Queue Scope

Interconnection Screening Tool

“Take a Tour”

Prepared by:
PJM System Planning

Disclaimer Notice

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Official Tool Name: **Queue Scope**

DESCRIPTION: The screening tool enables users to evaluate placement of future generators even before formally entering the PJM queue. 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 all types of generation (including batteries, pumped hydro, MTX)
- Leverages stored results from PJM generator deliverability analysis
- Provides facility loading impacts and headroom (MW) by POI
- 6000+ POI buses available to users within the PJM footprint
- Users have the option to run the analysis with a Transmission Planning case or Queue Study case

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 analysis.

Tool Workflow Overview

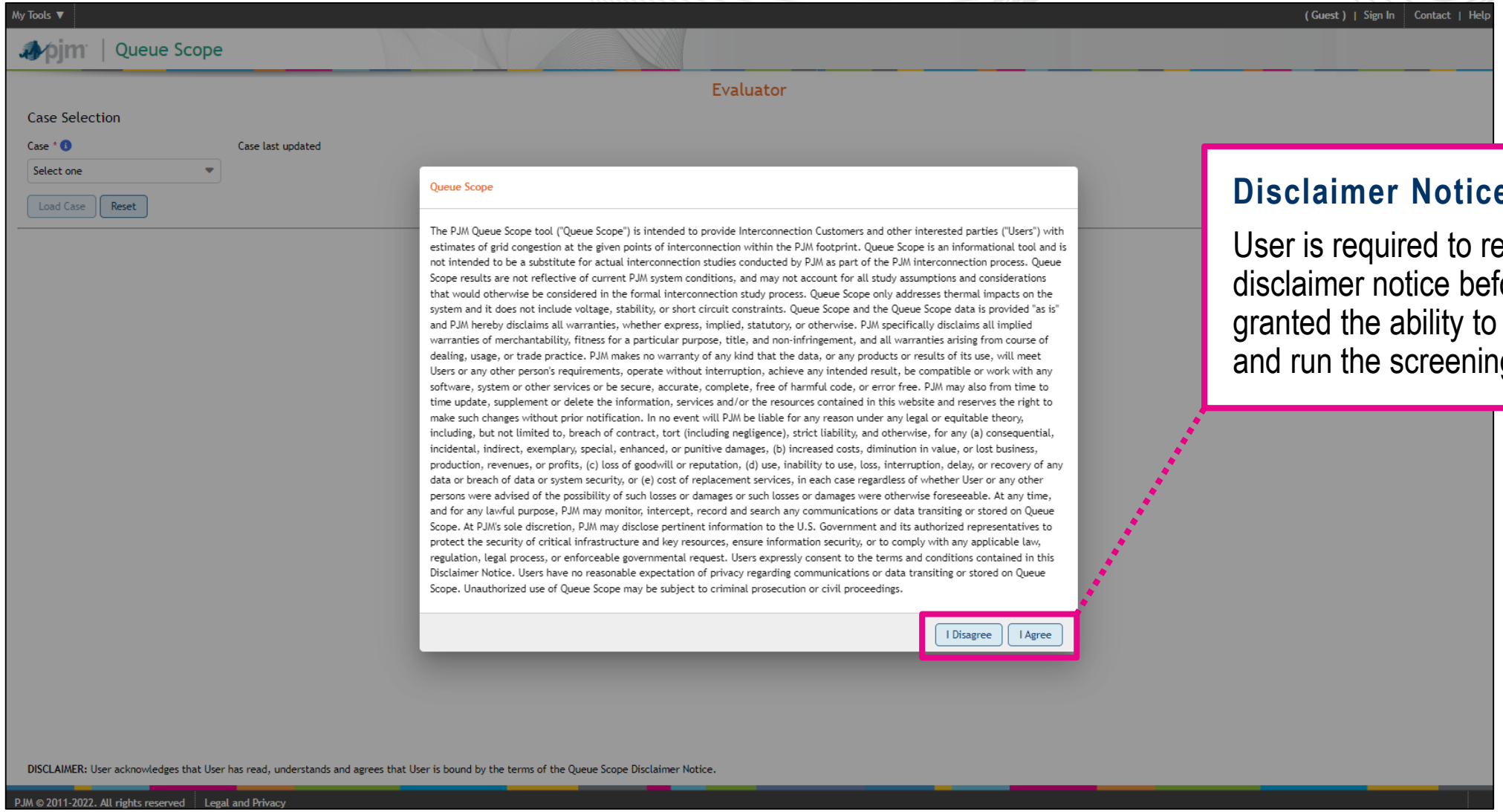
DESCRIPTION:

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**
- **Case Selection**
- **Generator Connection**
  - Transmission Owner
  - Voltage
  - Operating Mode
  - Desired MW
  - Points of Interconnection
- **Evaluation Results**
  - Load by POI
  - Export to Excel

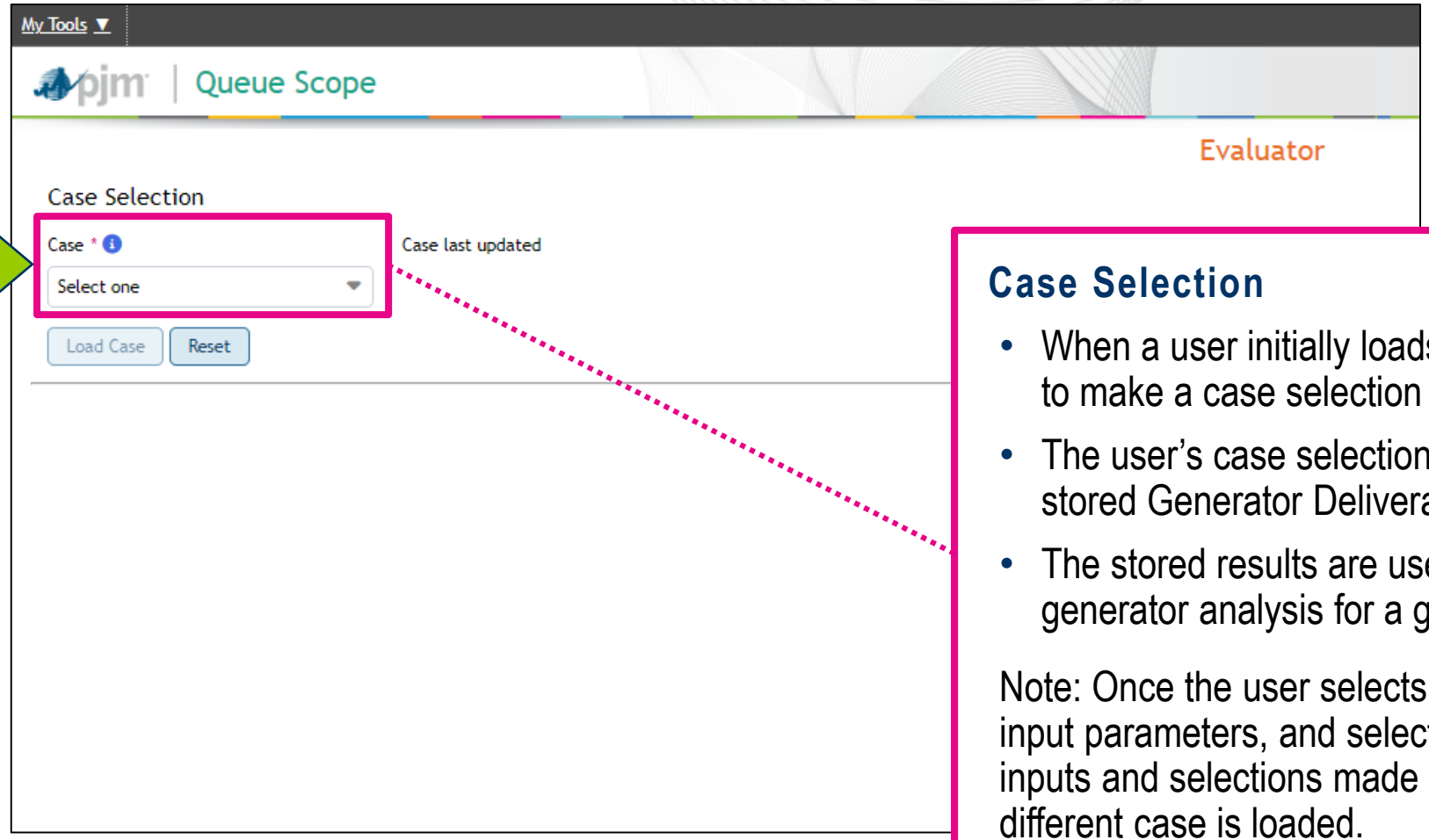
Disclaimer Notice



Disclaimer Notice

User is required to read and agree to the disclaimer notice before the user is granted the ability to load the application and run the screening analysis.

