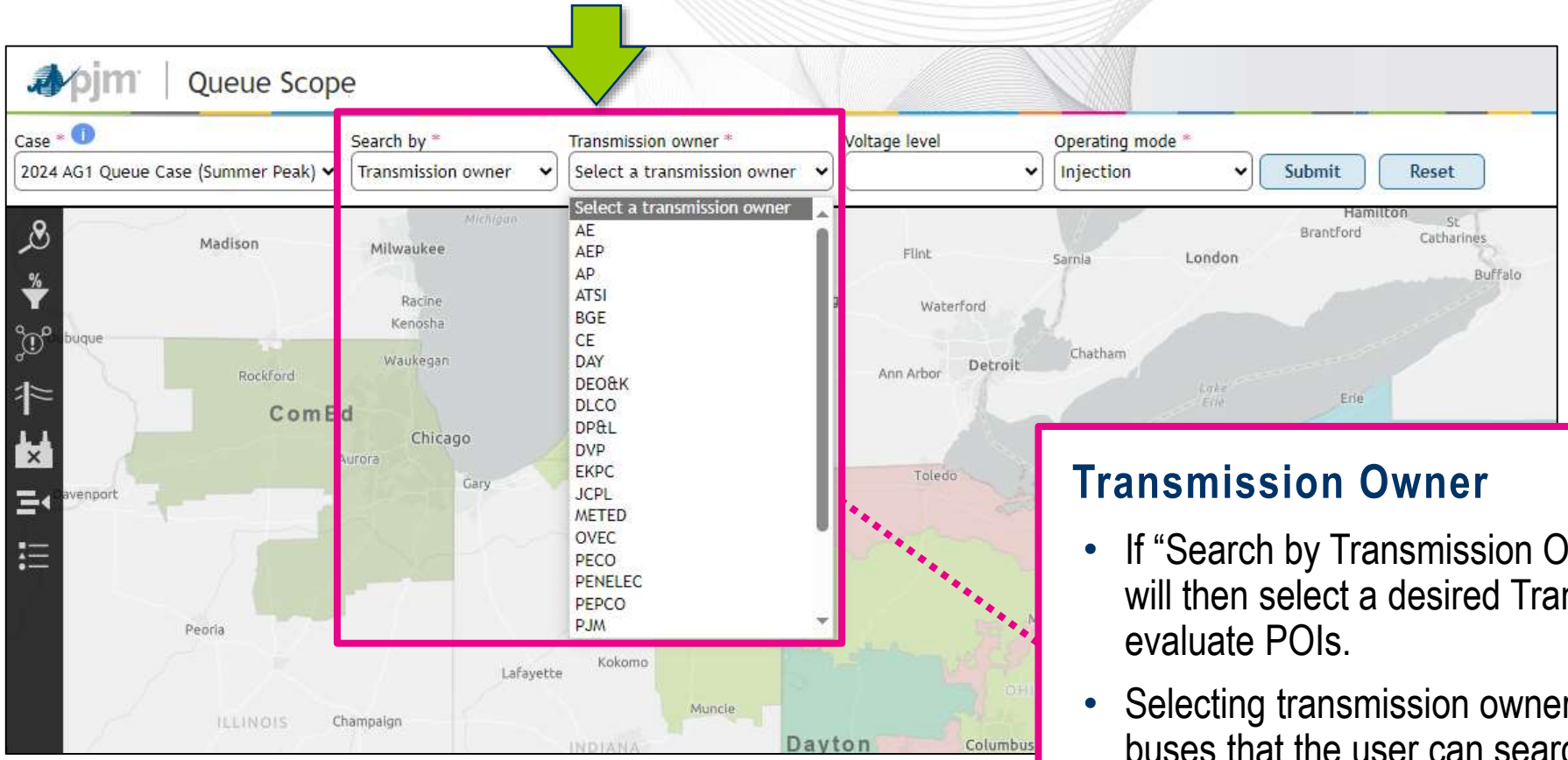
“Search By” Feature



Search by

After Case Selection, the user has the option to search for POI buses by either selecting a Transmission Owner within PJM, or if known, a Bus Name or Bus Number.

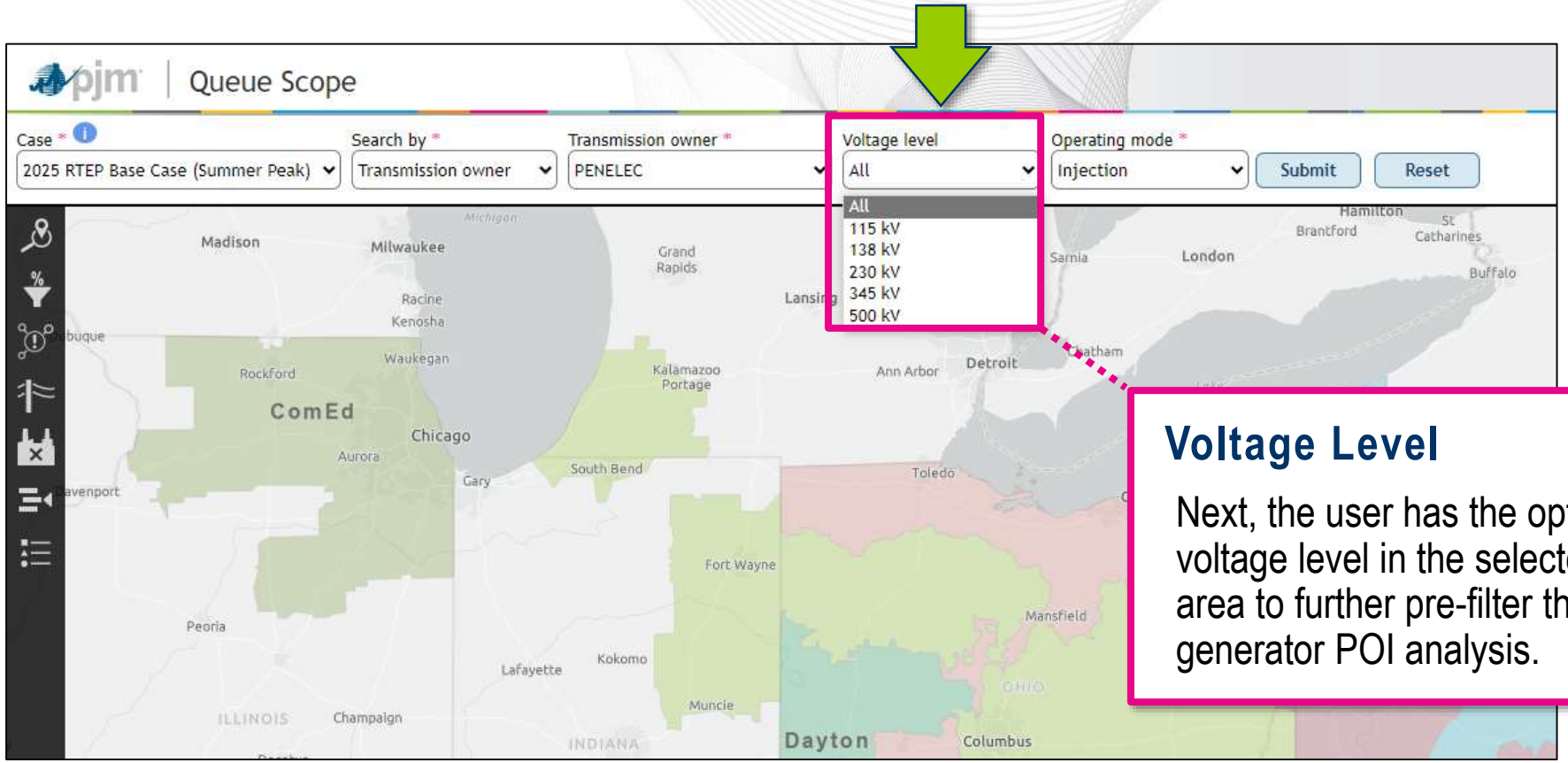
Transmission Owner



Transmission Owner

- If “Search by Transmission Owner” is selected, the user will then select a desired Transmission Owner area to evaluate POIs.
- Selecting transmission owner pre-filters the available buses that the user can search and select for the generator POI analysis.

