

November 2025

# NGED Curtailment Analysis Data Guidance

DSO

Curtailment team

nationalgrid ► DSO



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# 1. Overview

## 1.1. Executive Summary

National Grid Electricity Distribution (NGED) are focused on operating the network openly and transparently so that our stakeholders can make informed decisions about the value they will gain from connecting to our energy system.

Key to this is understanding how we arrive at decisions about curtailment, balancing security of supply with network capability and access.

We publish significant data through our website. To facilitate our stakeholders' use of this data and issued curtailment reports, the following inputs and assumptions used have been detailed within this document. These include:

- 1.1.1. The published input data required to carry out curtailment analysis
- 1.1.2. The functionality of NGED's Active Network Management (ANM) systems which need to be considered when undertaking curtailment analysis
- 1.1.3. NGED's methodology for carrying out the analysis that produces the curtailment reports that will be provided with a new Flexible connection offer
- 1.1.4. For further information on how NGED's ANM system works please see NGED's published ANM guidance.

Our role in the energy transition supports the growth of cleaner, more affordable and locally generated power. By sharing data and insight, and helping our stakeholders to use it well, we're aiming to provide firm foundations for growing businesses, economies and skills throughout the licence areas that we serve.

## 1.2. Glossary

Please see the appendix for explanation of each term.

| Term         | Definition                                          |
|--------------|-----------------------------------------------------|
| <b>ADMS</b>  | Advanced Distribution Management System             |
| <b>ANM</b>   | Active Network Management                           |
| <b>BESS</b>  | Battery Energy Storage Systems                      |
| <b>BSP</b>   | Bulk Supply Point                                   |
| <b>CAFPL</b> | Connection Assets Forward Power Limit               |
| <b>CARPL</b> | Connection Assets Reverse Power Limit               |
| <b>CCP</b>   | Connection Control Panel                            |
| <b>DANM</b>  | Distribution Active Network Management              |
| <b>DCP</b>   | Distribution Change Practice                        |
| <b>DCUSA</b> | Distribution Connection and Use of System Agreement |
| <b>EHV</b>   | Extra High Voltage                                  |
| <b>GSP</b>   | Grid Supply Point                                   |
| <b>GT</b>    | Grid Transformer                                    |
| <b>HV</b>    | High Voltage                                        |
| <b>LTDS</b>  | Long Term Development Statement                     |
| <b>LV</b>    | Low Voltage                                         |
| <b>NESO</b>  | National Energy System Operator                     |
| <b>PEL</b>   | Pre-Event Limit                                     |
| <b>PS</b>    | Primary Substation                                  |
| <b>PT</b>    | Primary Transformer                                 |
| <b>SGT</b>   | Super Grid Transformers                             |
| <b>TANM</b>  | Transmission Active Network Management              |

*Table 1. Glossary. See appendix for explanations*

### 1.3. Revision History

| Revision | Description | Date       |
|----------|-------------|------------|
| 1        | First issue | 26/11/2025 |

Table 2. Revision History

## Introduction

Context behind the publishing and utilisation of our data

## 2. Introduction

- 2.1. NGED have been offering Flexible connections since 2016 to enable customers to connect onto the electricity network faster and at a lower cost. Flexible connections are delivered using NGED's ANM systems which monitors real-time thermal and voltage behaviour on our network and calculates the allowable output of Flexible and Curtailable Connections.
- 2.2. Understanding expected levels of curtailment is key for customers when deciding whether to connect to NGED's network. NGED have a team dedicated to producing curtailment reports and making the data available for external users. This document provides supporting information to help understand the content of the input data only.
- 2.3. The data and process detailed here is to enable estimation of curtailment volumes rather than edge case analysis. This will not align with the DCUSA Schedule 2D methodology for producing Curtailment Limits.
  - 2.3.1. As a result, these estimations do not come with any contractual guarantee and when compared together the curtailment estimate of a site may differ from a Curtailment Limit.
  - 2.3.2. The Curtailment Limit (hours) is a contractual cap which calculates curtailment caused by the worst single constraint that a site contributes to. It must be calculated in line with the spreadsheet produced as part of the DCP 404 process and NGED will be liable to any curtailment beyond the limit.
  - 2.3.3. Whereas a curtailment estimate (MWh) is an estimate of curtailment caused by any constraint a site might contribute to, taking into account the ANM system's method of operation.