Case Selection

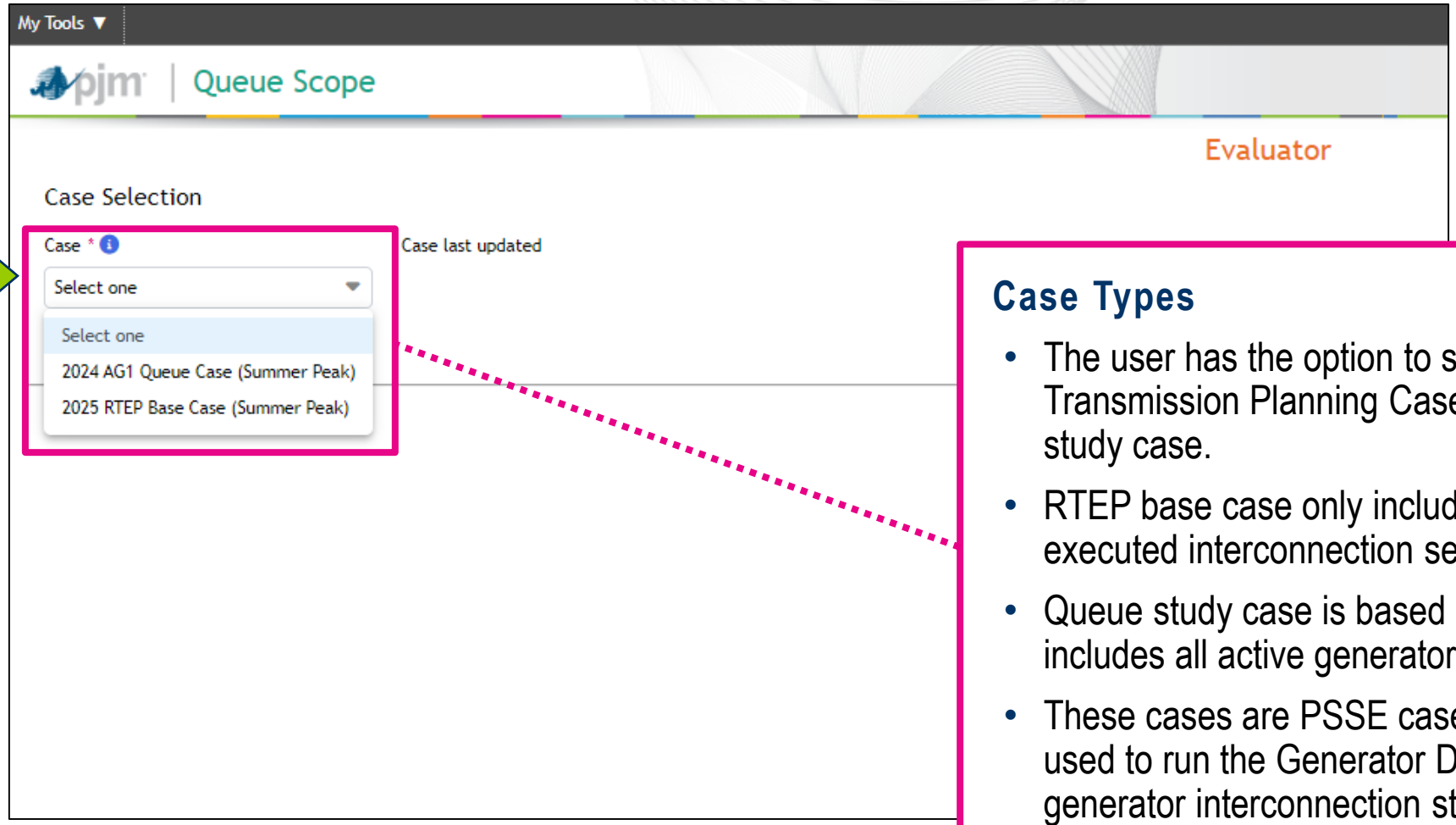


Case Selection

- When a user initially loads 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 used by the application to run the generator analysis for a given selection of 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 loaded.

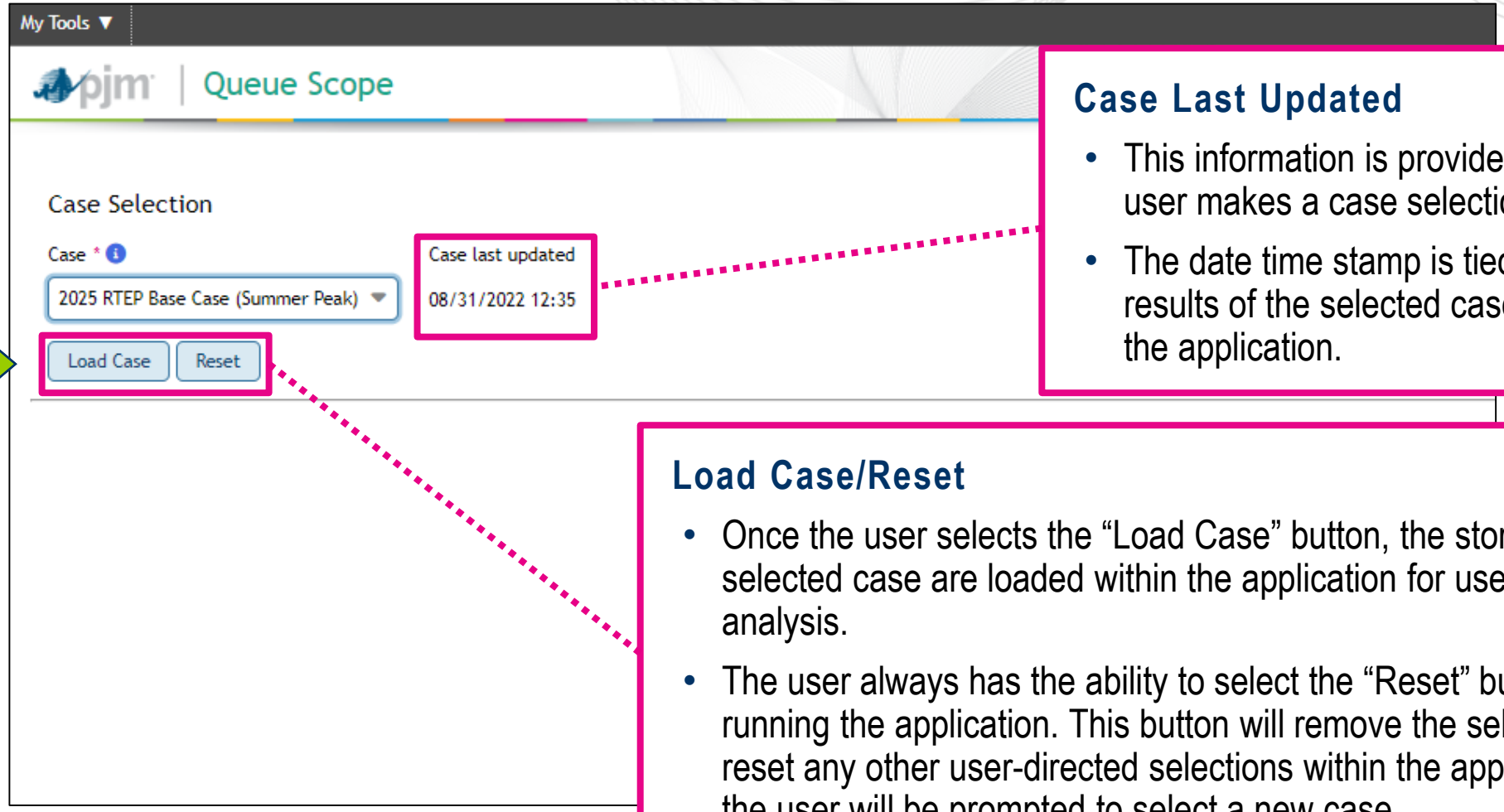
Case Selection (cont.)



Case Types

- The user has the option to select and load the results from a Transmission Planning Case (RTEP base case) or a Queue study case.
- RTEP base case only includes generators that have a fully executed interconnection service agreement (ISA).
- Queue study case is based on the RTEP base case, but also includes all active generators under study within the queue.
- These cases are PSSE cases and the associated case files used to run the Generator Deliverability analysis used in generator interconnection studies.

Case Selection (cont.)