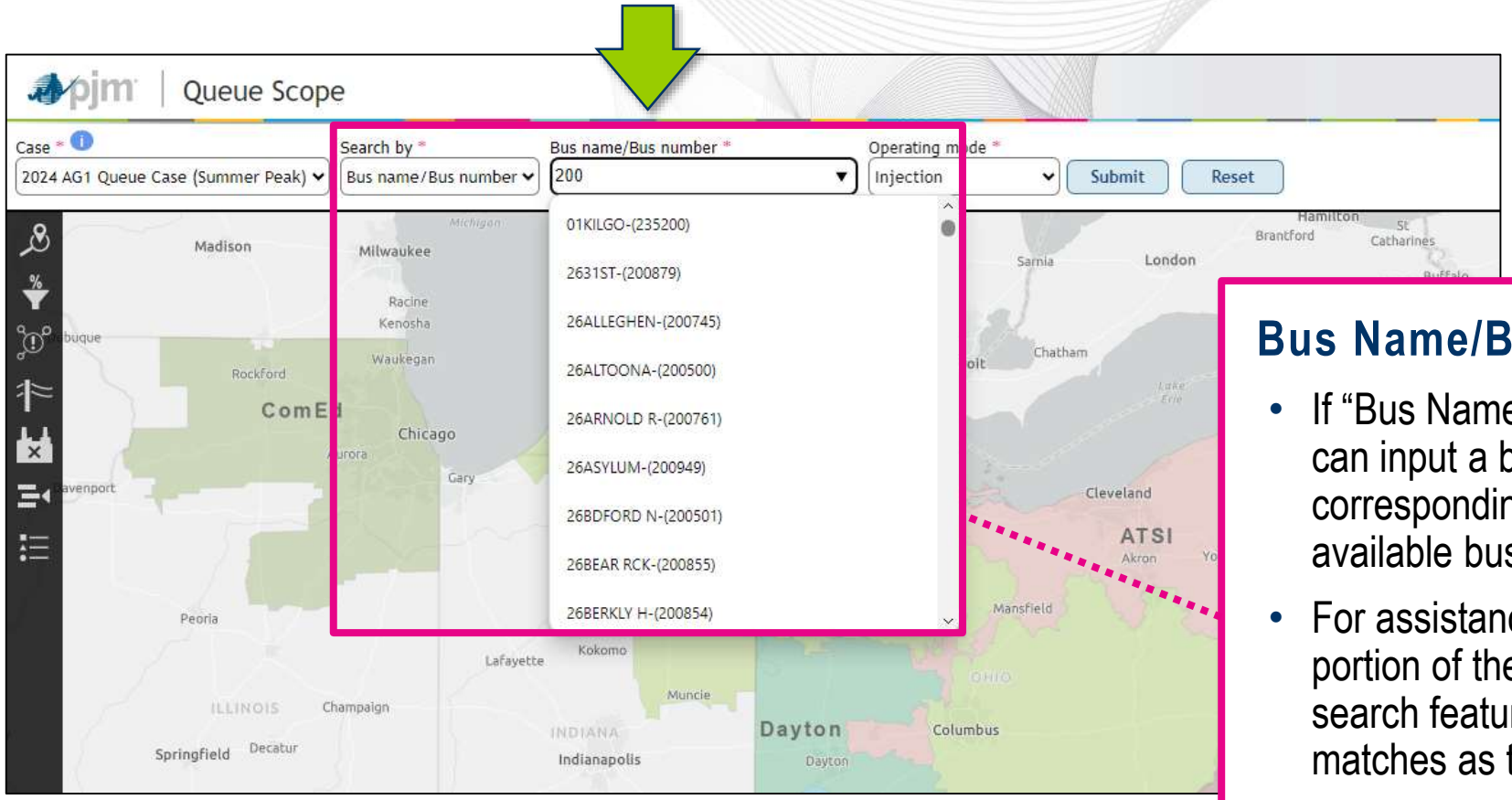
Voltage Level



Voltage Level

Next, the user has the option to select a specific voltage level in the selected “Transmission Owner” area to further pre-filter the available buses for the generator POI analysis.

Bus Name/Bus Number Search

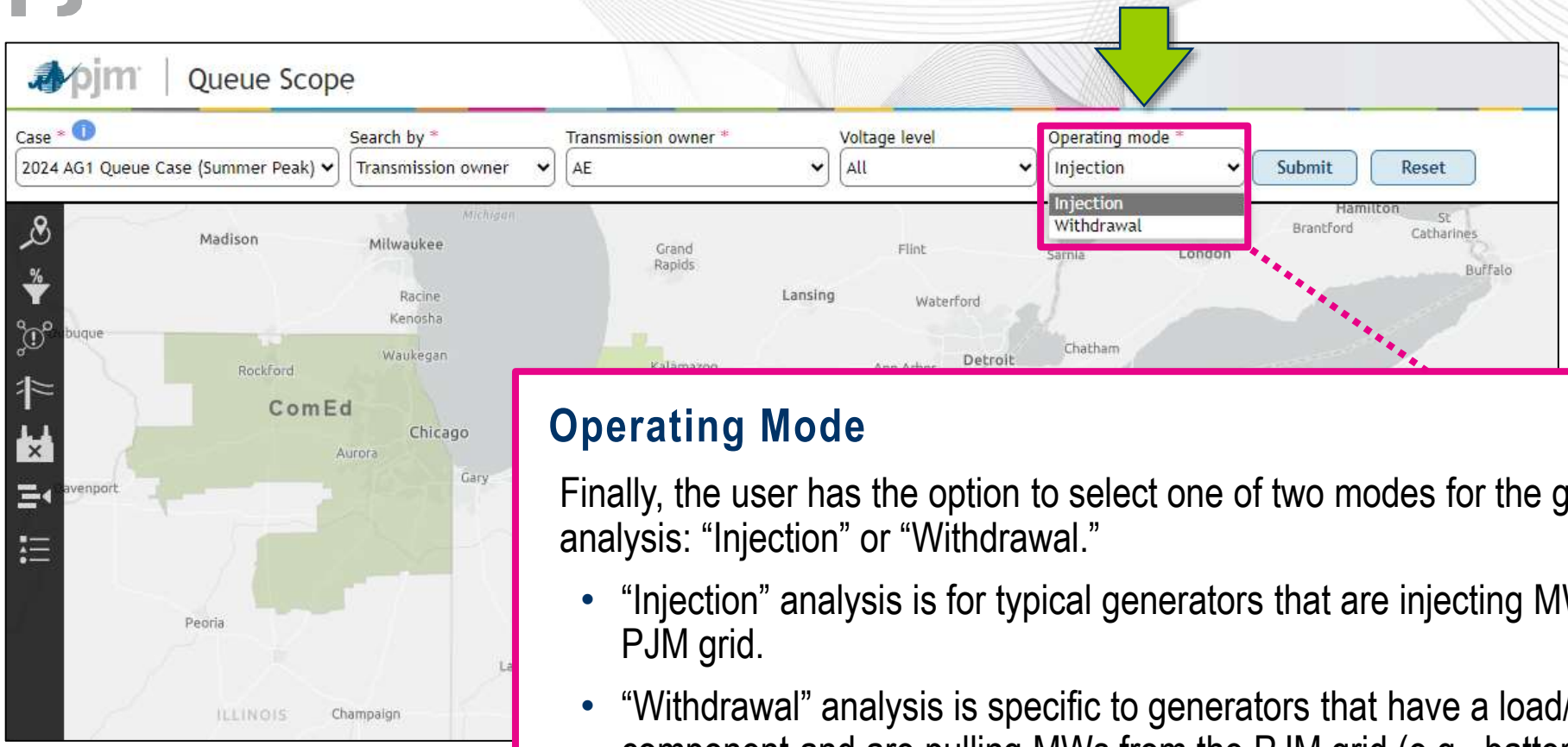


Bus Name/Bus Number

- If “Bus Name/Bus Number” is selected, the user can input a bus name or bus number in the corresponding field, which will then query the available buses in the case dataset.
- For assistance, once the user starts typing in a portion of the bus name/number, a predictive search feature will populate a list of possible matches as the user continues to type.

Note: *The user can only select a single bus using this search feature.*

Operating Mode

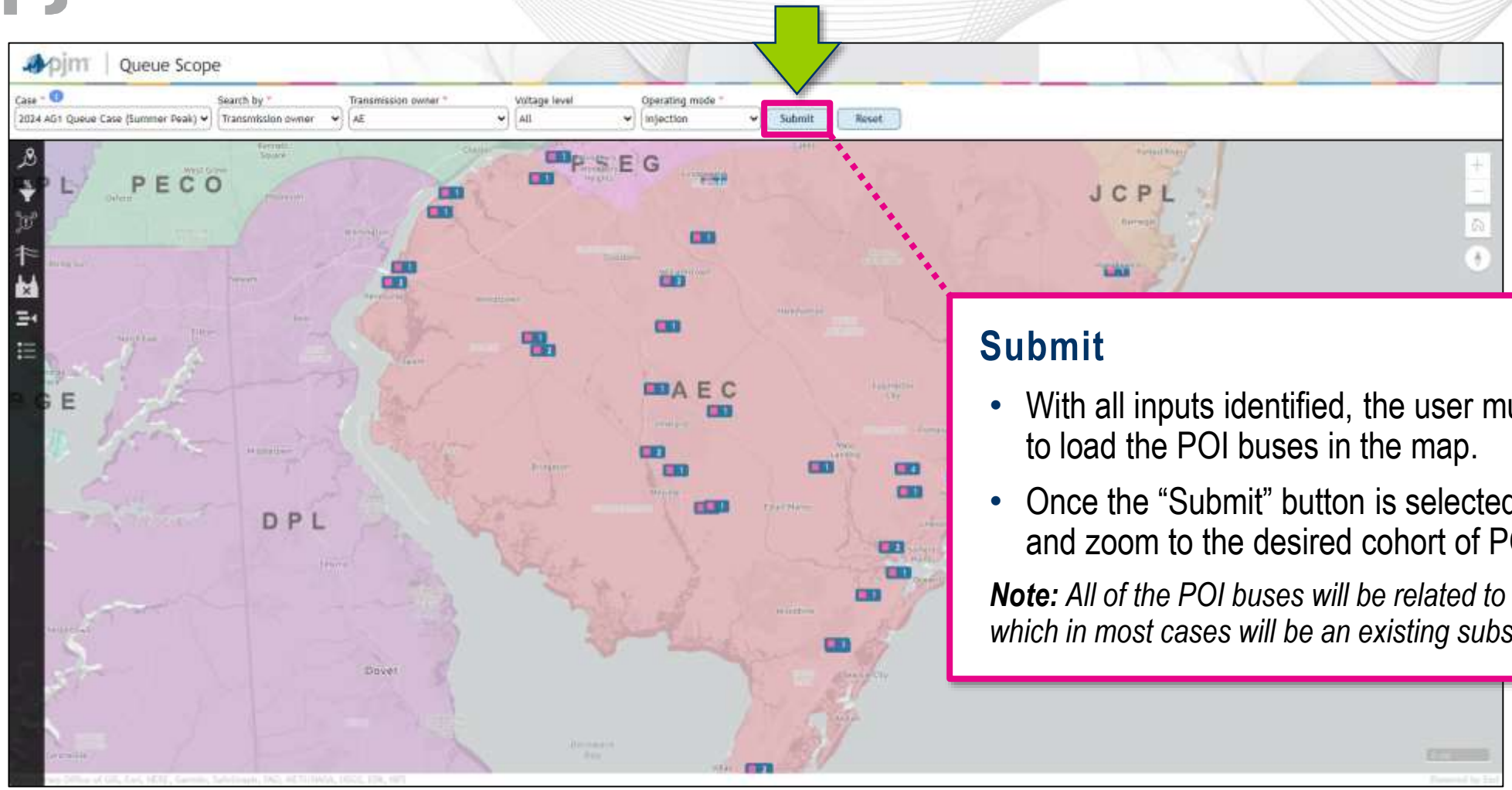


Operating Mode

Finally, the user has the option to select one of two modes for the generator analysis: “Injection” or “Withdrawal.”

