Open Networks WS1A Product 9 Updated Curtailment Information

Previously WS2 Product 7 Provision of Constraint Information

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Introduction

About ENA

Energy Networks Association (ENA) represents the owners and operators of licenses for the transmission and/or distribution of energy in the UK and Ireland. Our members control and maintain the critical national infrastructure that delivers these vital services into customers' homes and businesses.

ENA's overriding goals are to promote UK and Ireland energy networks ensuring our networks are the safest, most reliable, most efficient and sustainable in the world. We influence decision-makers on issues that are important to our members. These include:

- Regulation and the wider representation in UK, Ireland and the rest of Europe
- Cost-efficient engineering services and related businesses for the benefit of members
- Safety, health and environment across the gas and electricity industries
- The development and deployment of smart technology
- Innovation strategy, reporting and collaboration in GB

As the voice of the energy networks sector, ENA acts as a strategic focus and channel of communication for the industry. We promote interests and good standing of the industry and provide a forum of discussion among company members.

About Open Networks

Britain's energy landscape is changing, and new smart technologies are changing the way we interact with the energy system. Our Open Networks project is transforming the way our energy networks operate. New smart technologies are challenging the traditional way we generate, consume and manage electricity, and the energy networks are making sure that these changes benefit everyone.

ENA's Open Networks Project is key to enabling the delivery of Net Zero by:

- opening local flexibility markets to demand response, renewable energy and new low-carbon technology and removing barriers to participation
- providing opportunities for these flexible resources to connect to our networks faster
- opening data to allow these flexible resources to identify the best locations to invest
- delivering efficiencies between the network companies to plan and operate secure efficient networks

We're helping transition to a smart, flexible system that connects large-scale energy generation right down to the solar panels and electric vehicles installed in homes, businesses and communities right across the country. This is often referred to as the smart grid.

The Open Networks project has brought together the nine electricity grid operators in the UK and Ireland to work together to standardise customer experiences and align processes to make connecting to the networks as easy as possible and bring record amounts of renewable distributed energy resources, like wind and solar panels, to the local electricity grid.

The pace of change Open Networks is delivering is unprecedented in the industry, and to make sure the transformation of the networks becomes a reality, we have created six workstreams under Open Networks to progress the delivery of the smart grid.

2021 OPEN NETWORKS PROJECT WORKSTREAMS

- WS1A: Flexibility Services
- WS1B: Whole Electricity System Planning and T/D Data Exchange
- WS2: Customer Information Provision and Connections
- WS3: DSO Transition
- WS4: Whole Energy Systems
- WS5: Communications and Stakeholder Engagement

Our members and associates

Membership of Energy Networks Association is open to all owners and operators of energy networks in the UK.

- Companies which operate smaller networks or are licence holders in the islands around the UK and Ireland can be associates of ENA too. This gives them access to the expertise and knowledge available through ENA.
- Companies and organisations with an interest in the UK transmission and distribution market are now able to directly benefit from the work of ENA through associate status.

ENA members

Cadent – Your Gas Network
electricity north west – Bringing energy to your door
ESB NETWORKS
gtc
nationalgrid
nationalgridESO
Northern Gas Networks
Northern Ireland Electricity Networks
NORTHERN POWERGRID
Scottish & Southern Electricity Networks
SGN – Your gas. Our network.
SP ENERGY NETWORKS
UK Power Networks – Delivering your electricity
WALES&WEST UTILITIES
WESTERN POWER DISTRIBUTION – Serving the Midlands, South West and Wales

ENA associates

- Chubu
- EEA
- Guernsey Electricity Ltd
- Heathrow Airport
- Jersey Electricity
- Manx Electricity Authority
- Network Rail
- TEPCO

1. Executive Summary

The purpose of this document is to review what information on constraints and curtailment is useful to customers, provide an overview of what information is currently made available and to establish good practice for network operators. A particular focus of this document is information that may usefully be provided to customers on actively managed connections so they have better understanding of what a constraint regime 'looks like', including uncertainties, historical 'likelihood' of events, etc.