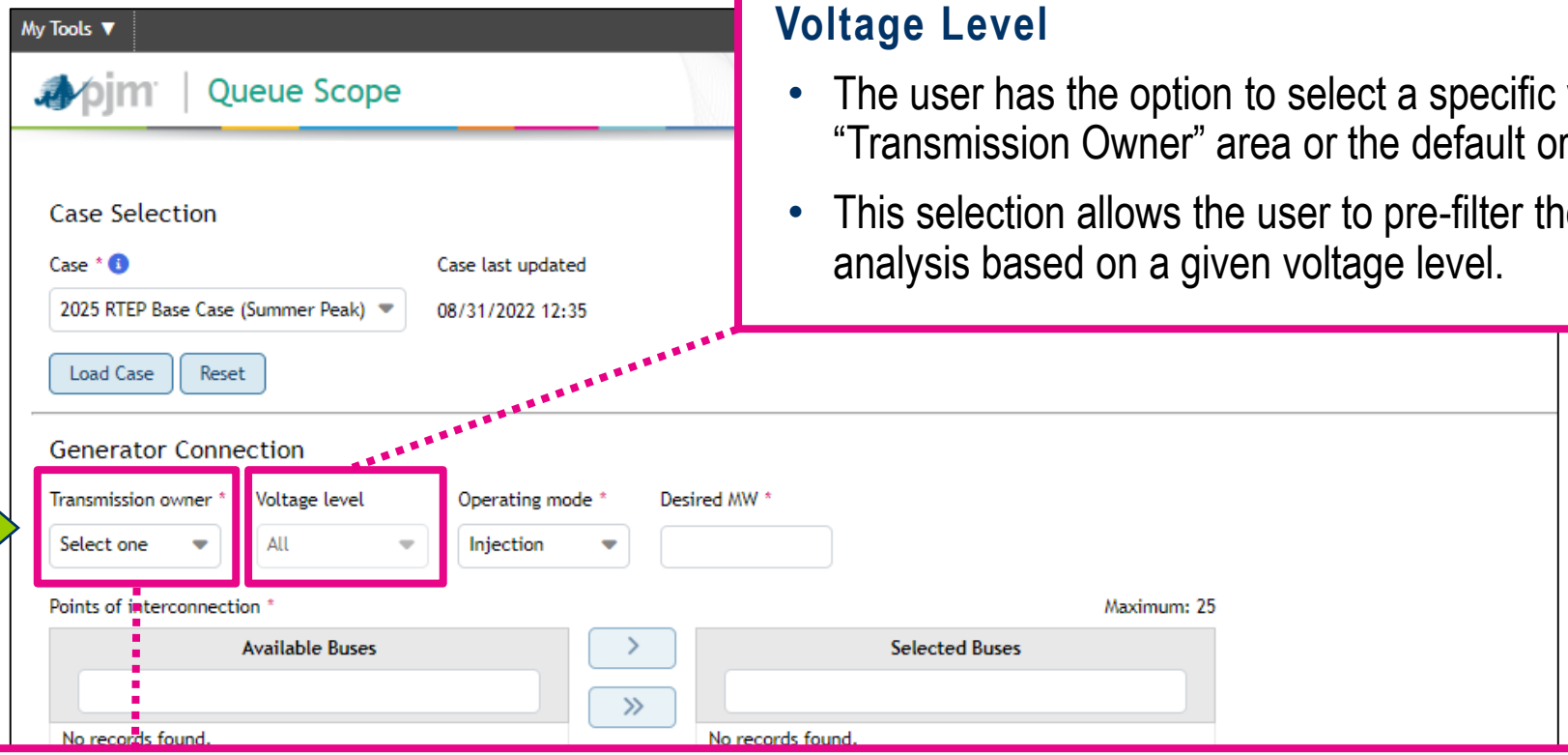
Case Last Updated

- This information is provided as soon as the user makes a case selection.
- The date time stamp is tied directly to when the results of the selected case were loaded into the application.

Load Case/Reset

- Once the user selects the “Load Case” button, the stored study results for the selected case are loaded within the application for use in the generator POI(s) analysis.
- The user always has the ability to select the “Reset” button at any time while running the application. This button will remove the selected case results and reset any other user-directed selections within the application. Once selected, the user will be prompted to select a new case.

Generator Connection



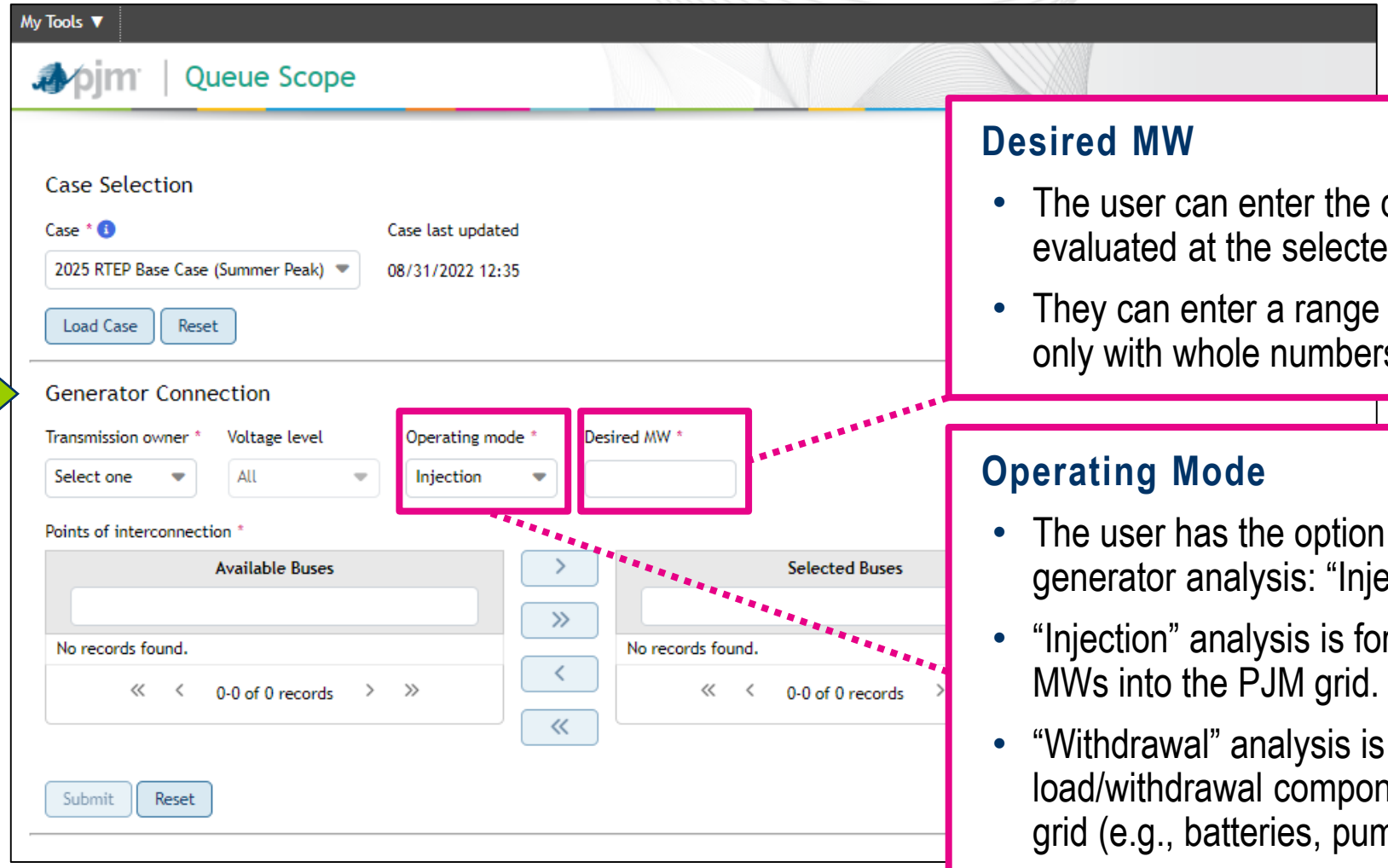
Voltage Level

- The user has the option to select a specific voltage level in the selected "Transmission Owner" area or the default or "All" will be used by the application.
- This selection allows the user to pre-filter the available buses for the generator POI analysis based on a given voltage level.

Transmission Owner

- The user must select a Transmission Owner area where the user desires to evaluate POIs.
- This selection pre-filters what "Available Buses" are provided for the user to search and select for the generator POI analysis.

Generator Connection (cont.)