## **Curtailment Analysis Input Data**

A breakdown of the data published by NGED for the purpose of undertaking curtailment analysis studies

## 3. Curtailment Analysis Input Data

Datasets are provided per ANM zone, defined as either a single Grid Supply Point (GSP), or a GSP group where 132kV interconnection is present. The following data sets enable the analysis of potential curtailment on NGED's network due to the ANM system. Used in conjunction with the Long Term Development Statement (LTDS), it is anticipated that the connection conditions (e.g. ANM or intertrip requirements) of a site can be understood in more detail. The LTDS is published per licence area but the curtailment analysis input data is published on an ANM zone basis, which will be a subset of the licence area.

### 3.1. Network model

Initially the data will be based on the connected network models, representing the current network topology under Intact running arrangement, while the planned reinforcement in our committed models is reviewed as part of Connection Reform.

### 3.2. Historic loading

Net MW and MVA<sub>r</sub> load is provided per half hour from across the network where four quadrant metering is available. Where it is not available, we use an assumed appropriate power factor with metered MVA. The load includes the contribution of connected generation. Changes in operational behaviour of our connected customers at High Voltage (HV) or Low Voltage (LV), for both import and export, will lead to changes in the network loading and hence experienced curtailment.

Power flows are published in two formats:

#### 3.2.1. Substation load

The net power flow through each GSP, Bulk Supply Point (BSP) and primary substation. For each substation the data is presented against each relevant node in the network model to reflect the Intact topology. Statistical data cleansing (identification and replacement of erroneous time-series values with imputed alternatives) is applied to the data to remove any erroneous outliers or populate any outage periods where necessary.

The sign associated to this load is based on the convention of power flow direction of positive for demand i.e. HV to LV. As a result the load of a generator site will be negative.

#### 3.2.2. Branch load

The derived net power flow through each branch. This is calculated using the substation loading and sensitivity factors for each substation's node(s) to each branch.

Due to the unavailability of four-quadrant metering on all areas of the network, initially only MW values are available for this data.

The sign associated to this load is based on the From Node and To Node. Positive represents From Node → To Node power flow. Negative represents To Node → From Node power flow.

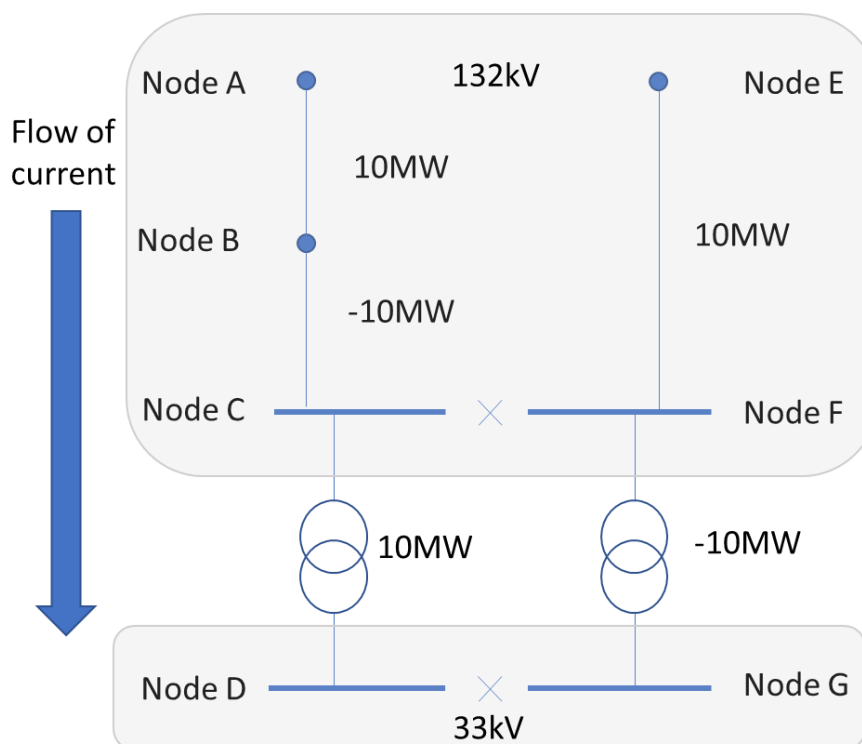


Figure 1. Explanation of power flow conventions used by NGED

| Branch | From Node | To Node | From node voltage (kV) | To Node voltage (kV) | MW  |
|--------|-----------|---------|------------------------|----------------------|-----|
| A → B  | A         | B       | 132                    | 132                  | +10 |
| C → B  | C         | B       | 132                    | 132                  | -10 |
| C → D  | C         | D       | 132                    | 33                   | +10 |
| E → F  | E         | F       | 132                    | 132                  | +10 |
| G → F  | G         | F       | 33                     | 132                  | -10 |

Table 3. Breakdown of Figure 1

### 3.3. Generic fuel type profiles

All Standard, Flexible and Curtailable connections are categorised into Wind, Photovoltaic, Battery or Other dependant on their fuel type within the application. An annual half hourly profile is provided for each fuel type.

