

# Open Networks Project

## Product 3: Principles to Review Legacy Flexible Connections (ANM) contracts

Review of existing legacy Flexible Connection (ANM) Contracts, and stakeholder feedback and recommendations.

## DOCUMENT CONTROL

### Authorities

Version	Issue Date	Authorisation	Comments
0.1	19/03/2021	WS1A Product 3	Initial draft
0.2	12/05/2021	WS1A Product 3	Finalised report

**TABLE OF CONTENTS**

**Contents**

1. Forward.....5

2. Introduction ..... 5

2.1 Background to Open Networks Project ..... 5

2.2 Background to WS1A Flexible Connection (ANM) Products ..... 5

2.3 Background and Purpose of this Document ..... 6

**2.3.1 Flexible Connection (ANM) Product 3 Deliverables..... 6**

3 . Scope and Approach .....7

3.1 Review of Contracts ..... 7

4 . Main Findings .....7

4.1 Degree of standardisation across the various Flexible Connection (ANM) contracts? .. 8

4.2 When are sites curtailed and under what conditions? ..... 8

4.3 How has curtailment been implemented within each DNO organisation? ..... 9

4. 4 What technical or commercial requirements are there for Flexible Connections (ANM)? ..... 9

4.5 What Information is Provided to Customer – specific to the Flexible Connection (ANM) Contract? ..... 10

4.6 Can Customers with Flexible Connection (ANM) Contracts move to a standard Connection?..... 11

5. Stakeholder Feedback .....11

5.1 Feedback from the Flexible Connection (ANM) Focus Group Workshop ..... 11

6. Conclusion and Next Steps .....12

6.1 Next Steps: Opportunities to explore with ENA Open Networks Project and DNOs.... 12

Appendix A – Contract Samples ..... 14

**Appendix 1a: Example of the Two-stage connection offer from SPEN.....14**

**Appendix 1b: Example list of factors that can influence curtailment, provided by WPD..... 14**

**Appendix 1c: Curtailment instruction example ..... 14**

**Appendix 1d: Example of the Constraint information provided in a connection agreement, UKPN contract ..... 15**

**Appendix 1e: Example of the Actual and Forecast Curtailment information, provided by ENWL 17**

**Appendix 1f: Example of the technical requirements for customers participating in an ANM scheme, provided by UPKN.....18**

## 1. Forward

The ENA Open Networks Project is laying the foundations of the smart grid in the UK and is helping to inform similar developments in Ireland. It is a key initiative to deliver Government policy set out in the Ofgem and BEIS Smart Systems and Flexibility Plan, the Government's Industrial Strategy and the Clean Growth Plan, working in collaboration with Ofgem, BEIS, 10 of UK and Ireland's electricity network operators, and other key stakeholders.

Networks have a key role to play in helping facilitate the emerging flexibility market that will be a fundamental element of a successful smart grid. In addition to procuring ancillary services for network-related issues to mitigate the need for reinforcement they must ensure that non-network-related services, traded on a peer-to-peer basis, can flourish and contribute to the increasingly dynamic nature of a future energy system.

## 2. Introduction

### 2.1 Background to Open Networks Project

In December 2016, Energy Networks Association (ENA) members gave their commitment to the Open Networks Project (ONP), a major collaboration that will transform the way that both local Distribution Networks and national Transmission Networks will operate and work for customers.

Launched in January 2017, ENA's ONP has started to lay the foundations of a smart energy grid in the UK.

The Open Networks Project has introduced real momentum into the development work required to enable the UK's energy networks to:

- Facilitate our customers' transition to a low carbon future, including the electrification of heat and transport.
- Address the challenges rising from the continued uptake of local generation.
- Evolve to be market enablers for a whole range of new smart energy technologies.
- Reduce costs to customers by contracting for flexibility services alongside investment in traditional and innovative network solutions.
- Play a key role in delivering overall lowest energy system costs for customers.

### 2.2 Background to WS1A Flexible Connection (ANM) Products

The objective of Open Networks project Workstream 1A (Flexibility Services) in 2021 is to continue to define and develop transparency and standardised approaches across DNOs in their procurement of flexibility services, as well as delivering consistency with the ESO. It will continue to design changes to enable and encourage new markets and platforms for flexibility (e.g. peer-to-peer trading).

WS1A Product 3 is one of three products within Workstream 1A that is looking to address industry concerns on Flexible Connections facilitated by Active Network Management (ANM) and their interaction with Flexibility Services.

The interaction between Flexible Connection (ANM) and Flexibility Services was identified in 2020 as a key priority and this was confirmed in discussions with BEIS and Ofgem, and by stakeholders in the Advisory Group, bilateral engagements and their responses to the Flexibility consultation. As a result of this feedback, three products were identified within WS1A which seek to address key areas of concern for stakeholders as shown in Table 1 WS1A Flexible Connection (ANM) Products

This document is focused on **Product 3 Principles to Review legacy Flexible Connection (ANM) Contracts** although there are material overlaps across the three products.