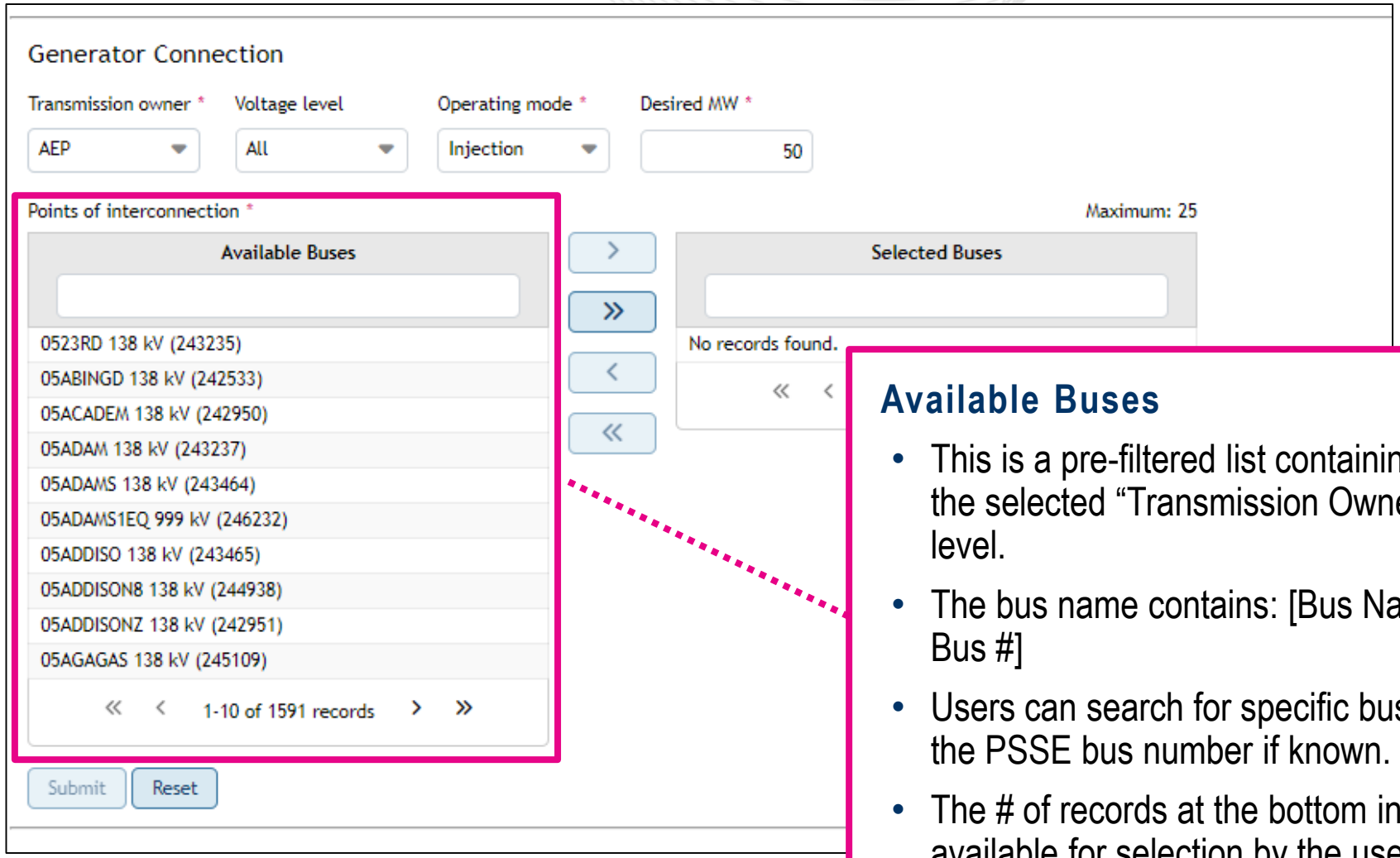
Desired MW

- The user can enter the desired MWs of the generator to be evaluated at the selected POI buses.
- They can enter a range of desired MWs from 1 to 9,999 and only with whole numbers.

Operating Mode

- 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).

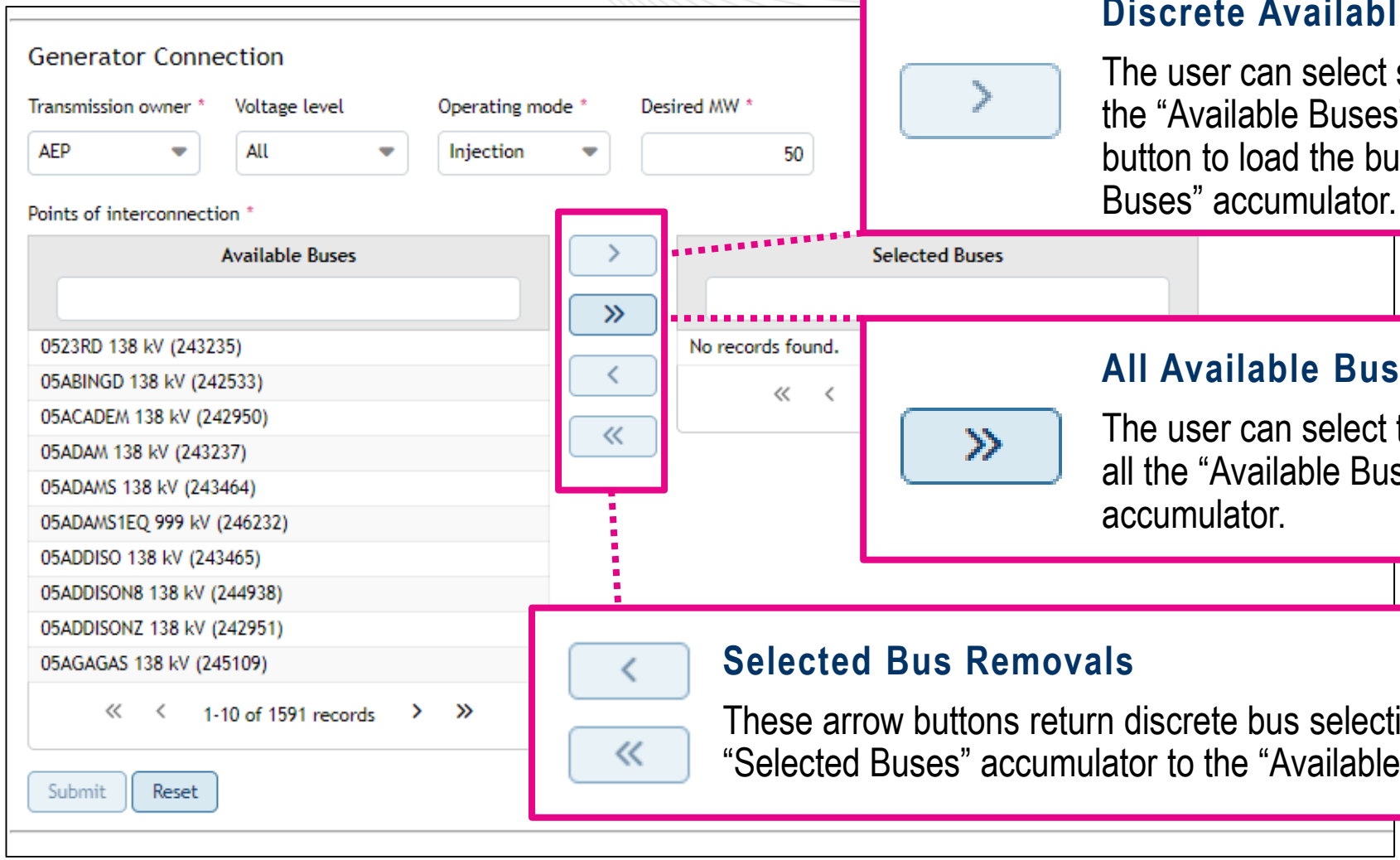
Points of Interconnection



Available Buses

- This is a pre-filtered list containing all of the available POI buses in the selected “Transmission Owner” area and the selected voltage level.
- The bus name contains: [Bus Name/Abbr.] + [Voltage] + [PSSE Bus #]
- Users can search for specific buses by bus name/abbreviation or the PSSE bus number if known.
- The # of records at the bottom indicates the total # of buses available for selection by the user.

Points of Interconnection (cont.)



Discrete Available Bus Selections

The user can select single or multiple POI buses in the "Available Buses" list and select the single arrow button to load the bus/buses into the "Selected Buses" accumulator.