- “Injection” analysis is for typical generators that are injecting MWs into the PJM grid.
- “Withdrawal” analysis is specific to generators that have a load/withdrawal component and are pulling MWs from the PJM grid (e.g., batteries, pumped hydro, MTX).

Select Submit

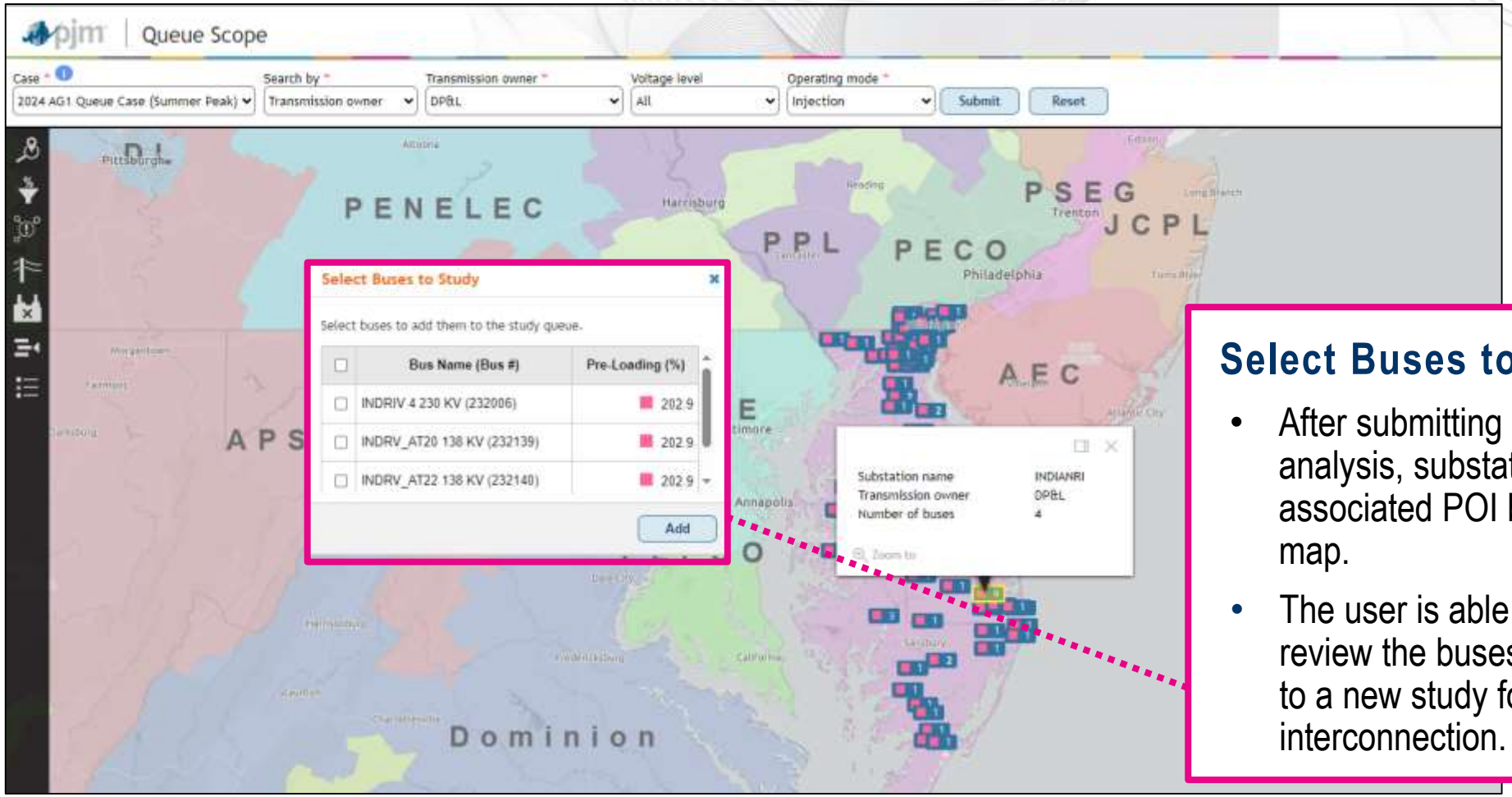


Submit

- With all inputs identified, the user must select “Submit” to load the POI buses in the map.
- Once the “Submit” button is selected, the map will pan and zoom to the desired cohort of POI bus locations.

Note: *All of the POI buses will be related to a location in the map, which in most cases will be an existing substation.*

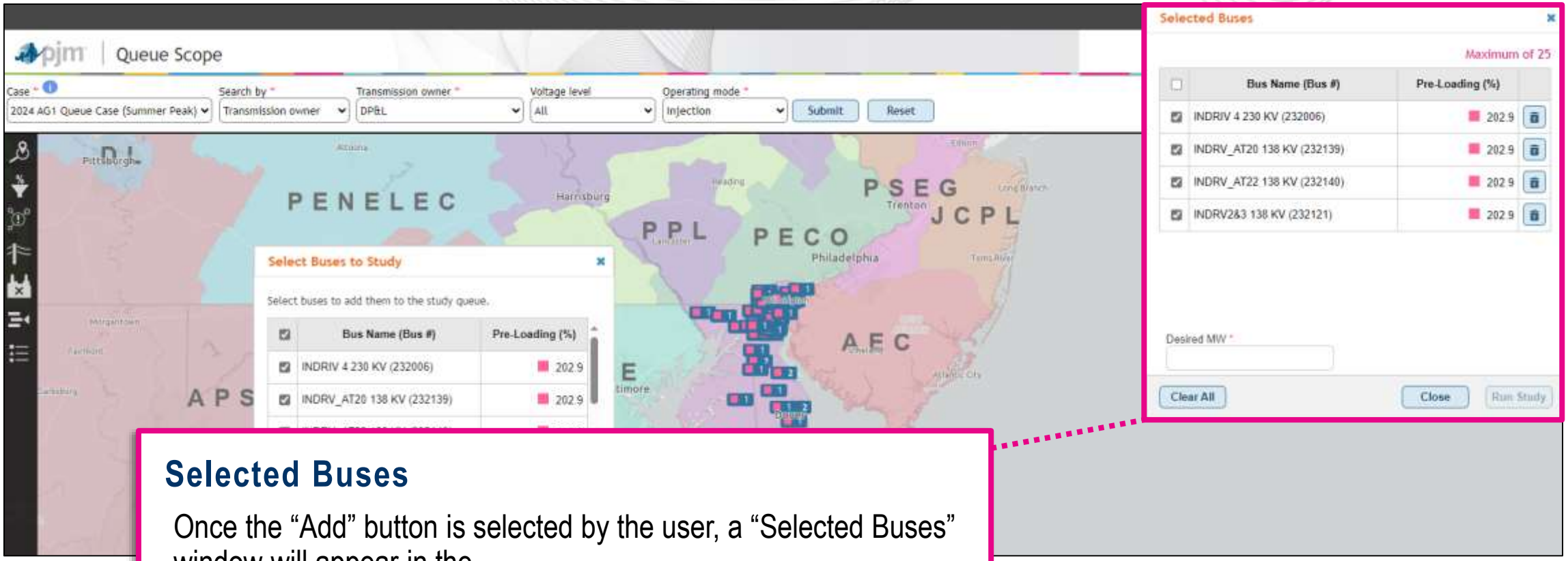
Select Buses to Study



Select Buses to Study

- After submitting the generator POI analysis, substation symbols with the associated POI buses will be visible in the map.
- The user is able to select any symbol to review the buses at that location and add to a new study for a generator interconnection.

