

Congestion Estimate Heatmaps Methodology for Cluster 1

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1. Introduction

This report provides additional information related to the Congestion Estimate Heatmaps for Cluster 1. 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.¹ 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. Also, pre-Cluster 1 congestion estimate heatmaps and their assumptions are available on the AESO Engage website under *Session 6 of the Cluster Assessment Process Implementation* page.

2. Assumptions and Methodology

The Congestion Estimate Heatmaps studied each hour in the study year of 2028 to forecast the number of hours with congestion for each transmission facility. The estimate assumes all generating units are in-service prior to 2028, which includes both in-flight projects and projects in Cluster 1. The transmission system topology and cluster project assumptions followed each projects' respective Preliminary Assessment Study Scope, which included modelling CETO Stage 1² and VATD³.

The Congestion Estimate Heatmaps forecast congestion in each cluster under the assumption that all the Cluster 1 projects in the cluster region are energized. For each cluster, projects that were energized outside of the cluster region were: all existing generators and all in-flight projects that had paid GUOC.⁴

With Stage 1 – Preliminary Assessment, every market participant in Cluster 1 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 Heatmaps used a methodology that estimates the forecasted congestion for each transmission facility. The Congestion Estimate Heatmaps approximated the congestion by:

1. Conducting a pre-Cluster 1 congestion assessment for each region. These regional assessments used a direct current power flow solver with existing generating units, in-flight generating units within the cluster region, in-flight generating units outside the cluster region which have paid GUOC, forecasted load, and system transmission projects.
2. Modelling the hourly production profiles of the Cluster 1 projects within the cluster. Each project's production profile was modelled by scaling the production profile of a similar generating unit's maximum capability (MC).

¹ The AESO's preferred connection alternative for the project.

² More information can be found on the AESO website under *Central East Transfer-out Development (7001)*.

³ More information can be found on the AESO website under *Vauxhall Area Transmission Development (7075)*.

⁴ Generating Unit Owner's Contribution

3. Calculating the flows onto the transmission system that would be added by Cluster 1 projects. This was done by taking the hourly production profiles for Cluster 1 projects (from point 2 above) and adding those power injections to the transmission system, where the additional flows on each transmission facility were the power injections weighted by their effectiveness factor to each facility. These additional flows were then added to the results of the pre-project cluster congestion assessment for that region (from point 1 above).

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. 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.

For the Southeast cluster, the potential congestion resulting from voltage limits at Bowmanton 244S and the most severe single contingency limit for RAS 164⁵ were also studied.

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.

⁵ More information can be found on the AESO website under *Bowmanton 244S Substation Voltage Support Project (7083)*. This assessment used the post BVS and post Smart-RAS transfer-out limit.