#### 3.3.1. Wind

The half hourly output of a number of wind generation sites from within the relevant Licence Area is collated to form a per unit normalised output curve, targeting around 25% capacity factor. This is applied to all wind generators to maintain a level of conservatism.

#### 3.3.2. Photovoltaic

The output of a number of solar sites within the relevant Licence Area is collated to form a normalised output curve. This makes it possible to represent a standard solar site by removing localised variations in output, while maintaining the observed time and seasonal fluctuations. A capacity factor of 14% is targeted.

### 3.3.3. Synchronous/Other

All other fuel types, such as hydro and bio-gas, will have a constant 100% output applied.

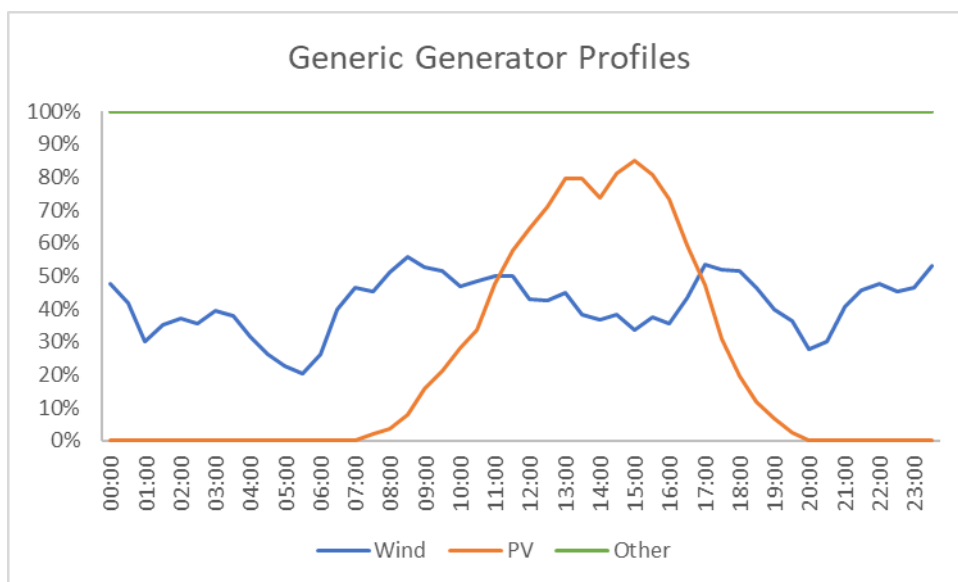


Figure 2. Plot of generic generator output profiles

### 3.3.4. Battery Energy Storage Systems (BESS)

To avoid excessive curtailment estimation through the use of a 100% BESS export capacity factor profile NGED have developed a profile that is more representative of the operation of BESS monitored by NGED's ANM system. This is based on:

- 3.3.4.1. Historic operating profiles of connected BESS on our network to identify times of likely coincident operation and historic export capacity factors
- 3.3.4.2. Benchmarked industry analysis of a large sample of BESS that identified a statistically likely operating profile and export capacity window, which guided a minimum export of 25% throughout the year and export capacity factor of between 40 and 50%
- 3.3.4.3. The operational behaviour of NGED's ANM systems, which determined the use of 100% operation at times of likely coincident operation

This approach has been taken to build on the available industry analysis and tailor it to reflect NGED's ANM system's operational approach. By taking an empirical approach, which leans on industrial experience, it is expected the profile will avoid unrealistic curtailment but provide a representative view of how NGED's ANM system will operate. As more BESS connect and more data is available the profile will continue to be reviewed to continue to create an appropriate and representative way to assess these connections.

The below heat map presents an overview of the profile demonstrating high export periods in the morning and evening, which alter throughout the year.