Selected Buses

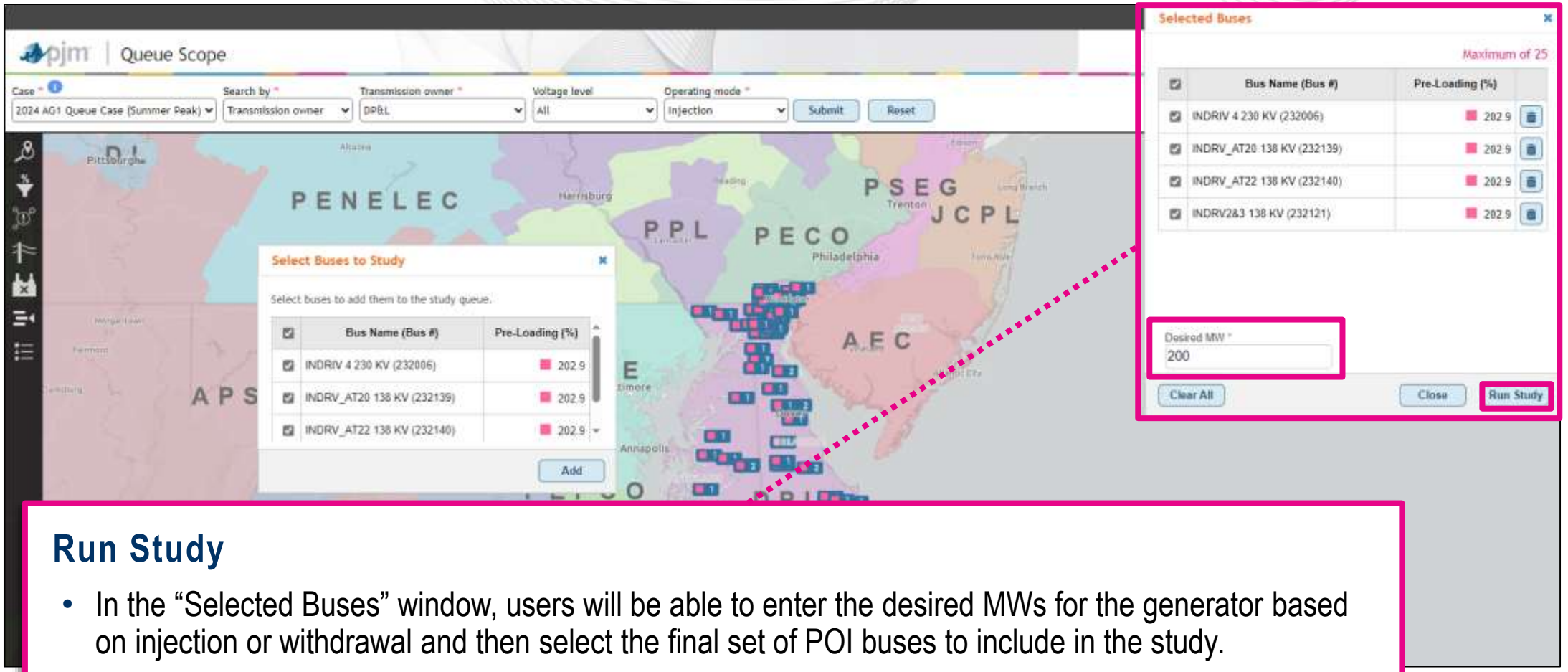


Selected Buses

Once the “Add” button is selected by the user, a “Selected Buses” window will appear in the user-interface.

Note: *A maximum of 25 buses may be selected for the study.*

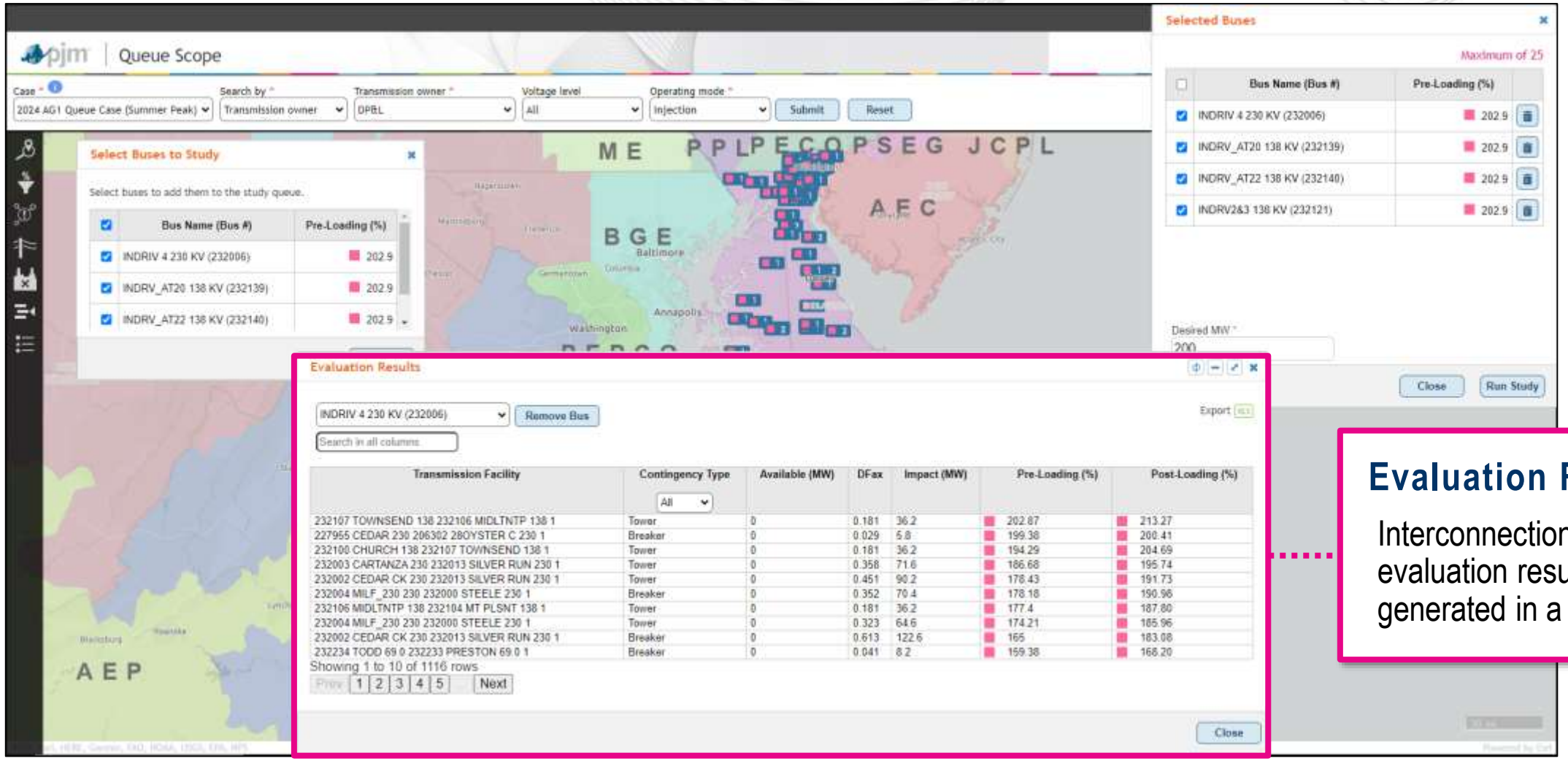
Run Study



Run Study

- In the “Selected Buses” window, users will be able to enter the desired MWs for the generator based on injection or withdrawal and then select the final set of POI buses to include in the study.
- The user can then select “Run Study” to generate evaluation results.

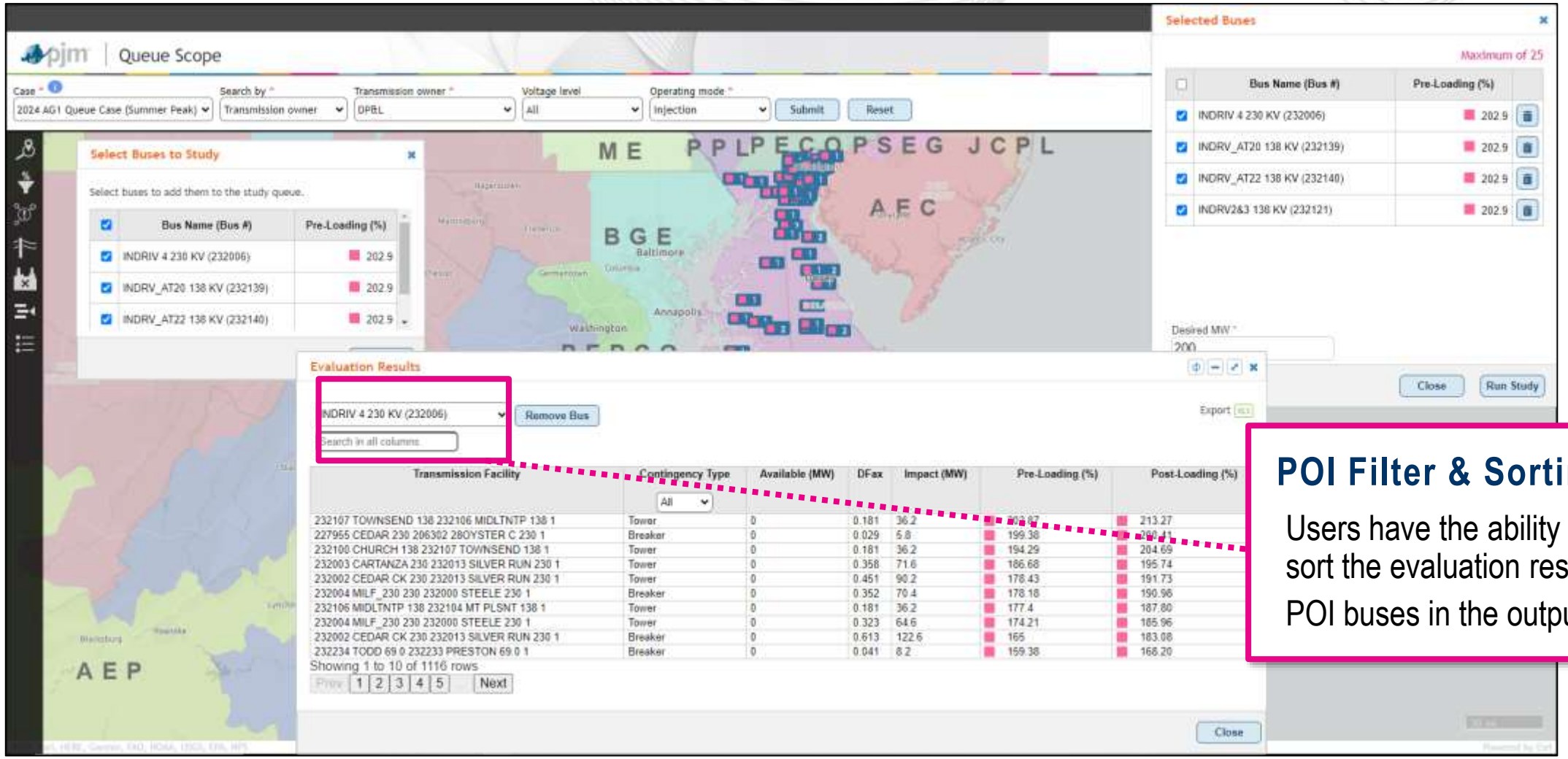
Evaluation Results



Evaluation Results

Interconnection study evaluation results are generated in a table.