This document is aimed at:

- Network operators of constrained distribution networks; and
- Customers (both generation and demand) seeking new connections to, or with existing connections in, constrained parts of the electricity network.

This document does not consider information provision on transmission networks, where actively managed connections are commonplace and customers (or users) are compensated for curtailment, unless they have opted for restrictions on availability on a design variation to the Security and Quality of Supply Standard (SQSS). In these circumstances National Grid (the Electricity System Operator) will discuss with connecting customers the likely impact of outages, etc.

This document considers information provision pre and post-connection.

Pre-connection: Curtailment Assessments and Timescales of Provision

Network companies publish online information on their flexible connections processes and provide information on capacity availability through their Long Term Development Statements (LTDS) and Heat Maps. Further services are offered, targeted at flexible connections customers, which are aimed at providing greater clarity of likely curtailment. There are three main approaches:

- the DIY Assessment
- the DNO Curtailment Assessment
- the Curtailment Index

Good practice is seen as the network company offering the choice of a minimum of 2 of the above options i.e. the DNO Curtailment Assessment and at least one other.

Regarding the timing of provision of information, it is considered good practice for network companies to make high level curtailment information available early in the connection process. Depending on customer requirements, it is then recommended that network companies are flexible on the timing of when they conduct the more detailed assessment and make curtailment information available. Customers may require this information at the time of offer issue or post offer acceptance.

Pre-connection: Flexible Connection Offers

It is considered good practice for network companies to provide the following information in flexible connection offers:

- Explanation of the flexible solution being offered;
- Details of the constraint(s);
- An initial view of the curtailment; and
- Queue position (where relevant).

Post-connection: Notice of Upcoming Outages and Reporting of Actual Events

It is considered good practice for network companies to provide:

- Advanced notice of outages with updates as appropriate;
- A final update in advance of the outage taking place;

Network companies should establish fora at which connected customers are able to discuss operational issues.

It is considered good practice for network companies to provide to customers on request, a log of the outages that have impacted their connections. It is recommended that this information be supplemented (for ANM/flexible connections) with details of curtailment events on pre and post-connection**.**

2. Introduction

This document was an output of 2018 Open Networks project, Workstream 2 (Customer Experience), which covered:

Provision of Constraint Information - Review what information on constraints and curtailment would be useful to customers, what can be provided and establish good practice for network operators.

Objective:

- to set out what information should be provided to customers on say actively managed connections so that they have better understanding of what the constraint regime 'looks like', including uncertainties, historical 'likelihood' of events etc.
- Establish good practice on when and what information is provided by network operators.

This report has been updated as part of 2021 Open Networks project, Workstream 1A Flexibility Services, Product 9, which covers:

Curtailment Information - Strategy for Improving the Availability of Curtailment Information During ED1

Objective:

- The product focuses on setting out the approach to developing a curtailment information strategy with phased delivery of improved information ahead of ED2.

Benefits:

- Improvements in the availability and frequency of both curtailment and network information should increase the opportunities for both firm and non-firm assets to provide / stack flexibility services; ultimately reducing system costs for the end consumer
- Facilitate liquid flexibility markets, whilst accommodating the anticipated growth in low carbon asset connections, to support GB's transition to net zero

The growth in, particularly generation, connections has significantly increased the utilisation of many parts of the electricity network. As an alternative to continuing to build new or upgraded electricity infrastructure to address all network constraints, network operators are increasingly driven to more active management of the network, facilitating cheaper and faster connections. Network access may, however, be constrained, even if only for short periods of time as a result.

In response, network companies will endeavour to provide customers with information at various stages during the lifecycle of connections. For example, at the early stages of the connection process, network companies may provide high level details of likely future constraints. A curtailment assessment may also be provided, detailing the likely impact of constraints on a given connection. Post connection information may include details of planned outage works and actual curtailment history.