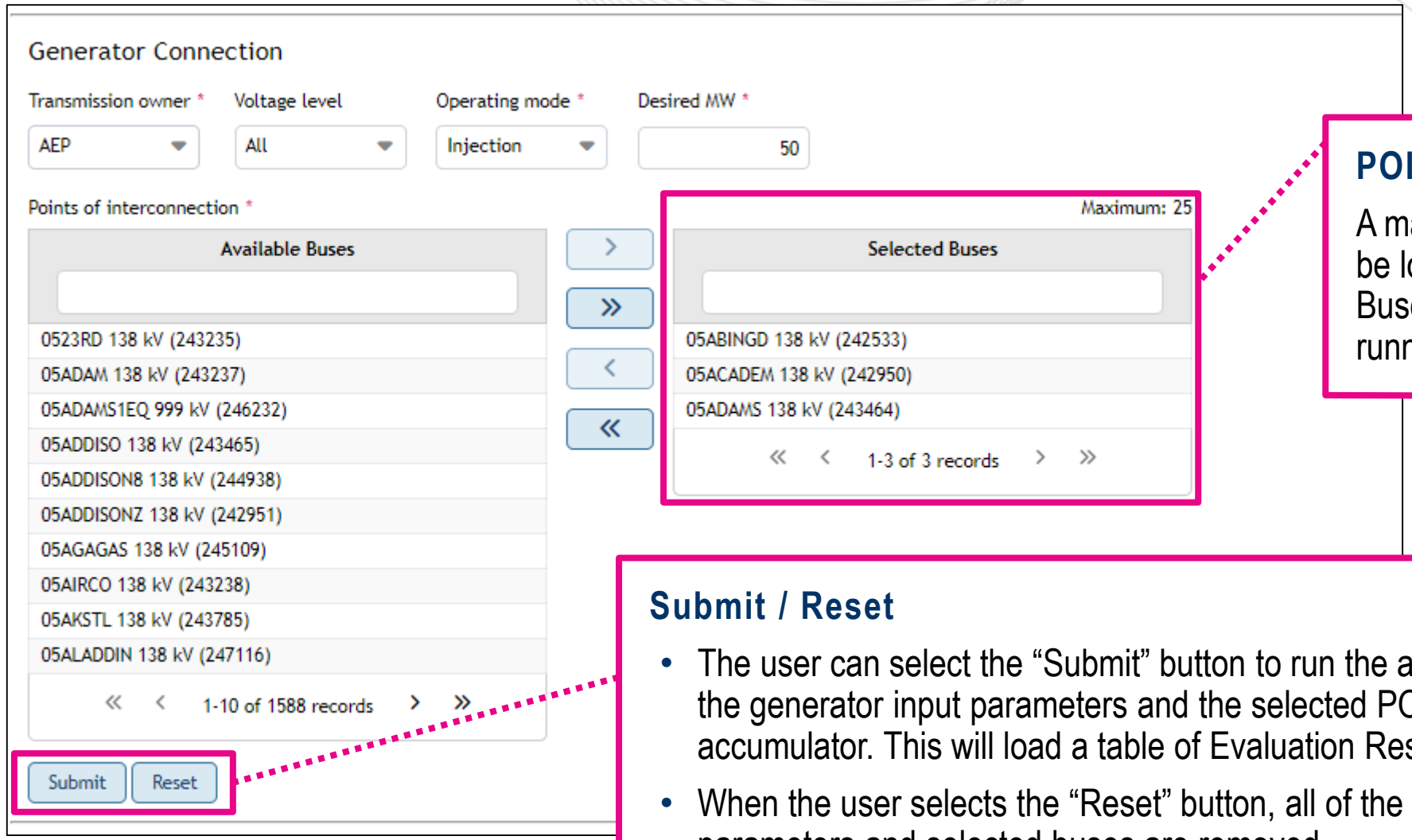
All Available Buses Selection

The user can select the double arrow button to load all the "Available Buses" into the "Selected Buses" accumulator.

Selected Bus Removals

These arrow buttons return discrete bus selections or all buses from the "Selected Buses" accumulator to the "Available Buses" list.

Points of Interconnection (cont.)



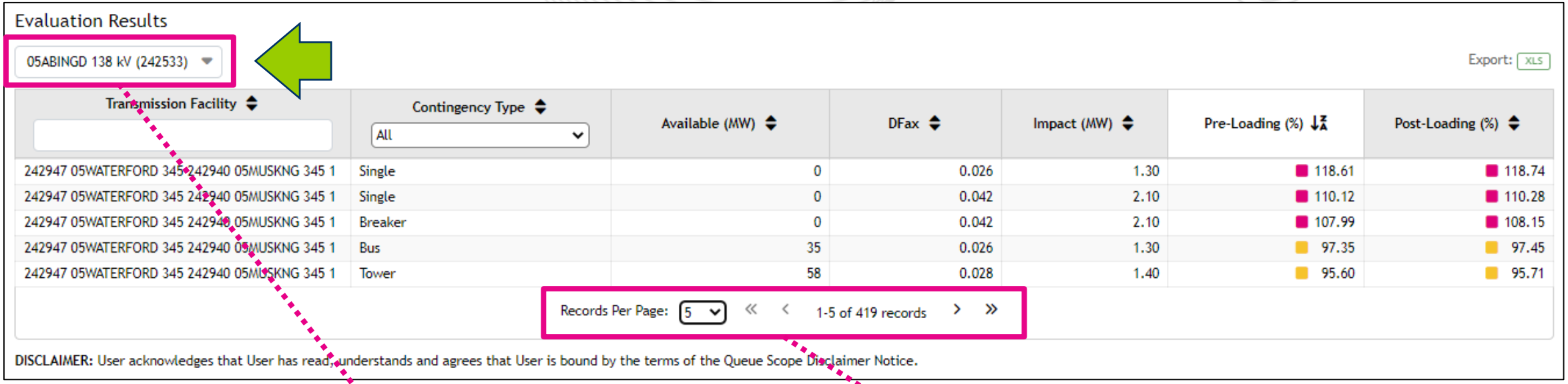
POI Bus Max

A maximum of 25 POI buses can be loaded into the "Selected Buses" accumulator before running the analysis.

Submit / Reset

- The user can select the "Submit" button to run the analysis based on the generator input parameters and the selected POIs in the accumulator. This will load a table of Evaluation Results below.
- When the user selects the "Reset" button, all of the generator input parameters and selected buses are removed.

Evaluation Results



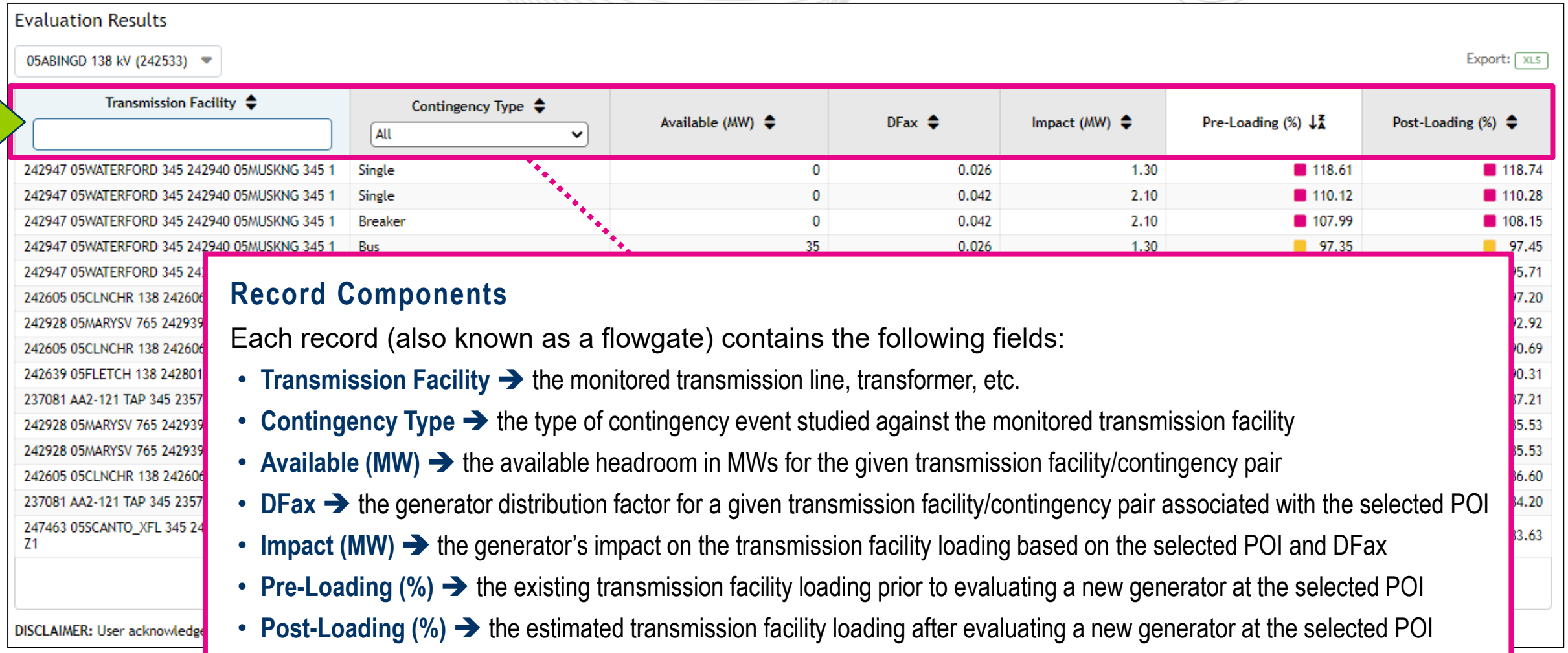
POI Bus Drop Down

- The user can select between different POI buses that were analyzed by the application. These POI buses were loaded in the “Selected Buses” accumulator previously.
- The selected bus in the drop will load the entire table of results for viewing by the user.

Records

- The user has the ability to change how many records are displayed on a single page within the application.
- The total # of records generated by the application are for the given POI and the generator input parameters.

Evaluation Results (cont.)