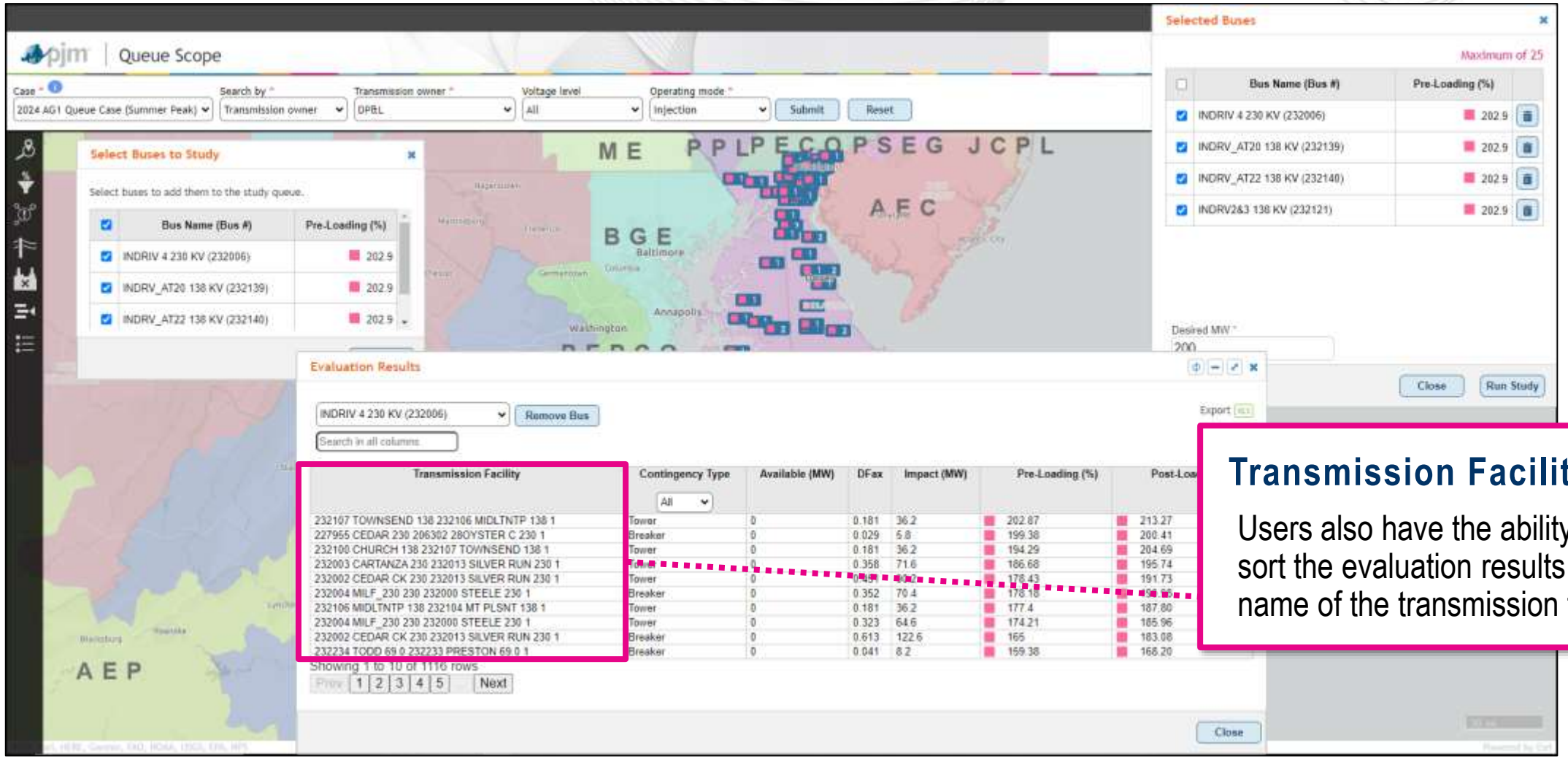
Evaluation Results – POI Filter & Sorting



POI Filter & Sorting

Users have the ability to filter and sort the evaluation results by the POI buses in the output.

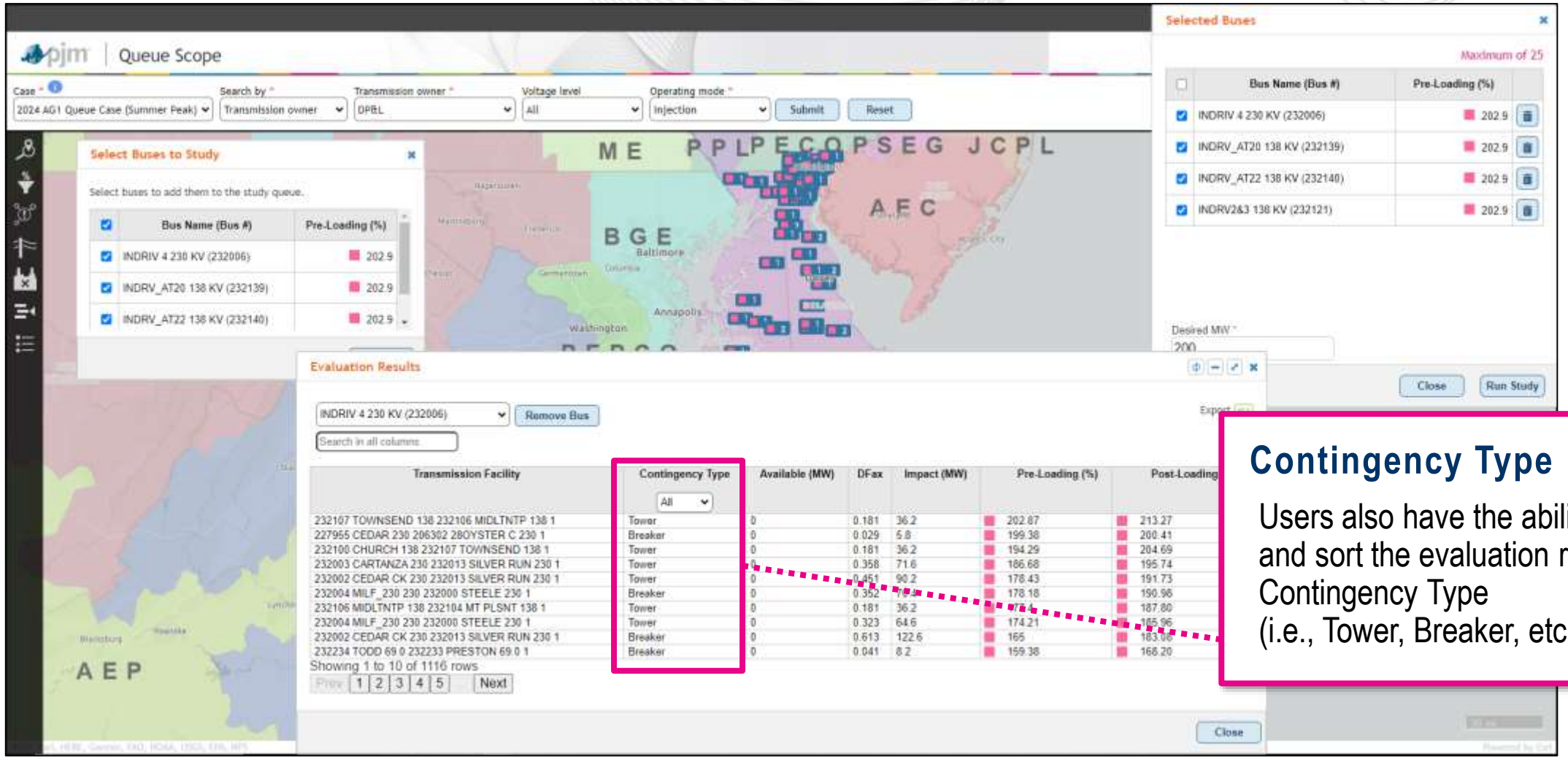
Evaluation Results – Transmission Facility



Transmission Facility

Users also have the ability to filter and sort the evaluation results by the name of the transmission facilities.