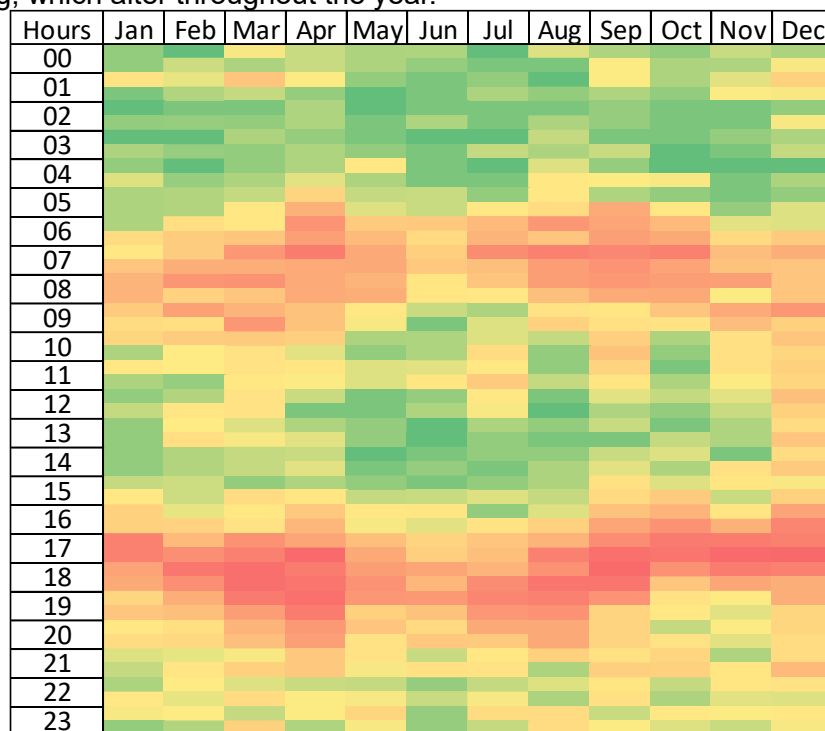


Figure 3. Heatmap representing BESS output

## 3.4. Sensitivity factors

- 3.4.1. The relationship from every node to any branch in the network model is provided within the sensitivity factor tables. These are calculated using PSS/E load flow software and are used to determine the effect of increasing net demand at each node to net forward power flow along sensitive branches and the amount of curtailment required for any connection.

The sensitivity factor is the contribution from a node to a branch and is calculated as follows:

$$SF = \frac{\Delta \text{Power flow at branch}}{\Delta \text{Load at node}}$$

- 3.4.2. For example, if a generator increases its output by 1MW and the load on a constraint increases by 0.5MW, then the sensitivity factor for a generator at that point on the network to that branch will be 0.5 (or 50%). Conversely if the same constraint had a 1MW overload and this was the only ANM generator contributing to it, the generator would need to reduce its output by 2MW.
- 3.4.3. These calculations are subject to a 2% cutoff for reporting purposes, however NGED apply a minimum threshold of 5% in our ANM systems, to avoid unnecessarily onerous curtailment.
- 3.4.4. Any changes to the network model such as between generation or demand scenario, reinforcement or running arrangement may require new sensitivity factors to be calculated.

- 3.4.5. The direction of the sensitivity factor is relative to the from and to node, where positive represents a flow of power originating at the from bus and resulting at the to bus, therefore a negative sensitivity factor may not relate to reverse power flow.

### 3.5. Asset ratings and Pre-event limits

- 3.5.1. For each branch the forward and reverse pre-event limit (MVA) of each asset within an ANM zone are provided.
- 3.5.2. To avoid post fault overloads NGED apply the principle of pre-event limits. This means that rather than curtailing against the full rating of an asset, limits are calculated based on worst-case load following an event.
- 3.5.3. This could be a change in topology or rapid change in load (e.g. loss of demand or sudden export of generation).
- 3.5.4. The standard derivation of a Pre-Event Limit (PEL) assumes the intact power flow direction is the same as the abnormal power flow direction. However, on some circuits the power flow direction can swap when certain outages are applied. Therefore, the limit considered during the analysis needs to be linked to the direction of power flow during intact conditions. For each branch NGED provides two PELs for each branch, representing the worst forward and reverse power flow conditions after the worst credible faults in both directions. The positive power flow and PEL represent power flows from the from bus towards the to bus, and vice versa.
- 3.5.5. The load flow from the worst first circuit outage will take account for any operational behaviour carried out on the network for each topology. The formula used for this is:

$$PEL = Rating \times \frac{Load_{intact}}{Load_{abnormal}}$$

- 3.5.6. An example of this is as follows:

|                                                                                                         |                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Initially each circuit is limited to 8MVA, despite being rated up to 12MVA                           | 2. When a fault or outage is taken the other two circuits will share the 8MVA, which flows through the now out of service circuit. By limiting the original load to 8MVA an instantaneous overload is avoided. |
| 3. For a prolonged outage this full loading could be maintained to fully utilise the network capability | 4. However, for a subsequent fault the remaining circuit would be loaded to 24MVA, 200% of its rating. If the ANM system cannot curtail generation within a short period of time this will damage the network. |