This document focusses on network constraint information provided by electricity network companies to their customers. It does not consider the methodology for assessing **how** customers' connection arrangements might be impacted by constraints or active network management (ANM) arrangements. Nor does this document produce guidance to ensure good practice and consistency in the production of ANM performance related information. Both of these areas are covered by 2018 ON Workstream 1, Product 7 "ANM Information".

This document aims to provide guidance to both customers and network operators on information provision in relation to network constraints, curtailment and outages.

Explanation of terms[1]:

"Active Network Management (ANM)" *is the use of distributed control systems to continually monitor network limits, along with systems that provide signals to DER to modify outputs in line with these limits.*

"Constraints" *a term used for restrictions on the ability of a network to transport energy, for example due to thermal or voltage limitations.*

"Curtailment" *typically applicable to generator export but can be applied to demand from large industrial sites. Under defined arrangements this is a temporary reduction, typically in the allowed exports from a generator, below a customer's agreed export capacity. Activated in response to a notification or signal that the generator is required to curtail its generation.*

Additionally[2]:

"Outage" *the deliberate act by the Company [the network company], by whatever means it determines, to interrupt the flow of electrical current to a part or parts of its Distribution System, for the purposes of carrying on its activities.*

Constraints on the network may result in curtailment at a customer's site.

This document:

- Provides some detail of the information currently published by network companies on their flexible connections processes
- Sets out good practice on information provision during the various stages of the connection lifecycle, including curtailment estimates, post connection information provided in respect of curtailment to ANM connections and planned outage works.

[1] Source: http://www.energynetworks.org/assets/files/180723 ON-PRJ-WS2 - P3 Terms and Definitions V1.1 (published).pdf
[2] Source: http://www.connectionterms.org.uk/Schedule%202B%20National%20Terms%20of%20Connection%20v10-min.pdf

3. Background

In some areas of the network it is not possible to connect further generation, energy storage or other distribution energy resources without the risk of breaching network limits. In these circumstances, network modifications and/or upstream reinforcements are required to accommodate new connections in an unconstrained manner. The costs of these works are borne by connecting and, in some instances, existing connected customers (through use of system charges). Connection applicants have the option in such instances to apply for a non-firm connection, including flexible connection solutions.

All network companies offer customers flexible connection opportunities. Note: A flexible connection will not be considered for applications specifically requesting a firm connection. The range or type of flexible connection offered may be dependent upon the constraints faced in a given network area.

Explanation of terms[3]:

"Flexible Connections" *are connection arrangements whereby a customer's export or import is managed (often through real-time control) based upon contracted and agreed principles of availability of capacity. Timed Connections and connections utilising Active Network Management arrangements are examples of Flexible Connections.*

Occasionally, Flexible Connections are also referred to as Managed Connections.

The need for network access to be managed, may arise through capacity limitations which are local or remote from the Connection Point. For example, a Flexible Connection might comprise a Firm local connection, but with a constraint being present deeper in the network. Flexible Connections are offered to customers so that Reinforcement can be avoided or deferred.

"Reinforcement" *is defined as the work carried out and the assets installed that add capacity (network or fault level) to the existing shared use Transmission or Distribution System.*

"Firm" The term Firm is used to describe a connection that remains available in a first fault scenario. A clear example of a Firm connection is a connection of 2 or more circuits to maintain availability in the event of one circuit not being available (Single circuit connections are a clear example of an Un-Firm / Non-firm connection whereby the connection becomes unavailable after a fault and remains unavailable for the duration of the fault repair).

A Firm arrangement is one which, in the event of a fault on, or the taking out of commission for maintenance or other purposes, any one circuit forming part of the connection arrangement, ensures continued availability of the agreed Maximum Import Capacity or Maximum Export Capacity (assuming that the wider network assets that the connection is connected to are intact and operating normally).