Evaluation Results – Contingency Type



Evaluation Results – Table Controls

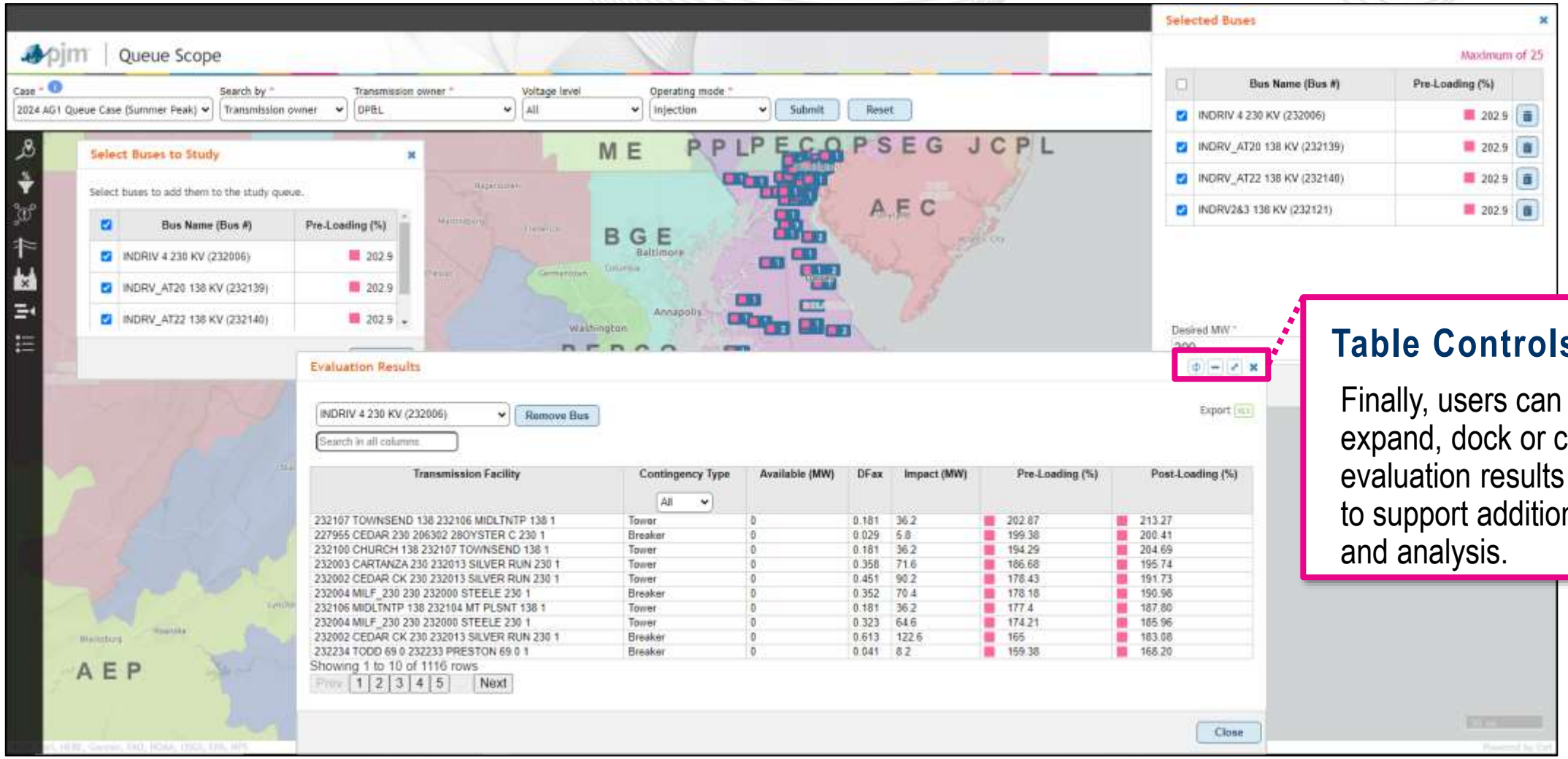
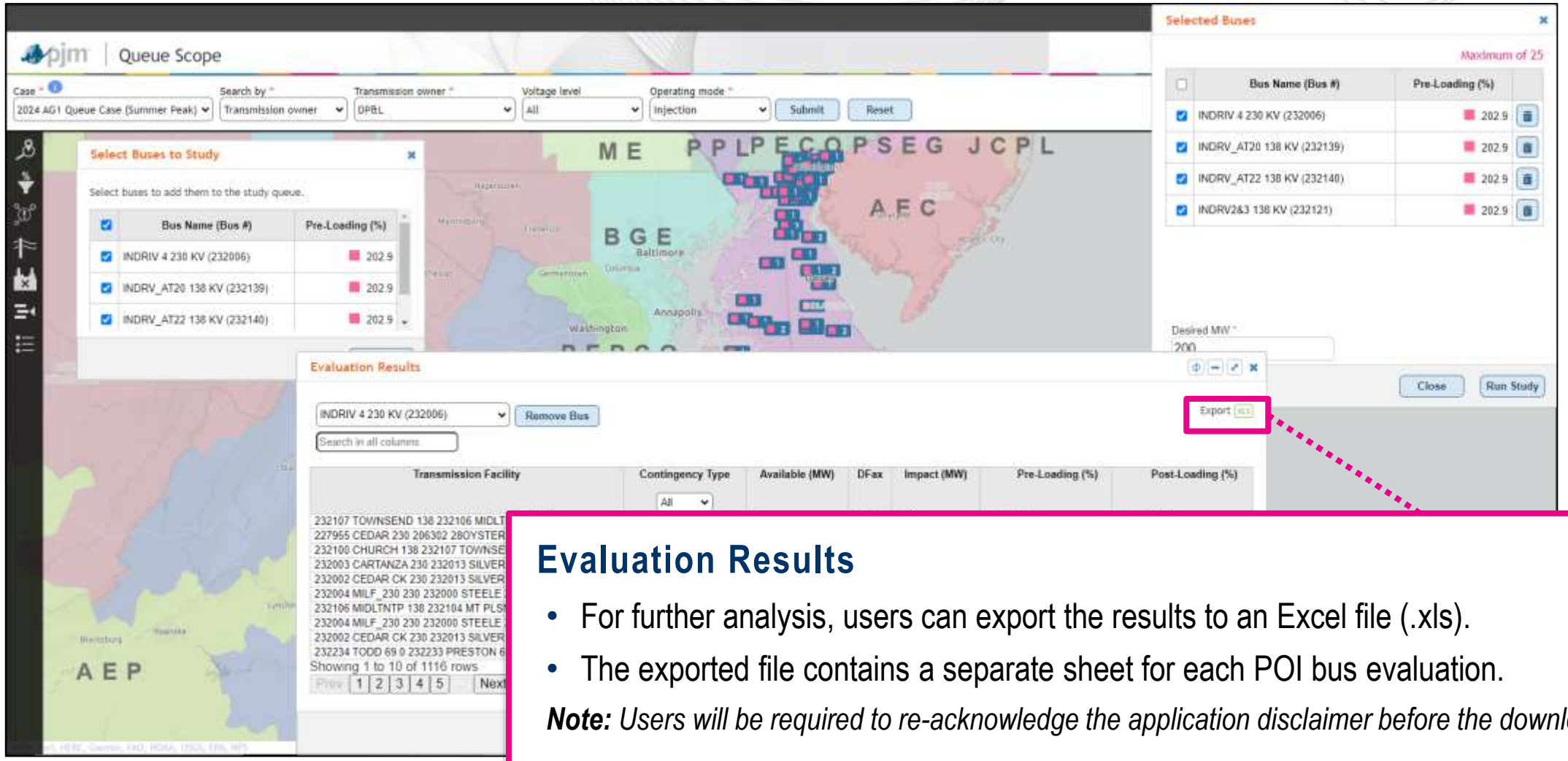


Table Controls

Finally, users can minimize, expand, dock or close the evaluation results on demand to support additional browsing and analysis.

Export Results

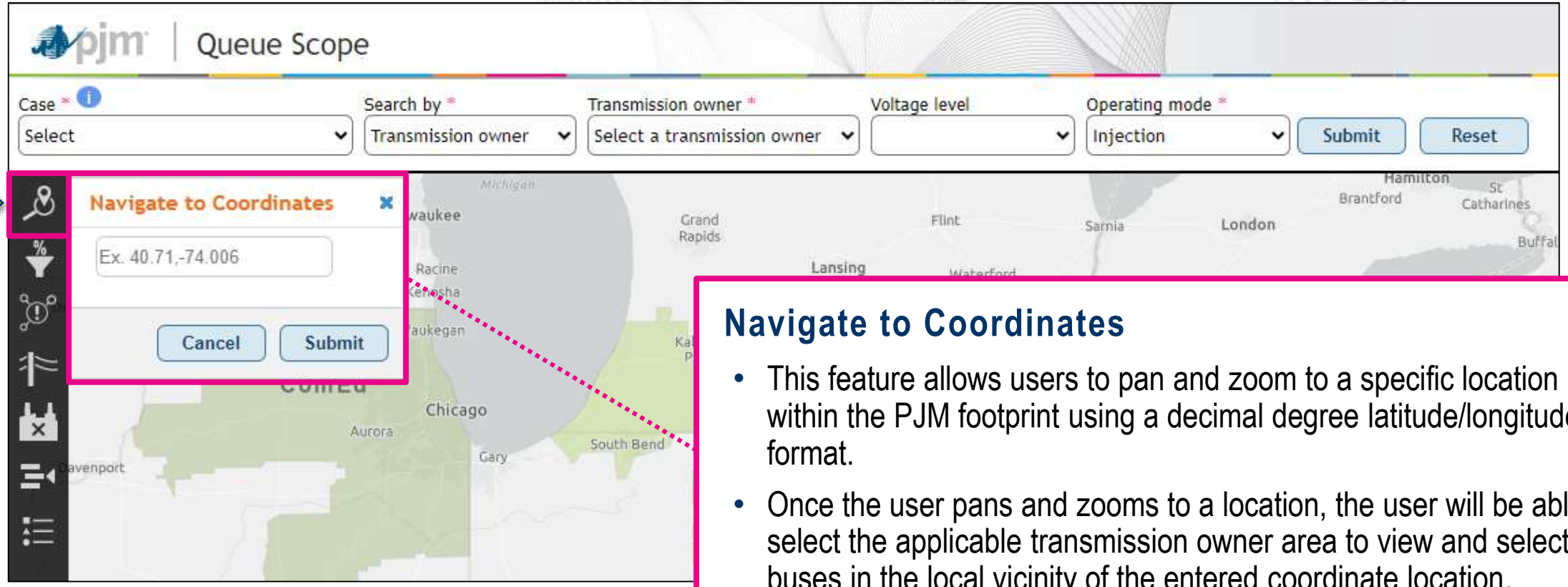


Evaluation Results

- For further analysis, users can export the results to an Excel file (.xls).
- The exported file contains a separate sheet for each POI bus evaluation.