5. A second pre-event load limit of 6MVA can be applied to mitigate against an overload

6. When a further fault occurs the remaining circuit is only loaded up to its rating of 12MVA, avoiding any damage to the network

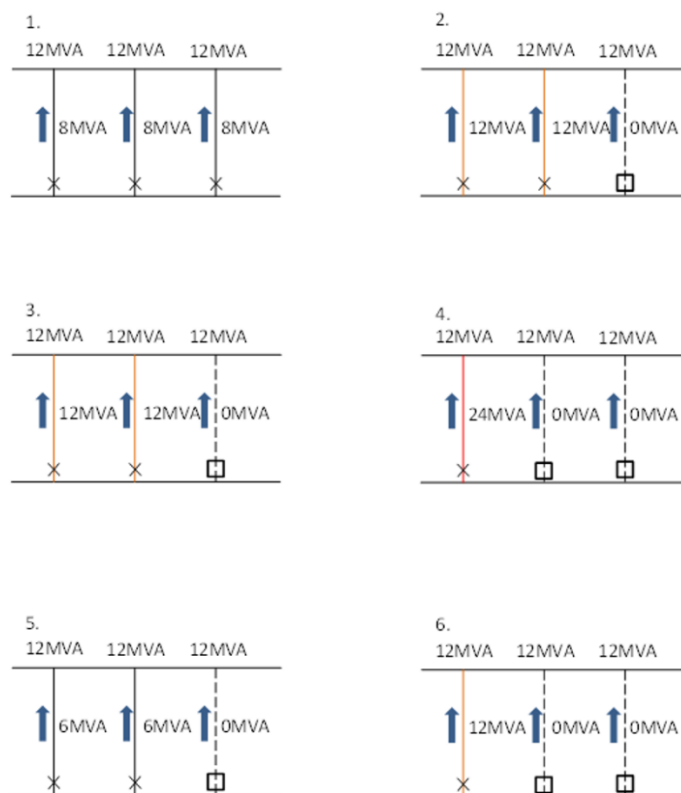


Figure 4. Example explaining the concept of pre-event limits

3.5.7. This limit provided is applicable for Intact analysis. Where analysis of abnormal running is required a new PEL may need to be calculated depending on the topology of the network. As the PEL is load dependant it may change throughout the lifetime of a connection. The limit published represents the network at that point in time and may be subject to change in the future.

3.5.8. NGED seasons are defined by the following date ranges:

| Month    | Season              |
|----------|---------------------|
| January  | Winter              |
| February | Winter              |
| March    | Intermediate (Cool) |
| April    | Intermediate (Cool) |
| May      | Intermediate (Warm) |

|                  |                     |
|------------------|---------------------|
| <b>June</b>      | Summer              |
| <b>July</b>      | Summer              |
| <b>August</b>    | Summer              |
| <b>September</b> | Intermediate (Warm) |
| <b>October</b>   | Intermediate (Warm) |
| <b>November</b>  | Intermediate (Cool) |
| <b>December</b>  | Winter              |

*Table 4. The months that corresponding to the seasons adopted by NGED*

- 3.5.9. NGED's ANM systems use sustained ratings as standard. The use of variable ratings is being deployed in some areas following technical review. In areas where this can be applied the ratings/PELs provided will be the variable rating, rather than sustained.
- 3.5.10. To avoid extreme sterilisation of capacity on the network PELs are limited to no less than 30% of an asset's rating.