[3] Source: http://www.energynetworks.org/assets/files/180723 ON-PRJ-WS2 - P3 Terms and Definitions V1.1 (published).pdf

4. Information Provision: General Process

All network companies publish online information on their flexible connections processes. This information can be accessed via the following web links:

Network Company	Web address
Electricity North West (ENWL)	https://www.enwl.co.uk/get-connected/apply-for-a-new-connection/flexible-connections/
Northern Powergrid (NPG)	https://northernpowergrid.custhelp.com/app/answers/list/st/5/kw/flexible/page/1
SP Energy Networks (SPEN)	https://www.spenergynetworks.co.uk/userfiles/file/ESDD-01-009.pdf
Scottish and Southern Energy Networks (SSEN)	https://www.ssepd.co.uk/GenerationConnectionsHome/
UK Power Networks (UKPN)	https://www.ukpowernetworks.co.uk/electricity/distribution-energy-resources/flexible-connections
Western Power Distribution (WPD)	https://www.westernpower.co.uk/alternative-connections

Table 1: Flexible connections process

In addition, network companies provide information on capacity availability through their Long Term Development Statements (LTDS) and Heat Maps. More information regarding both can be accessed via the ENA Open Networks Project Report "Good Practice ahead of Connection Applications"[4].

The majority of network companies publish information on those areas of their network(s) which are enabled for ANM and in some instances for other flexible connection opportunities, e.g. timed export, export limited devices and intertrip schemes. The following approaches are adopted:

- Heat maps,zone maps or mapping tools, flagging ANM enabled areas
- Future (geographic) ANM roll out plans
- Customer events

Most network companies publish heat or zone maps which highlight those areas of the network which are currently enabled for ANM connections. These maps are further supplemented by future roll out plans, segmented on a grid supply point (GSP) or bulk supply point (BSP) basis. Roll out plans can highlight when the network company will commence issuing quotations for ANM connections and/or when the roll out of the ANM

[4] Source: http://www.energynetworks.org/assets/files/ON-PRJ-WS2%20-%20P1%20Pre%20Application%20Good%20Practice%20-%20180924%20-%20Final%20clean.pdf

technology will be complete and connections will be available. Some DNO's have made Flexible Connections via ANM technology a business as-usual product and therefore no longer publish roll-out plans, as quotations for ANM connections are issued as standard practice across the network.

All network companies use customer fora events to raise awareness of flexible connection opportunities within their network area(s).

5. Curtailment Estimates

Network companies provide information to customers to better enable them to gain an appreciation of the likely curtailment flexible connections will experience and to assist investors in their assessment of the future revenues and risk profile of development opportunities. There are three main approaches to the provision of curtailment information:

- the DIY Assessment
- the DNO Curtailment Assessment
- the Curtailment Index

5.1 Approach No.1 (the DIY Assessment) – SSEN

Under this approach, SSEN provide their customers with relevant network data to enable them to carry out their own curtailment assessment. This data may include:

- Generation Table for location/BSP/GSP;
- Network Connection & Constraints for XXX GSP/BSP and location Generation;
- Demand Data for the location/BSP/GSP, Historic - 1 Year;
- Measurement Point (MP) Settings;
- Historic Outage Data for Constraints;
- ANM Contracted Generation, Last in / First off (LIFO) Stack Positions;
- Communications Availability Data (TSAT);
- Estimated G83 & sub 50kW Generation; and
- Long Term Development Statement (LTDS)

Please note: as of 2021, SSEN will also provide as

Other examples:

NPG, SPEN and WPD provide historical half-hourly network loading data upon request. SPEN and NPG explicitly withhold any information which they deem to be of a commercially sensitive nature (associated with existing or contracted customers). UKPN provide half-hourly curtailed and un-curtailed MW output data across one year for customers upon request. In addition, customers have access to the modelling data published in the network companies' respective Long Term Development Statements.

