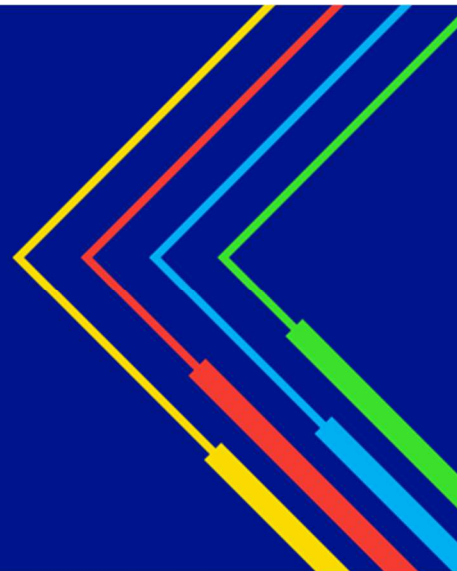


# NGED T/D Boundary Curtailment Report Supporting Guidance



## Overview of your Curtailment Report

Your T/D Boundary curtailment report includes an estimate of the curtailment triggered by Transmission Active Network Management (T-ANM) due to limitations around the transmission/distribution boundary at Grid Supply Points (GSPs).

The report has been created using historic measured loading data per half-hour (HH) on Super Grid Transformers (SGTs) and includes all Accepted-Not-Yet-Connected schemes on the relevant GSP(s) ahead of the subject site.

Non-T-ANM and sites with T-ANM in the Last-In First-Out (LIFO) stack are added to the historic load to calculate the available headroom per half hour.

The sum of the available headroom per half hour is compared to the Technical Limit for the constraint, and the resulting annual sum of exceedances is reported as the percentage of assumed uncurtailed output.

The report input data has been made available for customers who wish to use their own models to study the impact on the curtailment with differing levels of attrition of the Accepted-Not-Yet-Connected schemes.

### Input Data

1. **Export Technical Limit** is calculated from the unrestricted Registered Capacity from the Distributed Energy Resource (DER), as detailed in the BCA Appendix G, adjusted using a predefined list of Scaling Factors and then summed. The gross demand is subtracted to give the export Technical Limit.

$$\text{Export GSP Technical Limit} = \sum \left( \frac{\text{Unrestricted Registered Capacity}}{\text{* scaling factors}} \right) - \text{demand at defined cardinal points}$$

2. **Import Technical Limit** is calculated from the maximum observed/net demand added to the accepted unrestricted Part 2 sites on the Appendix G and 1 year of Distribution Future Energy Scenario (DFES) growth. This is calculated for Winter, Access Period and Summer.

$$\text{Import GSP Technical Limit} = \text{Maximum observed demand at defined cardinal points} + \text{unrestricted Part 2 Appendix G sites} + \text{1 Year DFES Growth}$$

On some GSPs the Connection Asset Reverse Power Limits (CARPL) may be lower than the Technical Limit, the CARPL is used instead.

Please note the following direction conventions have been used for the input data supplied:

- **GSP load:** import from transmission is positive, export to transmission is negative
  - **Import Technical Limits:** import from transmission is positive
  - **Export Technical Limits:** export to transmission is positive.
- NB: some Export Technical Limits are negative, and curtailment will be applied while the GSP is still importing.

3. **Loading Data** is based on a year of historic measured loading data per half-hour (HH) on the SGTs per GSP. Where GSPs run in parallel and a Technical Limit has been provided, the load for each GSP is provided.
4. **Non-ANM Connections** include all Accepted-Not-Yet-Connected connections, not subject to T-ANM or transmission delays, within the calculation, ahead of the LIFO stack. This includes conventional demand connections within the import assessment.
5. **Generation Profiles** are based on four standard technology types
  - Wind
  - Solar (photovoltaic)
  - Battery
  - Other (such as gas engines)

For export analysis, wind and solar sites are modelled with capacity factors of approximately 25% and 14% respectively. These are calculated per licence area using the average per-unit output of several sites of each category.

Battery and Other sites are modelled with 100% capacity factor. And for import analysis, all sites are treated with a 100% capacity factor.

100% capacity factor reflects the potential for sites to achieve their rated output during any half-hour of the year and is based on observed unpredictable operating profiles. Battery schemes can ramp their output faster than ANM systems can respond, and therefore to avoid transient overloads, which could trigger protection to operate, the *possible* output of the batteries within the ANM response time must be used for modelling. This is the driver for use of 100% BESS profiles for entire year.

6. **Scaled Contribution** for GSPs not running in parallel is the full output of a site. Where GSPs run in parallel, the contribution to each GSP is calculated in the form of a sensitivity factor which is applied to each site's output to calculate the scaled contribution. This is provided in the input data.

For example, a generator connecting equidistant between a GSP with three SGTs running in parallel with a GSP with one SGT would have a 75% contribution to the first GSP and a 25% contribution to the second.

## Calculations

For each HH of a year, the sum of (1) measured GSP loading, (2) accepted non-ANM connections and (3) accepted connections with T-ANM ahead in the LIFO stack for the ANM group is calculated, giving the estimated load on a GSP before the new connection:

$$\text{Load before new connection} = \text{GSP load} + \text{non-ANM connections} + \text{LIFO stack}$$

All accepted sites' outputs are multiplied by their HH generation profile and scaled contributions to the GSP(s). A range of reports are available with BESS operating at either 100%, 50% or float.

The “load before new connection” is compared to the Technical Limit and the contribution of the new connection considered, taking into account the scaled contribution and profile scaled output. The allowable output per half hour is summed to give a MWh annual output.

The MWh value of curtailment at the generator is compared to the connection’s assumed annual output in MWh (Uncurtailed Output), using the standard technology profiles. This allows the calculation of a percentage curtailment for a year. The Estimated Output represents the difference between the Uncurtailed Output and the volume of curtailment.

## **Clarifications**

Any connection may experience other causes of curtailment beyond that attributed to a Technical Limit constraint. This may be due to planned or unplanned network and telecoms outages, distribution constraints (where applicable) or SGT reverse powerflow limits, which may persist once the Technical Limit has been removed or increased.

The data used to calculate curtailment is based on historic observed load. Background demand and generation growth may lead to changes in experienced curtailment in future.

Abnormal running of the network may have an impact on the experienced level of curtailment. Connections made using Technical Limits will not be able to export to other GSPs.