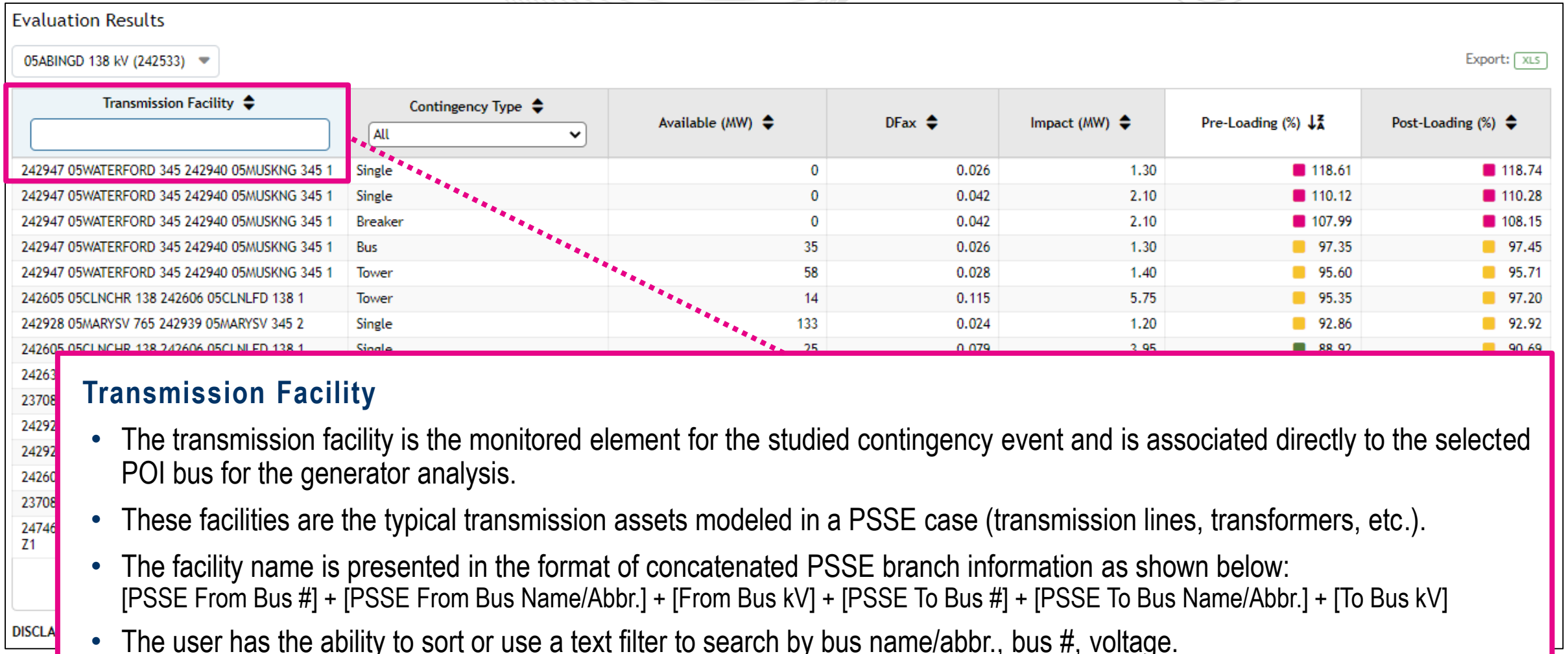


Record Components

Each record (also known as a flowgate) contains the following fields:

- **Transmission Facility** ➔ the monitored transmission line, transformer, etc.
- **Contingency Type** ➔ the type of contingency event studied against the monitored transmission facility
- **Available (MW)** ➔ the available headroom in MWs for the given transmission facility/contingency pair
- **DFax** ➔ the generator distribution factor for a given transmission facility/contingency pair associated with the selected POI
- **Impact (MW)** ➔ the generator's impact on the transmission facility loading based on the selected POI and DFax
- **Pre-Loading (%)** ➔ the existing transmission facility loading prior to evaluating a new generator at the selected POI
- **Post-Loading (%)** ➔ the estimated transmission facility loading after evaluating a new generator at the selected POI

Evaluation Results – Transmission Facility


Evaluation Results

05ABINGD 138 kV (242533)

Export: XLS

Transmission Facility	Contingency Type	Available (MW)	DFax	Impact (MW)	Pre-Loading (%)	Post-Loading (%)
	All					
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Single	0	0.026	1.30	118.61	118.74
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Single	0	0.042	2.10	110.12	110.28
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Breaker	0	0.042	2.10	107.99	108.15
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Bus	35	0.026	1.30	97.35	97.45
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Tower	58	0.028	1.40	95.60	95.71
242605 05CLNCHR 138 242606 05CLNLFD 138 1	Tower	14	0.115	5.75	95.35	97.20
242928 05MARYSV 765 242939 05MARYSV 345 2	Single	133	0.024	1.20	92.86	92.92
242605 05CLNCHR 138 242606 05CLNLFD 138 1	Single	25	0.079	3.95	88.92	90.69
24263						
23708						
24292						
24292						
24260						
23708						
24746 Z1						

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Transmission Facility

- The transmission facility is the monitored element for the studied contingency event and is associated directly to the selected POI bus for the generator analysis.
- These facilities are the typical transmission assets modeled in a PSSE case (transmission lines, transformers, etc.).
- The facility name is presented in the format of concatenated PSSE branch information as shown below:
  [PSSE From Bus #] + [PSSE From Bus Name/Abbr.] + [From Bus kV] + [PSSE To Bus #] + [PSSE To Bus Name/Abbr.] + [To Bus kV]
- The user has the ability to sort or use a text filter to search by bus name/abbr., bus #, voltage.

Evaluation Results – Contingency Type

Evaluation Results

05ABINGD 138 kV (242533)

Export: XLS

Transmission Facility	Contingency Type (All)	Available (MW)	DFax	Impact (MW)	Pre-Loading (%)	Post-Loading (%)
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Single	0	0.026	1.30	118.61	118.74
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Single	0	0.042	2.10	110.12	110.28
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Breaker	0	0.042	2.10	107.99	108.15
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Bus	35	0.026	1.30	97.35	97.45
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Tower	58	0.028	1.40	95.60	95.71

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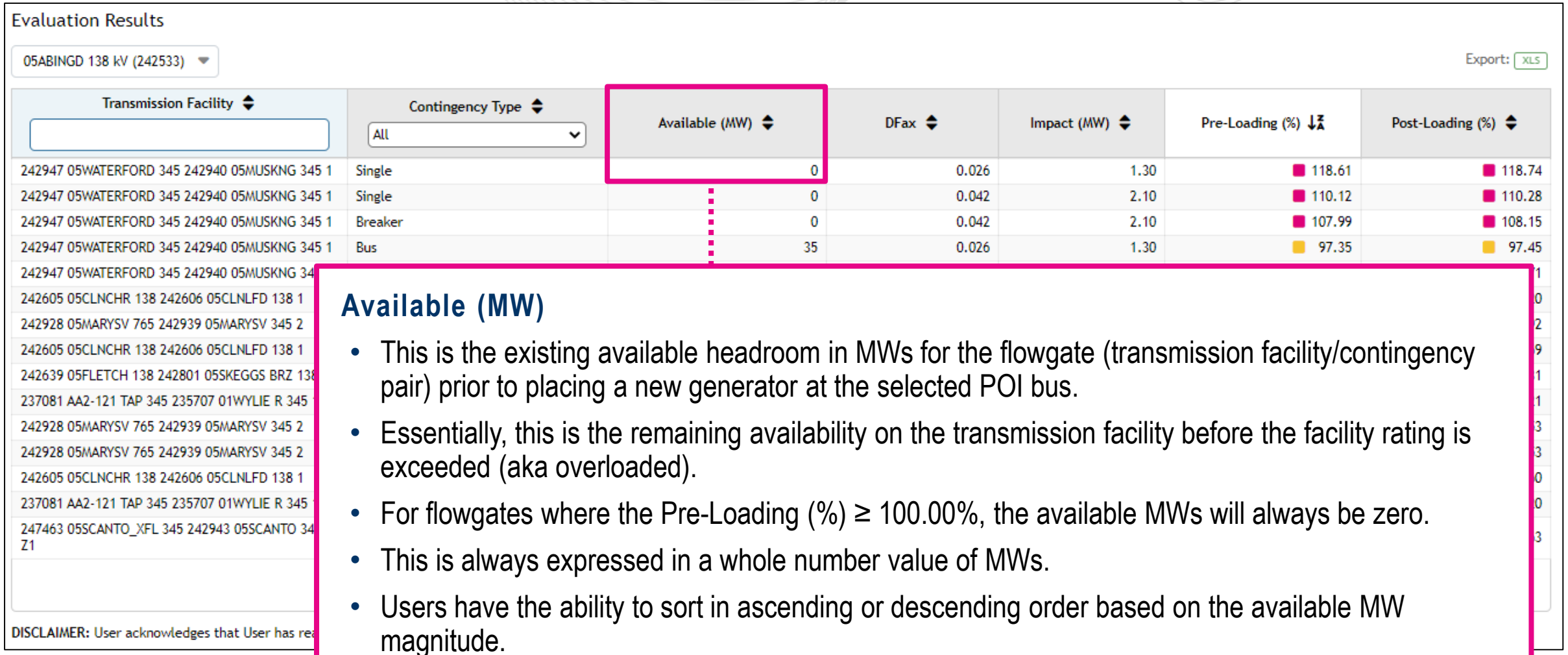
Contingency Type

- The contingency type indicates what type of contingency event was studied that resulted in the Pre- and Post-Loading (%) values for the related transmission facility.
- The contingency events are broken into the following:
  - **Single** ➔ the outage of a single facility for a fault
  - **Breaker** ➔ a multiple facility outage due to a failed circuit breaker (aka stuck breaker)
  - **Bus** ➔ a multiple facility outage due to a substation bus fault
  - **Tower** ➔ a multiple facility outage based on criteria for the loss of transmission lines with common structures/right of way
- The user has the ability to sort or filter on the discrete contingency type

Evaluation Results – Available (MW)



Available (MW)

- This is the existing available headroom in MWs for the flowgate (transmission facility/contingency pair) prior to placing a new generator at the selected POI bus.
- Essentially, this is the remaining availability on the transmission facility before the facility rating is exceeded (aka overloaded).
- For flowgates where the Pre-Loading (%) ≥ 100.00%, the available MWs will always be zero.
- This is always expressed in a whole number value of MWs.
- Users have the ability to sort in ascending or descending order based on the available MW magnitude.