Pros	Cons
Freedom to choose basis of curtailment assessment and who conducts it	Access to personnel with required skills or knowledge to carry out assessment
Customer in control of costs and timescales	Potential restrictions on release of some network data due to commercial confidentiality (e.g. data for existing connected customers)
	Volatility of information, i.e. may change depending upon new acceptances, disconnections, etc.

5.2 Approach No.2 (the DNO Curtailment Assessment) – SPEN, NPG, UKPN, WPD, SSEN (2021)

Alternatively, the network companies may offer to provide a curtailment assessment report. This assessment will typically be developed utilising loadflow models and between 1- 2 years' worth of historical loading data, coupled with a predicted output profile of the customer's proposed development, which may be supplied by the customer. The analysis report will present detail on the frequency and duration of events as well as overall MWh Curtailment. Some sensitivity impacts may be required, including reductions in background demand, heavier than average generation profiles for entrants higher in the LIFO stack, increased failure rates , etc.

Explanation of terms[5]:

"Curtailment assessment" *is an estimate of the expected curtailment over time, expressed in terms of MWh or the fraction of expected un-curtailed output. Often, this is based on simulation of Active Network Management (ANM) operation across representative time-frames.*

Pros	Cons
Site specific curtailment assessment	Customer has less opportunity to input into scope/detail of report
Studies can be based on a 'complete' non-redacted half-hour (HH) data set	Different approaches adopted by different network companies

[5] Source: http://www.energynetworks.org/assets/files/180723 ON-PRJ-WS2 - P3 Terms and Definitions V1.1 (published).pdf

Customer benefits directly from network company's knowledge, skills and experience	

5.3 Approach No.3 (The Curtailment Index) – ENWL

A further approach, developed by ENWL, is provided specifically for flexible connections of capacity greater than 200kW. This approach provides a forecast of curtailment, which is based upon the voltage of connection. A Curtailment Index will be provided at the time of connection and will be incorporated into the customer's connection agreement. This Curtailment Index provides a cap on curtailment. Where actual curtailment in any cumulative 6-year period exceeds the agreed cap (the Curtailment Index), ENWL will seek to take action, e.g. by progressing network reinforcement. Under this service, customers will be provided with an annual statement of actual curtailment for the previous 12-month period.

Pros	Cons
Annual provision of 'actual' curtailment	Generic nature of curtailment forecast could produce unnecessarily pessimistic results for some customers (not site-specific).
Commitment of intervention where actual (6-year average) curtailment exceeds the Curtailment Index	Action to resolve breaches of Curtailment Index subject to funding approval.

<u>Customer Feedback</u>

Customer feedback has reinforced many of the pros and cons identified with the three Approaches. Some customers supported the view that good practice for network companies was the provision of Approach 2, whilst others saw benefits in both Approaches 1 and 2. The following points were made in support of this:

- Smaller organisations being more likely to favour Approach 2; and
- Larger organisations more likely to favour Approach 1, noting they are more likely to have readily available access to resources capable of supporting the assessment evaluation.
- Others supported network companies offering all 3 Approaches, and more specifically Approaches 1 and 2 supplemented by agreed curtailment caps.
- Finally, the inclusion of curtailment caps in enduring connection agreements also received some support.

5.4 How are Curtailment Assessments (Approach No.2) provided?

There are a number of approaches adopted by the network companies.

SPEN utilise a standard template for all assessments, providing detail on forecast MWh exported as part of an ANM scheme based upon real-network data (taking into account demand, generation export and network conditions i.e. any outages that occurred on a relevant circuit or constraint location, during a relevant 12-month period). SPEN's assessment will utilise an assumed capacity factor / profile for the connecting installation, based on either:

- data provided by the customer; or
- typical data from existing connected technologies.

Customers are advised at offer stage of the principles of network access and method of securing position in the queue.

UKPN provide:

- LIFO queue position at time of connection offer6
- A list (and description) of active constraints
- Energy estimate before and after curtailment
- Capacity after curtailment (%)
- Reduction in energy produced to curtailment (%),
- Duration curves for uncurtailed and curtailed power output
- Time series chart for uncurtailed and curtailed power outputs: yearly, monthly and time of day profile.