## 3.6. Transmission Distribution boundary limits

- 3.6.1. For each GSP the Transmission Distribution boundary limits are provided for Technical Limit and Super Grid Transformer (SGT) Forward/Reverse Power Flow restrictions where they exist. These are provided to NGED by NESO (National Energy System Operator) and are given on a substation basis, rather than per asset.
- 3.6.2. Where both limits have been provided, the lower of the two for the respective direction should be taken. The variation of Technical Limits being provided in MW and SGT Forward/Reverse Power Flow restriction in MVA reflects the units provided to NGED. To account for the different in units a power factor of 0.95 is applied.
- 3.6.3. Individual SGTs are also included within the Asset rating and PEL table to enable SGT specific constraints to be captured. This may be necessary where the presence of a third-party connection on an SGT's tertiary winding has reduced the available capacity for NGED on that SGT. Therefore, it may trigger curtailment sooner than another SGT at that GSP.
- 3.6.4. The limits are provided in line with NGED's seasonal rating categorisation.
- 3.6.5. If these limits have not been issued at the time an offer is provided the customer would be notified if this was retrospectively applied.

## 3.7. Connection Queue

- 3.7.1. Network access for ANM is determined using a Last In First Off (LIFO) principle to determine the connection queue order. It is determined per ANM zone and filtered based on whether a connection has at least 5% sensitivity to a constraint. When a constraint is breached, the connection that most recently applied will be curtailed first.
- 3.7.2. The list of sites within the Connection Queue is made up of:

- 3.7.2.1. Connected sites
- 3.7.2.2. Recently connected (within the calendar year of analysis). Their contribution has been removed from all data provided so should be added as though it were an accepted site within any analysis
- 3.7.2.3. Accepted sites that have received a gate 2 offer from NESO
- 3.7.3. All connected ANM sites and all those due to connect within an ANM zone are provided within the connection queue tables, giving visibility of status and whether a site is controlled under ANM. Due to confidentiality restrictions, commercially sensitivity information has been removed under Section 105 of the Utility Act.
- 3.7.4. The connection queue is formatted to list where a site has multiple fuel types and their associated installed capacity. Where the combined installed capacity is greater than the export capacity, it should be capped to the export capacity.
- 3.7.5. The data included will be:

| Column                               | Description                                                                                        |
|--------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Licence Area</b>                  | One of NGED's four licence areas                                                                   |
| <b>GSP</b>                           | The name of the GSP                                                                                |
| <b>Status</b>                        | The connection status of a scheme e.g. Accepted                                                    |
| <b>Export Capacity (MW)</b>          | The agreed allowable export of the site                                                            |
| <b>Import Capacity (MW)</b>          | The agreed allowable export of the site                                                            |
| <b>Solar Installed Capacity (MW)</b> | The photovoltaic installed capacity                                                                |
| <b>Wind Installed Capacity (MW)</b>  | The wind installed capacity                                                                        |
| <b>BESS Installed Capacity (MW)</b>  | The BESS installed capacity                                                                        |
| <b>Other Installed Capacity (MW)</b> | The other fuel type installed capacity                                                             |
| <b>Solar</b>                         | The site has some photovoltaic installed capacity                                                  |
| <b>Wind</b>                          | The site has some wind installed capacity                                                          |
| <b>BESS</b>                          | The site has some BESS installed capacity                                                          |
| <b>Other</b>                         | The site has another fuel type installed capacity                                                  |
| <b>TANM</b>                          | The site is subject to ANM managing constraints on the transmission network e.g. Technical Limits, |

|            |                                                                                                                                                         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | SGT Forward/Reverse Power Flow. TANM limits are provided within the TD boundary limits table.                                                           |
| DANM       | The site is subject to ANM managing constraints on the distribution network. DANM limits are provided in the “asset rating and pre-event limits” table. |
| Bus name   | The name of the node the site is due to connect to. This may be the nearest node in the connected model if the site is not connected.                   |
| Bus number | The number of the node the site is due to connect to. This may be the nearest node in the connected model if the site is not connected.                 |