Note: *Users will be required to re-acknowledge the application disclaimer before the download begins.*

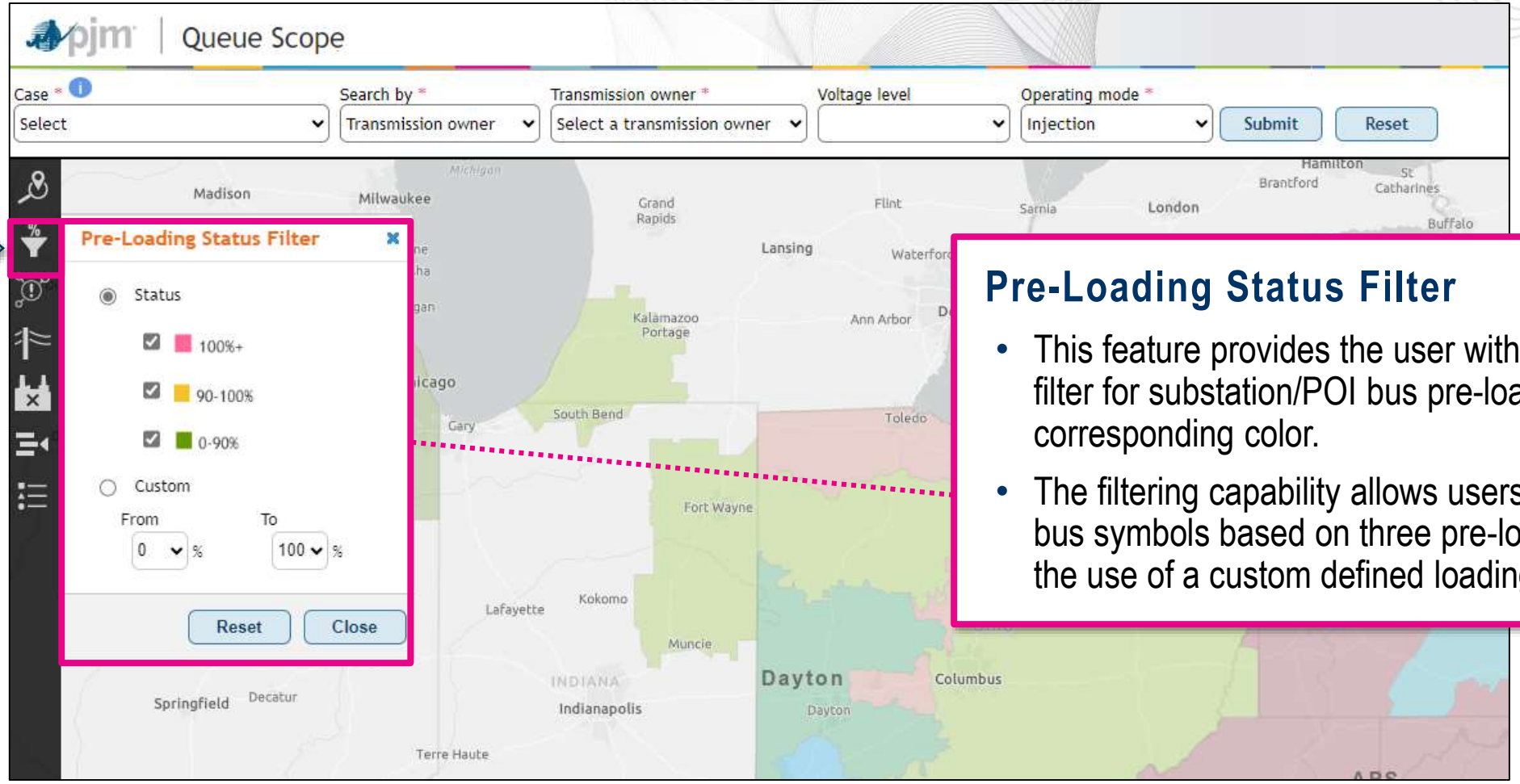
Navigate to Coordinates



Navigate to Coordinates

- This feature allows users to pan and zoom to a specific location within the PJM footprint using a decimal degree latitude/longitude format.
- Once the user pans and zooms to a location, the user will be able to select the applicable transmission owner area to view and select POI buses in the local vicinity of the entered coordinate location.

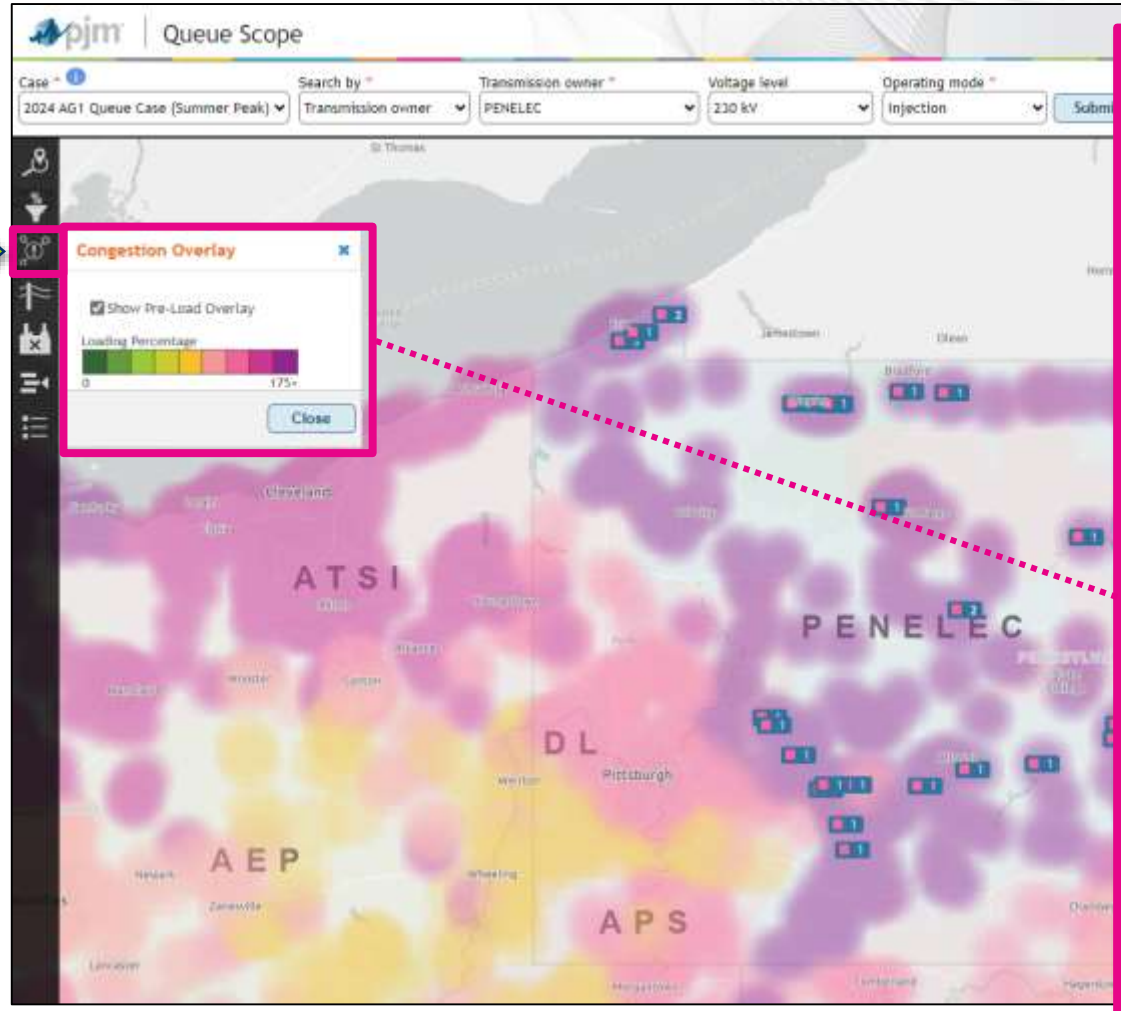
Pre-Loading Status Filter



Pre-Loading Status Filter

- This feature provides the user with a combined legend and filter for substation/POI bus pre-loading (%) and the corresponding color.
- The filtering capability allows users to filter substation/POI bus symbols based on three pre-loading (%) ranges or via the use of a custom defined loading range.