UKPN's assessment will utilise an assumed capacity factor / profile for the connecting installation, based on typical data from existing connected technologies.

The data within WPD's curtailment assessment is provided in MWhs of curtailment. It includes the LIFO queue position and pictorial representation over a year and numbers of customers ahead in the LIFO stack at time of study. It is calculated using historic load flow data within a detailed power flow study process to account for the impact of multiple connections within parallel networks. The study is carried out on an intact system and over a two year period. While fault rates are not included or published the report is based on pre-event curtailment to the next outage.

NPG provide:

- on request, historical half hourly network loading data on key assets likely to be constrained;
- a curtailment estimate with the ANM offer utilising a loadflow model and typically a year's worth of historical data;

SSEN and ENWL do not currently provide Curtailment Assessments. Service offerings from both are described above.

[6] LIFO position may change (move up in the stack) post-acceptance if customers ahead in the stack at the time of application do not progress

SSEN's outlined approach is detailed below for when SSEN starts issuing curtailment assessment reports.

SSEN Provide:

- Estimated average energy curtailment over a 24 month period
  - Predicted maximum output (MWh)
  - Curtailed Volume (MWh)
  - Un-curtailed output (MWh)
- LIFO position and generation type & capacity ahead of generator
- Capacity factor used
- SSEN will use a modelling tool built specifically for curtailment assessments. The calculations within the power flow model utilise multiple data sets, including but not limited to half-hourly historical data, ANM configuration parameters, generation capacity factors and assumed profiles; although generators will be able to submit site-specific profiles for each site. The report takes into consideration historical outages on the relevant network and the reliability of communications which results in system failsafe action. For each half-hour period the load and generation values are populated, simulations are performed and the curtailment is calculated

Note on allocation of LIFO position when producing curtailment assessments during offer process

Two approaches can be taken with respect to allocating LIFO position when there are a number of customers with live applications;

(i) All customers with live applications receive the same LIFO position
This approach assumes no other customers with live applications in a LIFO stack accept their flexible connection offer, i.e. provides a best-case view of potential curtailment in the assessment.

(ii) All customers with live applications receive individual LIFO positions according to application date.
This approach assumes all customers with live applications in a LIFO stack accept their flexible connection offer, i.e. provides a worst-case view of potential curtailment in the assessment.

There are pros and cons to both approaches. Approach (i) is less likely to deter customers from accepting a flexible connection offer as it offers a best-case view of potential curtailment. However, depending on whether customers ahead in the LIFO stack also accept their flexible connection offer, it could lead to increased curtailment estimates for some customers as the LIFO stack resolves. Approach (ii) manages customer expectations better as it provides a worst-case view of curtailment, which can only improve as the LIFO stack resolves. At present, UKPN and WPD use approach (ii) when producing curtailment assessments. SSE is considering approach (i) when they begin to produce curtailment assessments later in 2021.

5.5 Timescales for Provision of Curtailment Assessments

The timescales for providing curtailment assessments differs between network companies. For the purposes of this report these timescales are grouped into:

- prior to application;
- at the time of connection offer issue; and
- following acceptance of connection offer.

Prior to application

- UKPN provide typical curtailment levels for different generation technologies via their DG Mapping Tool (heat maps).
- All DNO's provide the opportunity for customer's to have a face-to-face discussion with DNO representatives, e.g. from network planning teams, where customers discuss specific projects in more detail and DNO's can provide indications of potential constraints and curtailment that could be associated with the project.

Pros	Cons
Early indication of constraints in the area likely to assist customer decision on whether to apply for a connection or not.	Level of constraint likely to change over time.