Evaluation Results – DFax

Evaluation Results

05ABINGD 138 kV (242533)

Export: XLS

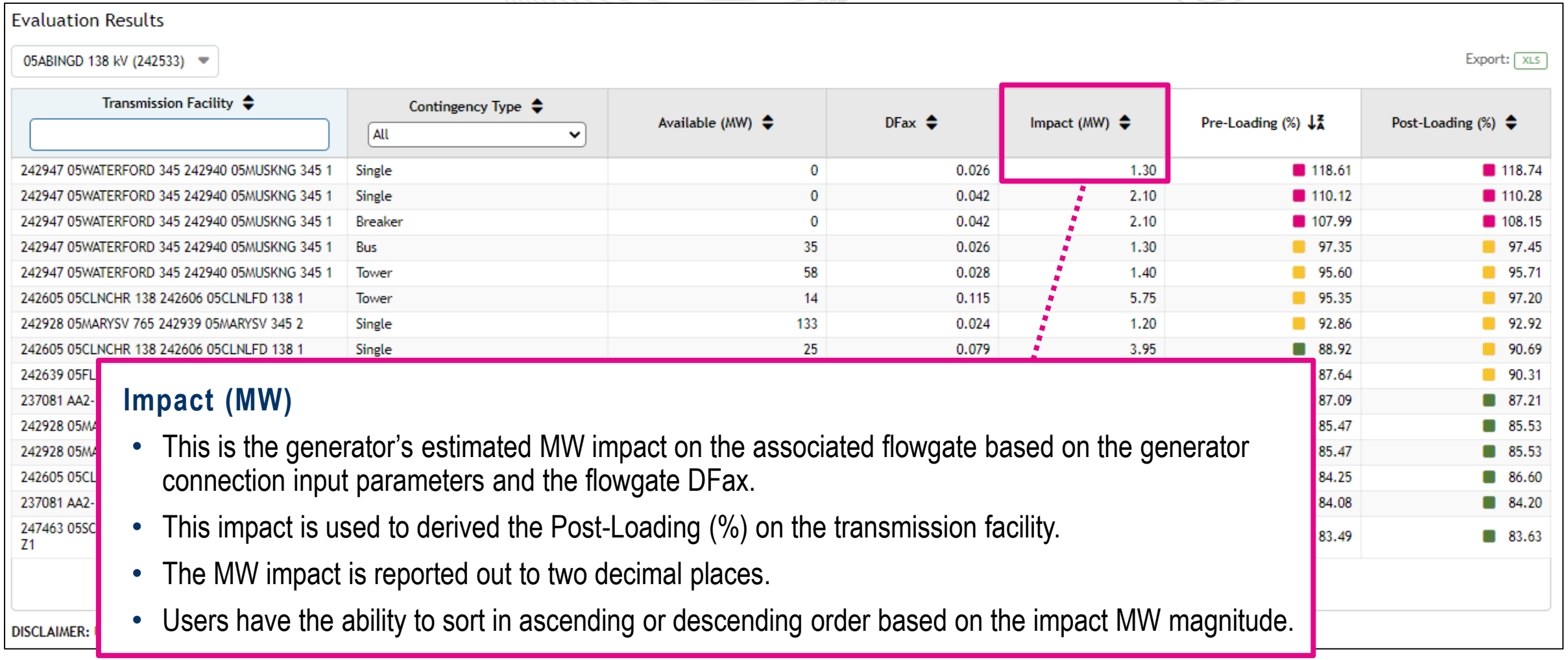
Transmission Facility	Contingency Type (All)	Available (MW)	DFax	Impact (MW)	Pre-Loading (%)	Post-Loading (%)
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Single	0	0.026	1.30	118.61	118.74
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Single	0	0.042	2.10	110.12	110.28
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Breaker	0	0.042	2.10	107.99	108.15
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Bus	25	0.026	1.30	97.35	97.45
242947 05WATERFORD 345 242940 05MUSKNG 345 1	Tower	58	0.028	1.40	95.60	95.71
242605 05CLNCHR 138 242606 05CLNLFD 138 1	Tower	14	0.115	5.75	95.35	97.20
242928 05MARYSV 765 242939 05MARYSV 345 2	Single	133	0.024	1.20	92.86	92.92
242605 05CLNCHR 138 242606 05CLNLFD 138 1	Single	25	0.079	3.95	88.92	90.69
242639 05FLETCH 138 242801 05SKEGGS BRZ 138 1						90.31
237081 AA2-121 TAP 345 235707 01WYLIE R 345 1						87.21
242928 05MARYSV 765 242939 05MARYSV 345 2						85.53
242928 05MARYSV 765 242939 05MARYSV 345 2						85.53
242605 05CLNCHR 138 242606 05CLNLFD 138 1						86.60
237081 AA2-121 TAP 345 235707 01WYLIE R 345 1						84.20
247463 05SCANTO_XFL 345 242943 05SCANTO 345 Z1						83.63

DISCLAIMER: User acknowledges that User has read, understands and agrees that User is bound by the terms of the Queue Scope Disclaimer Notice.

DFax (Distribution Factor)

- The generator distribution factor is for the given flowgate (transmission facility/contingency pair) associated with the selected POI bus.
- This is a ratio of the Impact MWs / Desired MWs and is reported out to three decimal places.
- Users have the ability to sort in ascending or descending order based on the DFax value.

Evaluation Results – Impact (MW)



Evaluation Results

05ABINGD 138 kV (242533)

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	All					
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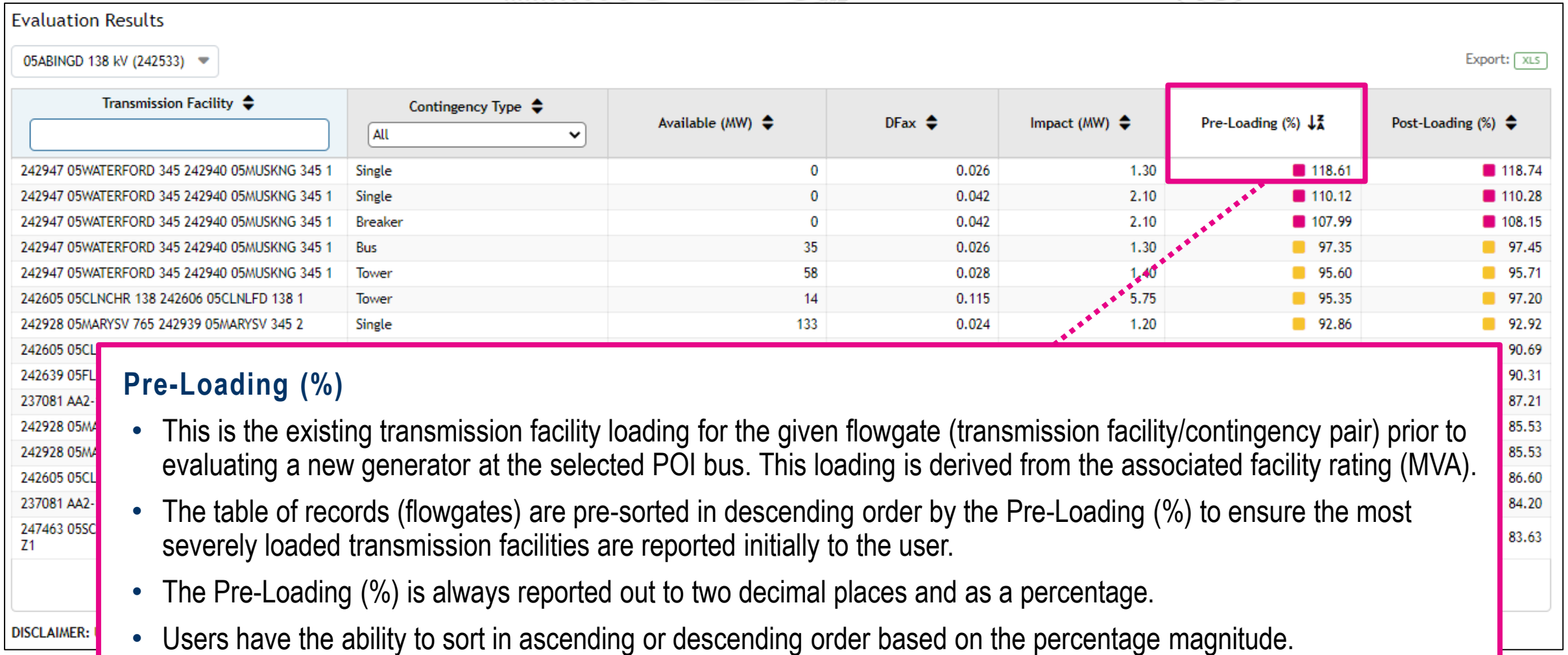
242928 05MARYSV 765 242939 05MARYSV 345 2	Single	133	0.024	1.20	92.86	92.92
242605 05CLNCHR 138 242606 05CLNLFD 138 1	Single	25	0.079	3.95	88.92	90.69
242639 05FL					87.64	90.31
237081 AA2-					87.09	87.21
242928 05MA					85.47	85.53
242928 05MA					85.47	85.53
242605 05CL					84.25	86.60
237081 AA2-					84.08	84.20
247463 05SC Z1					83.49	83.63

DISCLAIMER:

Impact (MW)

- This is the generator's estimated MW impact on the associated flowgate based on the generator connection input parameters and the flowgate DFax.
- This impact is used to derived the Post-Loading (%) on the transmission facility.
- The MW impact is reported out to two decimal places.
- Users have the ability to sort in ascending or descending order based on the impact MW magnitude.