Table 5. A breakdown of the data within the connection queue tables

# **NGED ANM System Functionality**

Configuration and operation of NGED's ANM system

## 4. NGED ANM System Functionality

- 4.1. When a constraint is identified, any sites that contribute to it (above a 5% sensitivity factor threshold) will be curtailed in LIFO order, until there is no overload or all connections in the LIFO stack are fully curtailed.
- 4.2. Where constraints are identified at various voltage levels, the lowest voltage constraints are resolved first to avoid unnecessary curtailment to higher voltage constraints.
- 4.3. Due to the necessary variation in assumptions, analysis for export connections is carried out independently from import connections.
- 4.4. Abnormal network running is not considered as standard due to the unpredictable nature of outages across all assets that a connection may have a sensitivity factor to. While a worst-case representative outage could be assessed for a defined period of time, on some networks an outage might inconsistently impact various connections within the LIFO stack more than others. The volume of data associated with contingency analysis would provide complications as for a 50-branch network with 50 credible first circuit outages there could be 2450 second circuit outage combinations to consider.
- 4.5. As NGED's analysis is based on observed historic power flow, changes in background demand or growth in domestic distributed generation may lead to changes in the volume and shape of curtailment across the lifetime of a connection.
- 4.6. Static PELs are applied during curtailment analysis estimation. However, across the lifetime of a connection these may change due to temporary changes to the running arrangement or permanent network topology changes.
- 4.7. A threshold of 5% is applied to sensitivity factors to avoid ineffective curtailment of connections. The static sensitivity factor provided may not be fully representative of a live system. This is particularly true on interconnected networks, for which the reactive power behaviour of grid-edge elements may materially change sensitivity factors over the course of a year.
- 4.8. For sites that connected part way through the data period provided, their contribution has been removed. This is to avoid an unrepresentative load to be assessed for the first part of the year they were not connected/operating. These sites are included in the Connection Queue as "Recently connected" to allow them to be modelled ahead of any ANM connections for the whole data period to provide a representative base loading condition.
- 4.9. The feedback control operation of an ANM system requires the transient behaviour of the network and connections to be considered. On top of the network topology, the ramp rate of each generator needs to be considered to ensure the next possible loading position of the network is handled and network exceedances mitigated against. The use of PELs is the primary implementation for this. However, for our ANM systems that use load flow in the loop, the output of generators within the real time curtailment calculation is based on their real time, plus their possible output. This ensures the ANM system will protect the network from a sudden jump in load.

## **Indirect Curtailment**

Other causes of curtailment not directly caused by  
NGED's ANM system

## 5. Indirect Curtailment

- 5.1. Sites connected to NGED's network using ANM require a Connection Control Panel (CCP). If the communications path to this CCP from the central Advanced Distribution Management System (ADMS) are lost, the CCP will go into a failsafe mode and require full curtailment of the site until the communications link is re-established. Due to the unpredictable nature of disruptions to the communications path, this curtailment is not accounted for within the estimate.
- 5.2. The CCP presents the ANM set point to the site. If this set point is not adhered to the CCP will escalate to a "Stage 1", which generally requires the site to operate at 0MW. If the site adheres to this Stage 1 signal, it will be released back to its ANM set point. If it does not the CCP will escalate to "Stage 2", which issues a trip signal to the site's circuit breaker to require disconnection. This requires a manual reset from NGED's control room. As this curtailment results from the site not complying with NGED's set point, this cannot be estimated and NGED do not take liability for the additional curtailment experienced.
- 5.3. When NGED's telecommunications network is undergoing maintenance, ANM sites may require curtailment as the network cannot be monitored for overloads.
- 5.4. During initial testing and commissioning of an ANM site, additional curtailment may be experienced. This could be due to configurations within NGED's system or the customer's control system but would not be expected to be endured beyond the initial commissioning period.
- 5.5. NGED's ANM systems are optimised to control the load on the network under Intact and N-1 outage conditions. If the network is run beyond this level of secured network operation it is very likely this will lead to additional curtailment.