At time of Offer issue

- SSEN provide the network data, enabling customers to carry out their own curtailment assessment. SSEN in future will also offer curtailment reports.
- UKPN, NPG and WPD provide a curtailment assessment.
- ENWL provide a forecast of curtailment (for the voltage type of the connection)

Pros	Cons
More comprehensive curtailment information likely to assist customer decision on whether to accept a connection offer or not.	Different approaches adopted by different network companies
	Additional workload leading to increased assessment and design fees payable by connection applicants.

Following acceptance of the Connection Offer

- SPEN provide a curtailment assessment

Pros	Cons
Comprehensive curtailment assessment based on actual contracted/connected background.	Visibility of detail of curtailment coming after customer decision to accept a connection offer and pay/commit financially to a connection scheme has been made.

Customer exposure to the costs associated with the production of the curtailment assessment delayed until after offer acceptance, when connection projects are more advanced.	

Customer Feedback

- There were a broad range of views expressed regarding the timescales for network companies providing curtailment assessment and associated information.
- Customers generally accepted that forecast levels of curtailment are often likely to change and therefore over-analysis at an early stage may not be the right approach. On this basis, higher level information should be made available when customers are first considering grid connections (e.g. a traffic light approach via network company heatmaps or otherwise).
- More detailed information (reflective of all accepted offers and connected sites and including the nature of constraint(s) and any associated interdependencies) can be provided either at the time of offer issue or post offer acceptance. Note: the quality of any such assessment will benefit from a detailed understanding of the technical parameters associated with the customer's installation. There were two main views on timescales:
- Some customers offered a preference for assessment to be provided at the time of offer issue to aid their decision on offer acceptance,
- Others preferred this analysis to be concluded post offer acceptance recognising the impact on assessment and design fees.

Consideration of Good Practice

There are 3 main approaches to the provision of curtailment information:

1. the DIY Assessment
2. the DNO Curtailment Assessment
3. the Curtailment Index

Stakeholder feedback reaffirmed that different types of customers prefer different options. For example, smaller organisations being more likely to favour Approach 2; and some larger organisations being more likely to favour Approach 1.

Based on this feedback and to recognise customer preferences, good practice is seen as network companies offering the choice of a minimum of 2 of the above options i.e. the DNO Curtailment Assessment and at least one other.

The timing of provision of curtailment information varies between network company, with a broad range of approaches applied. Customer feedback generally indicated a preference for less detailed information earlier in the connection process with the detail following, either at the time of offer issue or post offer acceptance. Whilst there was no clear majority view on when, there was sufficient evidence that customers would benefit from network companies being flexible on when they conduct assessments and make curtailment information available.

6. Flexible Connection Offers

As previously stated, all network companies offer their customers flexible connection opportunities. The information contained within connection offers regarding the extent of constraints, queue position, etc. is likely to play a significant role in the customer's decision-making process and is for this reason considered in this document. Network companies' approaches are as follows:

ENWL will identify within their offers constraints applicable to the connection. They will also provide a 'worst case' forecast of curtailment, based upon the voltage of the connection.

SPEN provide a 2-stage offer process for ANM connections. Under this process, the Stage 1 offer will outline the ANM solution and confirm queue position. This offer will also detail the network conditions where capacity may temporarily be suspended or curtailed. Upon acceptance of the Stage 1 offer, detailed curtailment analysis will be undertaken, along with detailed design and specification of the ANM scheme and associated communications.

SSEN will provide with the offer an assessment data letter. This assessment data letter is associated with the DIY Assessment approach described in Section 4 and includes details of the queue position, location, half hourly demand data, and the size and technology of other generation in the queue. The offer will detail the location and threshold of relevant constraints.
SSEN have committed to providing curtailment assessment reports in line with the 2018 Good Practice Guide. SSEN is in the process of finalising and validating the modelling tool and processes with the view of providing curtailment assessment reports in 2021.

UKPN will provide the full curtailment assessment report as described in Section 1.3, including details of LIFO position, supplemented with the connection offer. The connection offer itself gives an explanation of the flexible connection solution, assumptions taken in the curtailment assessment and refers to available communications options post-acceptance. .