Evaluation Results – Pre-Loading (%)



Evaluation Results

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242605 05CL						90.69
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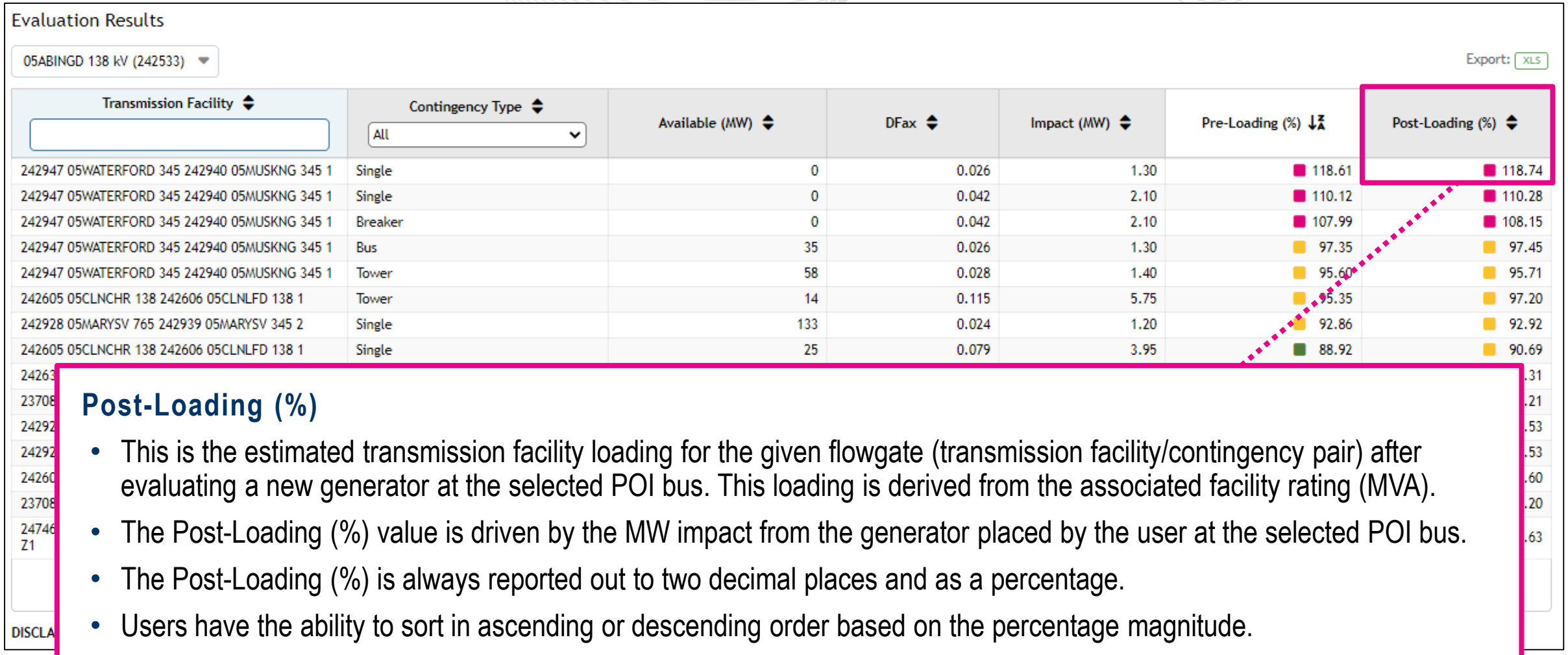
237081 AA2-						87.21
242928 05MA						85.53
242928 05MA						85.53
242605 05CL						86.60
237081 AA2-						84.20
247463 05SC Z1						83.63

DISCLAIMER:

Pre-Loading (%)

- This is the existing transmission facility loading for the given flowgate (transmission facility/contingency pair) prior to evaluating a new generator at the selected POI bus. This loading is derived from the associated facility rating (MVA).
- The table of records (flowgates) are pre-sorted in descending order by the Pre-Loading (%) to ensure the most severely loaded transmission facilities are reported initially to the user.
- The Pre-Loading (%) is always reported out to two decimal places and as a percentage.
- Users have the ability to sort in ascending or descending order based on the percentage magnitude.

Evaluation Results – Post-Loading (%)


Evaluation Results

05ABINGD 138 kV (242533)

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242605 05CLNCHR 138 242606 05CLNLFD 138 1	Single	25	0.079	3.95	88.92	90.69
24263						.31
23708						.21
24292						.53
24292						.53
24260						.60
23708						.20
24746 Z1						.63

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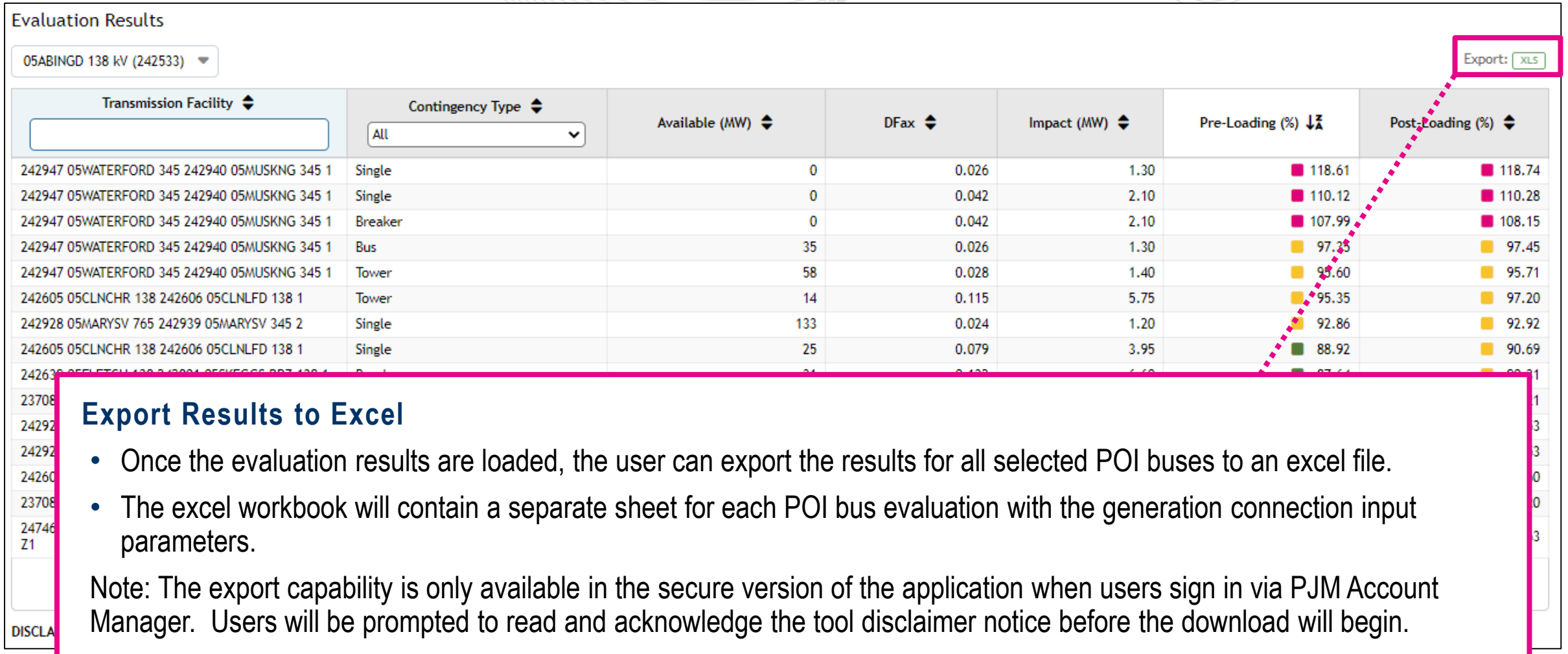
Post-Loading (%)

- This is the estimated transmission facility loading for the given flowgate (transmission facility/contingency pair) after evaluating a new generator at the selected POI bus. This loading is derived from the associated facility rating (MVA).
- The Post-Loading (%) value is driven by the MW impact from the generator placed by the user at the selected POI bus.
- The Post-Loading (%) is always reported out to two decimal places and as a percentage.
- Users have the ability to sort in ascending or descending order based on the percentage magnitude.

Export Evaluation Results



Export Results to Excel

- Once the evaluation results are loaded, the user can export the results for all selected POI buses to an excel file.
- The excel workbook will contain a separate sheet for each POI bus evaluation with the generation connection input parameters.

Note: The export capability is only available in the secure version of the application when users sign in via PJM Account Manager. Users will be prompted to read and acknowledge the tool disclaimer notice before the download will begin.