

## ***What is transmission capability?***

Transmission capability is the incremental generation capacity that can be safely and reliably connected to the transmission system. For these capability assessments, the capability is the incremental generation capacity that can connect before introducing category A congestion. This indicates the level of complexity expected in the Connection Process.

## ***What capability results are available?***

Capability results are available for each substation and transmission line within the South and Central East regions.

## ***How can I access the capability results?***

The transmission capability results are available through an interactive map and for download which can be accessed from the [Transmission Capability Map](#) webpage.

## ***What is the purpose of the transmission capability map?***

The transmission capability map serves as a guide to identify potential locations to integrate generation. Comparing the project size to the site capability indicates the level of complexity expected in the Connection Process. Locations with little capability or a capability smaller than the project will likely result in a complex connection request. This will signal generation to integrate in a way that optimizes the existing transmission system.

## ***How often will the results be updated?***

The capability results will be updated annually using the previous year's historical data. The projects shown in the map will be updated monthly, reflecting the most recent AESO Project List information.

## ***Can a project forgo the Connection Process if applying for the stated capability?***

The Connection Process is the official process to facilitate system access service and transmission connections; projects must continue to follow the Connection Process. See 'Are the capability results guaranteed?'

## ***Are the capability results guaranteed?***

The transmission capabilities are directional and are not guaranteed. The transmission capability map is a guide to identify potential locations to integrate generation based on category A congestion. The capability calculations do not assess all aspects of the engineering connection assessment; thus, the Connection Process is the official process to facilitate requests for new or altered system service access requests. The engineering connection assessment will determine the final connection alternative.

## ***What study assumptions are used in this assessment?***

The capability assessment uses historical generation, load, inertia, and transmission asset data from the previous year. For example, the capability results posted in Q1, 2022 uses 2021 historical data.

## ***What is the state of the transmission system in this assessment?***

The capability assessment uses a model of the transmission system as of December 31. This model reflects the topology and line ratings at the end of the year and does not include future projects or line upgrades.

### ***What constraints are considered in this assessment?***

The capability is calculated based on category A thermal constraints. Category B thermal constraints, voltage constraints, voltage stability, and transient stability, as well as mitigations including any remedial action schemes, are not considered in this assessment. These constraints would be assessed in the engineering connection assessment.

### ***How is the transmission capability calculated?***

The capability is calculated using hourly simulations and optimization techniques. Hourly scenarios are developed using historical data from the previous year, a DC power flow model, and a least-cost dispatch optimization. Then for each location, the incremental generation is calculated for each hour using a second optimization problem. The optimization determines the quantity of generation that can be added without introducing category A thermal violations in that hour. The objective function is to maximize incremental generation subject to constraints including DC power flow equation constraints, line rating constraints, and generation / load constraints. Next, the results are converted into capability values. The values represent the generation capacity that can connect at a specific location without introducing category A thermal violations to provide an indication of the level of complexity expected in the Connection Process.

### ***Are the capability results cumulative / can the results be added?***

The transmission capabilities are not cumulative. The capabilities are calculated independently for each location and do not take the incremental generation at other locations into account. Adding incremental generation at one location may impact the available capability at nearby locations. This relationship is not captured by the capability assessments.

For instance, if:

- Substation A can accommodate 50 MW of generation,
- Substation B can accommodate 100 MW of generation, and
- Both substation A and substation B capabilities are constrained by the same transmission line.

Then connecting a 40 MW generator to substation A would result in:

- 10 MW of remaining capability at substation A
- 20 MW of remaining capability at substation B

In this example, the total capability is not 150 MW, but ranges from 50 to 100 MW depending on the project(s) locations. The capability map communicates the individual location capability and not the total capability.

### ***Does the capability vary by different technologies?***

The capability depends on many factors: the key factors being nearby load, generation, and the transmission system configuration. In theory, a region with high wind penetration should be able to accommodate more solar generation than wind due a decreased correlation in generation patterns. However, analysis shows there is enough coincidence between generation technologies that the difference in capability is marginal and a single, technology agnostic capability is sufficient for the map's indicative purpose.

***Will the capability map provide more information in the future?***

The AESO plans to expand the information provided in the capability map as required and if feasible. The enhancements will be prioritized based on feedback, industry need, and AESO resources.

***What does the AESO Project layer mean to my project?***

The AESO Project layer provides context regarding existing project interest that could impact the capability in a particular area. These projects were not included in the capability calculations, including projects that have 'Recently Energized' but were not present in the historical data. These projects could impact the capability and increase the complexity of the Connection Process and should be taken into consideration accordingly, see 'Are the capability results cumulative / can the results be added?'. The project layer will be updated monthly as the new project list is released.

***What is the T-tap capability?***

The transmission capability for transmission lines will vary along the line depending on the T-tap location. The T-tap capability is provided for each terminal of the transmission line such that the capability at any location between the terminals can be approximated using linear interpolation.

For example, if:

- A T-tap connection @ Substation 1 can accommodate 60 MW of generation, and
- A T-tap connection @ Substation 2 can accommodate 100 MW of generation.

Then a T-tap connection located 25% of the distance from Substation 1 to Substation 2 could accommodate approximately 70 MW of generation.

***What is the In-and-Out capability?***

When connecting to an existing transmission line using an in-and-out configuration, the category A thermal constraints and the transmission capability are the same as the T-tap configuration.

***Who should I contact if I have further questions or comments?***

Please contact us at [customer.connections@aeso.ca](mailto:customer.connections@aeso.ca).