Congestion Overlay

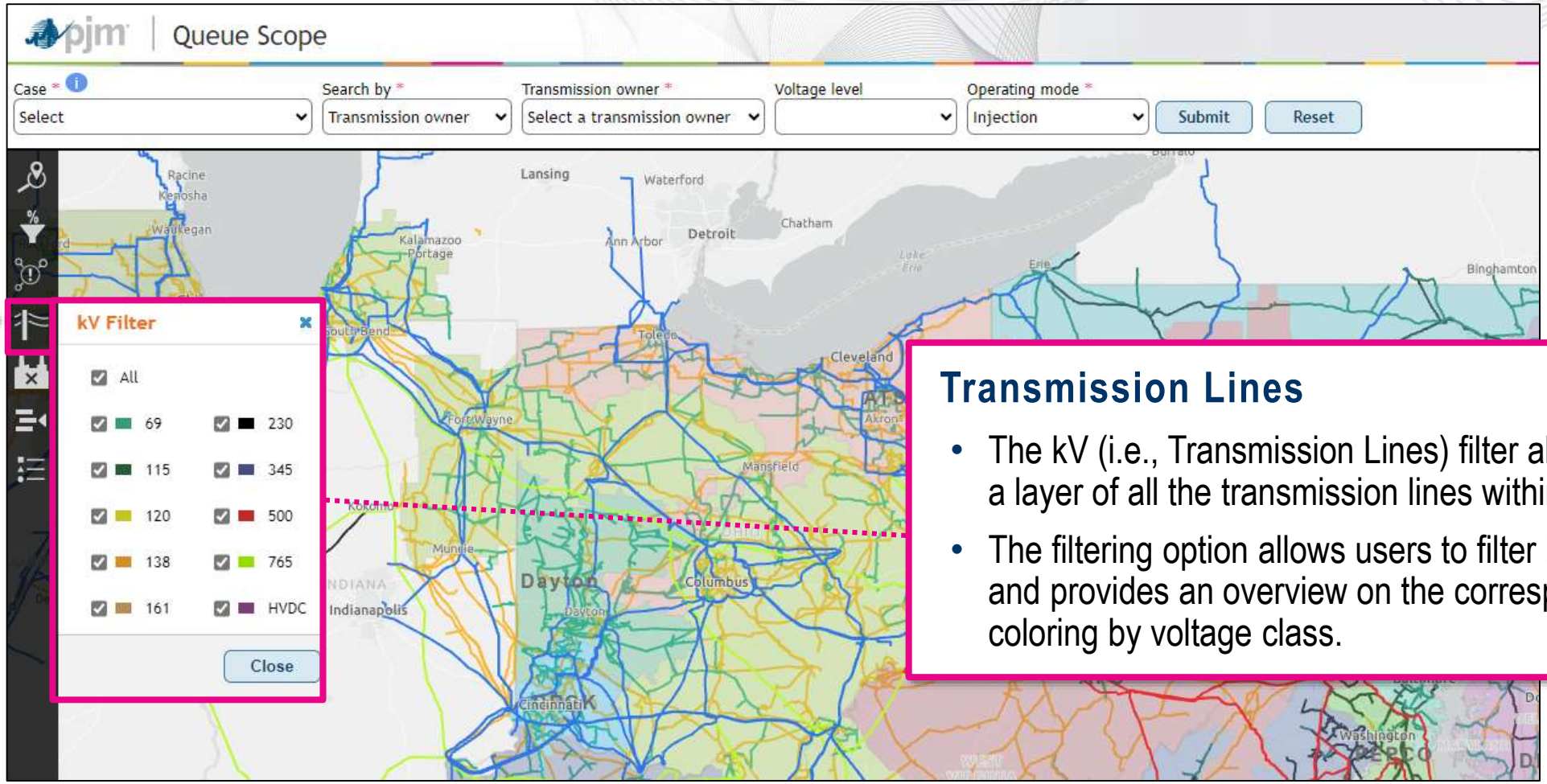


Congestion Overlay

- The overlay provides the user with the ability to visualize the facility loading at each substation/POI bus across the entire PJM footprint based on the selected case dataset.
- This visualization (often referred to as a heat map) can provide an indication on available transmission headroom across the PJM footprint and also give an indication on the severity of facility thermal loading based on generator impacts within a study.
- This overlay is not related to the market-based definition of grid congestion based on energy prices, etc. This overlay is only based on transmission facility loading (thermal).

Note: *Due to the volume of POI buses in the case dataset (6k+), it may take 5–10 seconds or more until the overlay is rendered and visible to the users. This is due to the processing time required for the size of the dataset and rendering within the web based application. Once the overlay is rendered, it can be toggled OFF and ON without a noticeable delay in processing.*

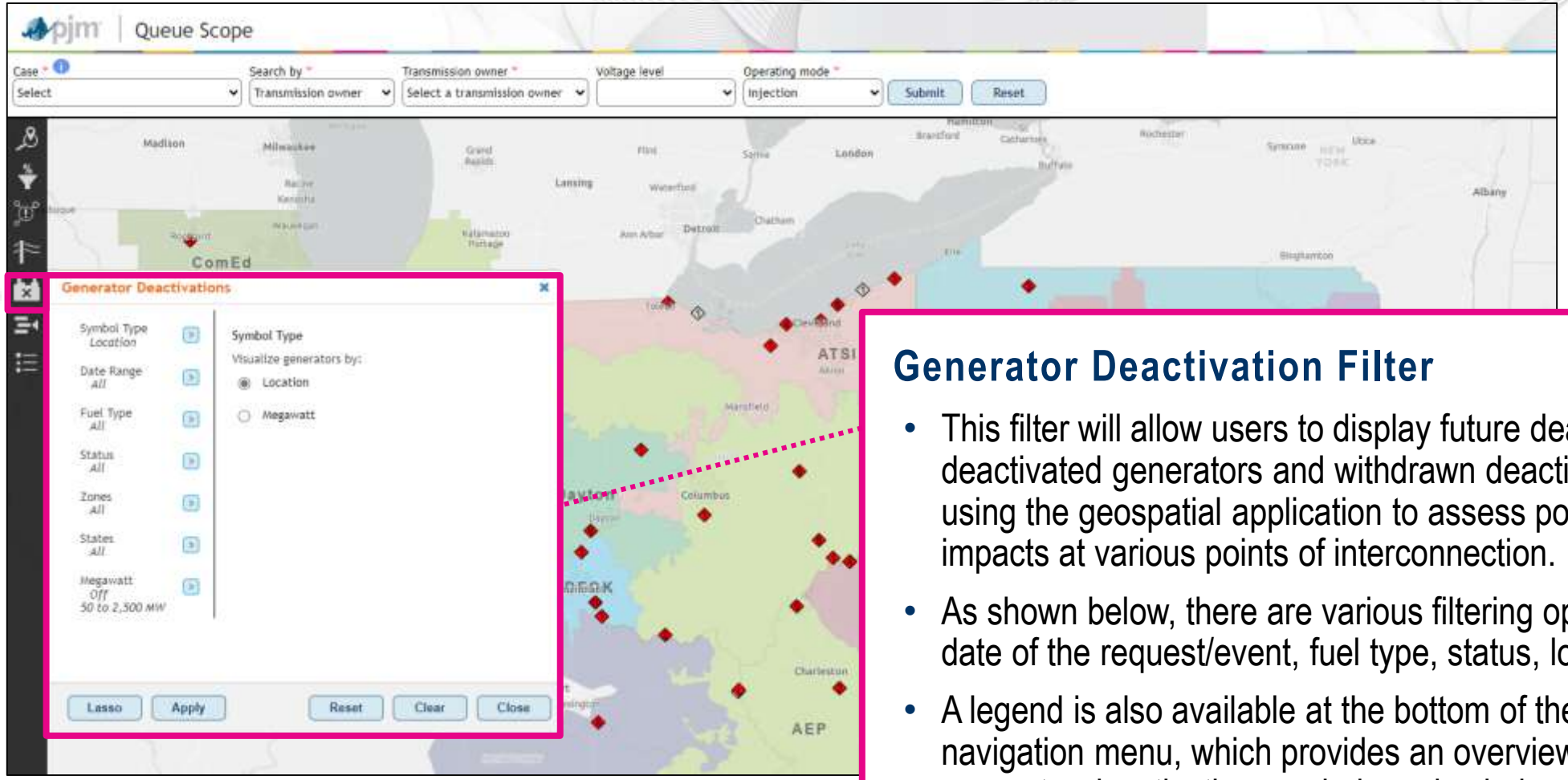
Transmission Lines (kV Filter)



Transmission Lines

- The kV (i.e., Transmission Lines) filter allows users to load a layer of all the transmission lines within the PJM footprint.
- The filtering option allows users to filter by voltage class and provides an overview on the corresponding line coloring by voltage class.

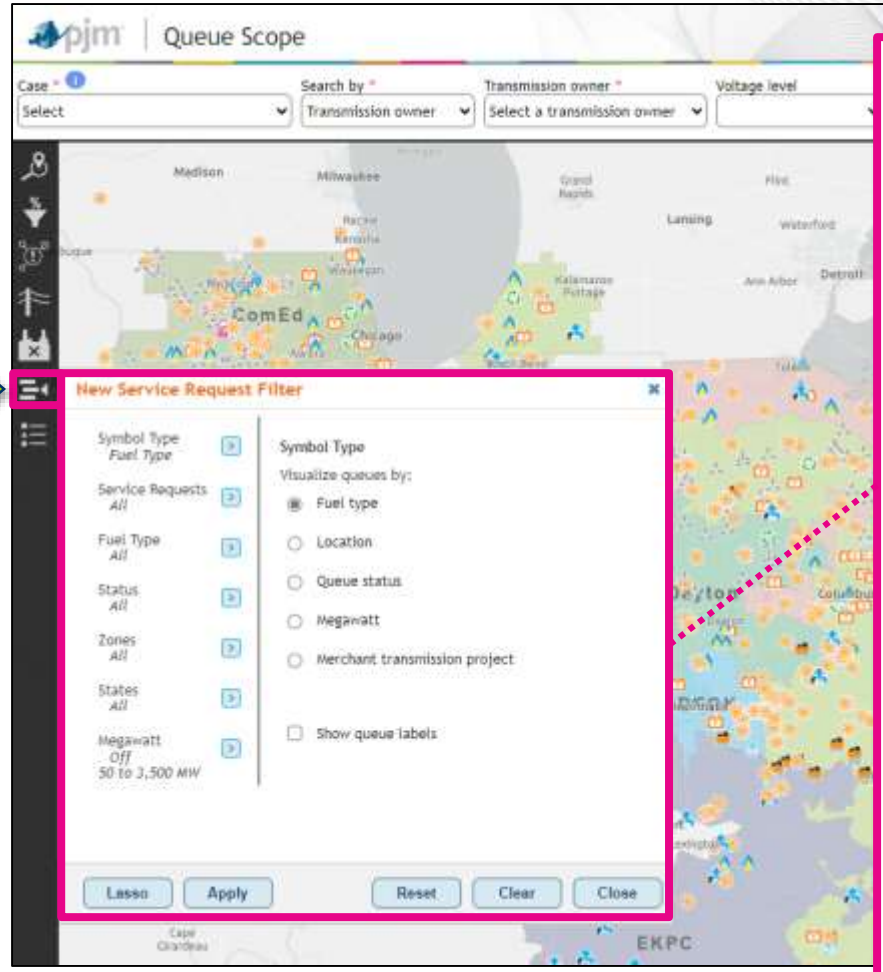
Generator Deactivations Filter



Generator Deactivation Filter

- This filter will allow users to display future deactivations, deactivated generators and withdrawn deactivations while using the geospatial application to assess potential generator impacts at various points of interconnection.
- As shown below, there are various filtering options based on date of the request/event, fuel type, status, location and size.
- A legend is also available at the bottom of the left-hand navigation menu, which provides an overview on all of the generator deactivation symbols and coloring.

New Service Requests Filter



New Service Request Filter

- The New Service Request filter will allow users to display all types of projects that ever entered the queue/cycle study process within PJM. This includes all projects with statuses such as “Active,” “Withdrawn,” “Deactivated,” “Engineering & Procurement,” “Under Construction,” etc. Users will have the ability to see past and present projects proposed across the PJM system to help assist with the POI assessment process.
- This also allows users to review existing projects near any potential POIs and further review any posted system impact studies on PJM.com. Much like the generator deactivations filter, there are various filtering options based on the request name, fuel type, status, location and size.
- A legend is also available at the bottom of the left-hand navigation menu, which provides an overview on all of the queue/cycle project symbols based on fuel type and queue/cycle status.
- The filtering option allows users to filter by voltage class and provides an overview on the corresponding line coloring by voltage class.