WPD will provide some general details about alternative connections and an assessment of predicted curtailment.

Consideration of Good Practice

It is considered 'Good Practice' for network companies to provide the following information in flexible connection offers:

- Explanation of the flexible solution being offered;
- Details of the constraint(s);
- An initial view of the curtailment (note: this will be accompanied in most instances by some form of disclaimer); and
- Queue position (where relevant).

7. Information Sharing - Post Connection

7.1 Notifications of Upcoming Planned Works

Under Regulation 12 of the Quality of Service Guaranteed Standards, distribution network companies are required to provide their customers with at least two days' notice of planned power cuts/outages. Financial penalties are in place in circumstances where network companies fail to give the required notice or the outage event takes place on a different day to that notified.

In addition, several network companies provide an enhanced service to their larger customers, including those which have been connected on a flexible basis. The following enhanced services are provided:

1. Annual notification with updates closer to the time
2. Operational fora

Annual notification with updates closer to the time

SPEN and WPD provide annual updates of works likely to result in curtailment activity and/or outages. This information is updated at various points throughout the year, with high level detail of the works, expected dates and duration. A further update is given closer to the time of the works.

Pros	Cons
Good customer service	Frequent changes to the plan? Too much information?
Enables customers plan more efficiently and strategically.	
Reduces post event calls from customers.	

Operational fora

All network companies have established fora to discuss operational issues. These fora will in addition provide customers with more accurate and up-to-date information on planned outages.

Pros	Cons
Enables customers plan more efficiently and strategically.	

Consideration of Good Practice

Customers advised us that it was good practice for the network company to provide advanced notice of outages affecting customers at an early stage. The network company should follow this up with further information and the offer of ongoing dialogue as appropriate. There should be final notification closer to the time of the outage taking place.

Operational Forums are seen as very helpful and customers are making effective use of these. Customers advised that there was evidence of good practice already being shared on Operational Fora with network companies attending each other's events.

The findings of this document align with customer feedback received. It is considered good practice for network companies to provide:

- Advanced notice of outages with updates, as appropriate when for example there are material changes in relevant outage details;
- A final update should be given in advance of the outage taking place;
- Fora at which connected customers are able to discuss operational issues.

On a general point, customers advised that network companies should also provide alternative means of communicating notices of planned outages, including text messaging.

7.2 Reporting of Actual Events

Network companies will generally provide customers with a log of network outages which have impacted upon their connections. Some network companies will in addition provide information specifically to ANM customers to enable them to better understand their post connection curtailment history. There are three general approaches to this:

Information Provided on Self-Serve basis

UKPN have implemented a web based portal where connected flexible connection customers can obtain operational information related to their connection.

Information Provided on Request

WPD and SPEN provide information, which will include the date of any curtailment event(s), their duration, and some high-level background explaining the cause of the curtailment incident(s).

Pros	Cons
Event based approach (date of curtailment, cause, etc.) provides customers with opportunity to plan for similar events going forward.	Service largely limited to major customers only
Improved transparency of information of curtailment events	Customer awareness of availability of service

Sufficient level of information with which to discuss any concerns, etc. with the network company	
Information available on request	

Both network companies are also currently developing web-based portals where customers can log in to obtain more detailed information on historical constraints.

Information Provided on an Annual Basis

Under the Curtailment Index approach, ENWL provide all flexible customers (>200kW) with an annual statement of their actual curtailment and a comparison with the agreed cap or threshold.

Pros	Cons
Improved transparency of total annual curtailment	No detail of each curtailment event
Provision of comparison with forecast 'worst case'	Annual statement rather than a service which is made available on request

Consideration of Good Practice

It is considered 'Good Practice' for network companies to provide, a log of outages which have impacted on their established connections. It is recommended that this information be supplemented (for ANM/flexible connections) with further details of curtailment events to better enable customers to understand their actual curtailment and, where possible to do so, make decisions regarding future operations.

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