# Appendix

Supporting information

## 6. Appendix

| Term  | Definition                                          | Explanation                                                                                                                                                                                                                                                                                                                                 |
|-------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADMS  | Advanced Distribution Management System             | The software used by NGED's control centre to monitor, control and optimized the performance of the electrical distribution network                                                                                                                                                                                                         |
| ANM   | Active Network Management                           | The Energy Networks Association Active Network Management Good Practice Guide summarises ANM as: Using flexible network customers autonomously and in real-time to increase the utilisation of network assets without breaching operational limits, thereby reducing the need for reinforcement, speeding up connections and reducing costs |
| BESS  | Battery Energy Storage Systems                      | Connections that can import or export power                                                                                                                                                                                                                                                                                                 |
| BSP   | Bulk Supply Point                                   | A substation comprising of one or more Grid Transformers and associated switchgear                                                                                                                                                                                                                                                          |
| CAFPL | Connection Assets Forward Power Limit               | Constraints on SGTs regarding power flow from the transmission to distribution network                                                                                                                                                                                                                                                      |
| CARPL | Connection Assets Reverse Power Limit               | Constraints on SGTs regarding power flow from the distribution to transmission network                                                                                                                                                                                                                                                      |
| CCP   | Connection Control Panel                            | The grid edge device NGED use to send signals to connections to monitor their import or output of power and instigate curtailment                                                                                                                                                                                                           |
| DANM  | Distribution Active Network Management              | ANM conducted due to constraints on the distribution network                                                                                                                                                                                                                                                                                |
| DCP   | Distribution Change Practice                        | Proposals for changes to the code that DNOs/DSOs are obliged to follow (the Distribution code), that are then approved by Ofgem. DCP404 specifically relates to non-firm connections at the distribution level and aims to streamline and standardise how such customers connect to the grid.                                               |
| DCUSA | Distribution Connection and Use of System Agreement | An agreement between electricity distributors, supplies and generators that specifies the terms & conditions for connection to and use of distribution systems                                                                                                                                                                              |
| EHV   | Extra High Voltage                                  | 132kV, 66kV or 33kV networks                                                                                                                                                                                                                                                                                                                |
| GSP   | Grid Supply Point                                   | A substation comprising of one or more Super Grid Transformers and associated switchgear                                                                                                                                                                                                                                                    |

|      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                   |
|------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GT   | Grid Transformer                       | The transformers used at a Bulk Supply Point. Typically used to step down from 132 or 66 kV to 11 or 33 kV.                                                                                                                                                                                                                                                                                       |
| HV   | High Voltage                           | 11kV or 6.6kV                                                                                                                                                                                                                                                                                                                                                                                     |
| LTDS | Long Term Development Statement        | An annually published document that sets out the use and likely development of the distribution network and the DNO's plans for modifying the distribution system for the following two years.                                                                                                                                                                                                    |
| LV   | Low Voltage                            | 400V or 230/240V                                                                                                                                                                                                                                                                                                                                                                                  |
| NESO | National Energy System Operator        | The body that performs the roles of transmission system operator (operation of the transmission system) and electricity system operator (real-time balancing of supply and demand)                                                                                                                                                                                                                |
| PEL  | Pre-Event Limit                        | A restriction applied to each branch to ensure that any event on the network will not cause the assets rating to be exceeded                                                                                                                                                                                                                                                                      |
| PS   | Primary Substation                     | A substation comprising of one or more primary transformers and associated switchgear                                                                                                                                                                                                                                                                                                             |
| PT   | Primary Transformer                    | The transformers used at a Primary substation. Typically used to step down from 66 or 33 kV to 11 or 6.6 kV                                                                                                                                                                                                                                                                                       |
| SGT  | Super Grid Transformers                | The transformers used at a Grid Supply Point. Typically used to step down from 400 or 275 kV to 132 or 66kV.                                                                                                                                                                                                                                                                                      |
| TANM | Transmission Active Network Management | ANM conducted due to constraints on the transmission network. This can be determined by Technical Limits or CAFPL/CARPLs                                                                                                                                                                                                                                                                          |
| -    | Constraint                             | Any limit on the ability of the licensee's Distribution System, or any part of it, to transmit the power supplied onto the licensee's Distribution System to the location where the demand for that power is situated.                                                                                                                                                                            |
| -    | Curtailable                            | A Curtailable Connection may enable a customer to connect quicker by agreeing that the use of some or all of that Connection may be restricted by the DNO/IDNO at certain times. The amount of Curtailment that a customer can be subject to will be measured relative to a defined Curtailment Limit, and the ability for a DNO/IDNO to Curtail that Customer may cease after an agreed end date |
| -    | Export Capacity Factor                 | The ratio of the volume of MW a connection exports against the maximum volume of export capacity MW across a year                                                                                                                                                                                                                                                                                 |

|   |               |                                                                                                                                                                                                                                                                                                                                                                                                         |
|---|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| - | Flexible      | Connection arrangements whereby a customer's export or import of electricity is managed (often through real-time control) based upon contracted and agreed principles of available capacity. Flexible Connections typically allow quicker and cheaper connection to the Distribution System but are made on the basis that there is no limit on the extent to which a user's access can be interrupted. |
| - | Intact        | With open points in their normal position and without any outages that are material to the condition being considered or studied                                                                                                                                                                                                                                                                        |
| - | Load          | The flow of electricity on our network in any direction                                                                                                                                                                                                                                                                                                                                                 |
| - | Network Model | Digital representation of the electrical network made up of components such as buses, branches, loads and generators                                                                                                                                                                                                                                                                                    |