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Congestion Estimate Heatmaps

Methodology for Cluster 2

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1. Introduction

This report provides additional information related to the Congestion Estimate Heatmaps for Cluster 2. The Congestion Estimate Heatmaps forecast the congestion that may occur if all the projects in the cluster were to energize using their currently preferred connection alternative. These preferred connection alternatives are based on the preliminary assessment results for each project. The Congestion Estimate Heatmap results are a preliminary estimate and will be refined in the Congestion Assessment in Stage 2 - Detailed Cluster Studies.

2. Assumptions and Methodology

The Congestion Estimate studied each hour in the study year of 2029 to forecast the number of hours with congestion. The estimate assumes generating units are in-service prior to 2029, which includes both connection assessment (CA) modelled projects and projects in Cluster 2. The transmission system topology and cluster project assumptions followed the Preliminary Assessment Study Scope, which included modelling Central East Transfer Out (CETO) Stage 2.[1]

The Congestion Estimate Heatmaps forecast congestion in each cluster under the assumption that all the Cluster 2 projects in the cluster region are energized.[2] For each cluster, projects that were energized outside of the cluster region were: all existing generators and all CA modelled generating units outside the cluster region which have also met the AESO's project inclusion criteria.

With Stage 1 – Preliminary Assessment, every market participant in Cluster 2 was issued a Preliminary Assessment Report for their project, with the current AESO-preferred connection alternative. The projects in each cluster may have multiple feasible connection alternatives; however, the final AESO-preferred alternative will not be determined until the Stage 2 studies. To manage uncertainty in the connection alternatives, the Congestion Estimate Heatmaps assessed a single combination of connection alternatives. Specifically, the current AESO-preferred connection alternative issued in each of the Preliminary Assessment Reports, which are based on results from the preliminary assessments.

The Congestion Estimate used a methodology that estimates the forecasted congestion for each project. The Congestion Estimate approximated the congestion by:

1. Conducting a pre-project cluster congestion assessment using a direct current power flow solver with existing generating units, CA modelled projects within the cluster region, CA modelled generating units outside the cluster region which have also met the AESO's project inclusion criteria as of the April 2025 connection project list,[3] forecasted load, and system transmission projects.

[1] More information can be found on the AESO website under *Central East Transfer-out Development (7001)*.
[2] For the Edmonton [EDM-02] cluster, Central [CNTL-02] projects P2981, P2994, and P3022 were also included in the Edmonton [EDM-02] Congestion Estimate Heatmap.
[3] For a description of the inclusion criteria, see AESO Connection Project List Guide V2.

2. Modelling the hourly production profiles of the projects within the cluster. Each project's production profile was modelled by scaling the production profile of a similar generating unit according to maximum capability.
3. Calculating the congestion by adjusting the pre-cluster transmission flows by:
    a. adding the project's hourly production profile and calculating the change in flows,
    b. re-dispatching the merit-order and calculating the resulting change in flows from generators no longer in-merit. This includes re-dispatching generation during supply surplus.

    The change in flows were calculated using the change in injection at each bus and their effectiveness factor to each facility.

3. Results

With the exception of the Southeast cluster, the Congestion Estimate Heatmaps forecast the potential congestion resulting from Category A facility rating violations only:

- For the Southeast [SE-02] cluster, congestion is reported when the outflows on lines 1034L and 1035L exceed a 1200 MW stability limit at the Bowmanton 244S substation.[4]
- For all other clusters, congestion on the 1034L and 1035L paths is not reported. However, for these clusters, generating units effective to the stability limit were constrained so that no more than 1200 MW flowed out of Bowmanton 244S on 1034L and 1035L.

The estimates do not forecast the potential congestion caused by Category A: pre-contingency curtailment, most severe single contingency limits, or congestion associated with voltage or transient stability criteria violations. Considering these items would increase the potential congestion.

The heatmaps for each cluster are provided on the AESO website.

The results are sensitive to the underlying assumptions and are subject to change. The forecasted congestion may be impacted by the preferred alternative selected for each project in the cluster, as well as project cancellations or change proposals from other projects. The forecasted congestion will be refined in the Congestion Assessment in Stage 2 - Detailed Cluster Studies as these inputs and assumptions become more certain.

[4] This 1200 MW limit was also used in relevant deterministic subcluster studies.