WS1A Product	Description
3	Principles to review legacy Flexible Connection (ANM) Contracts
8	Apportioning Curtailment Risk
9	Curtailment Information

Table 1 WS1A Flexible Connection (ANM) Products

## 2.3 Background and Purpose of this Document

Stakeholder feedback on the use of Flexible Connections (enabled with ANM technology) has highlighted concerns that these connections are having an adverse impact on the growth of flexibility services and markets. Throughout this report Flexible Connections (enabled with ANM technology) are referred to as Flexible Connections (ANM).

Flexible Connection (ANM) contracts (and degree of curtailment risk) is often fixed at the point of connection. However, the value users place on network access can vary over time. As the DNO network evolves, and constraints change, the curtailment requirements and windows, determined at connection, may also need revisions. Currently, stakeholders perceive there is no formal process for reviewing or exiting legacy contracts that may have been in place for several years.

This report has been prepared as part of activity to deliver a set of principles for the review of existing Flexible Connection (ANM) contracts. It combines the deliverables for Ref A and B Product Elements as shown in Table 2. It captures the current status of existing Flexible Connection (ANM) contracts and identifies the key similarities and differences between each DNO.

The report has been enhanced by feedback from the Flexible Connection (ANM) Focus Group workshop held in April 2021. Additional customer feedback is essential to fully understand the customer issues with the current Flexible Connection (ANM) contracts and determine improvements and priorities.

This report, and follow on deliverables within this Product as outlined in Table 2, also aims to improve the Flexible Connection (ANM) asset owners' knowledge of ANM technology and its wider use, curtailment restrictions, and other options available, including Flexible Connection (ANM) contract exit options.

### 2.3.1 Flexible Connection (ANM) Product 3 Deliverables

The deliverables of WS1A Product 3 in 2021 are shown in Table 2:

Ref	Product Element	Activities	Deliverable	Timeline
A	Understand the content and range of curtailment information and approaches in legacy contracts	Review sample contracts from all DNOs to assess current approaches to the provision of curtailment information. Identify best practice and the definition of "legacy" in this context.	Interim report on the findings of the review of existing FC(ANM) contracts	Mar 21

<b>B</b>	Engage stakeholders to understand better their information needs in a review of curtailment requirements	Workshop with stakeholders  Capture feedback and recommendations	Final report building on Ref A and incorporating stakeholder feedback.	May 21
<b>C</b>	Develop a set of principles for carrying out reviews of curtailment requirements in legacy contracts; including the approach to identifying and offering improved curtailment choices where it is possible.	<ul style="list-style-type: none"> <li>• Develop a simple users' guide for Flexible Connections (ANM) Curtailment (link to WS5)</li> <li>• Review approaches to identifying and offering improved curtailment options and managing expectations where improvements are not identified.</li> <li>• Develop a set of principles for reviews of FC(ANM) existing contracts and where appropriate their application as best practice in future FC(ANM) contracts.</li> </ul>	<ul style="list-style-type: none"> <li>• Curtailment Guidance</li> <li>• Consultation on Principles for Reviewing Existing FC(ANM) Contract</li> <li>• Publish principles for existing FC(ANM) contracts and where appropriate their application as best practice in future FC(ANM) contracts.</li> </ul>	Oct 21
<b>D</b>	Agree with Ofgem the approach to cost recovery resulting from the provision of improved curtailment options	Some alternative / improved curtailment options may result in additional costs for the DNO outside of the current price control.		Dec 21

Table 2 WS1A P3 Deliverables

## 3 . Scope and Approach

### 3.1 Review of Contracts

The WS1A P3 working group reviewed and compared the various connection contracts for Flexible Connections (ANM) already in operation across the DNO networks. It was noted that **ENWL** does not currently operate any ANM schemes but do offer connections with curtailment clauses and these were deemed to be broadly equivalent and included in the study.

Northern Ireland Electricity Networks (NIEN) does not currently issue Flexible Connections/ANM connection offers for the distribution network. There is no concept of “firmness” in relation to the distribution system in Northern Ireland (NI) and connections are currently designed under Normal System Operation (NSO) only. This is stated in the connection offer and in the connection agreement of all generator connections.

The main points considered during the review and findings can be found in section 4

## 4 . Main Findings

The review of Flexible Connection (ANM) Contract main findings included the following:

#### 4.1 Degree of standardisation across the various Flexible Connection (ANM) contracts?

The review found that Flexible Connection (ANM) contracts tend to be fairly standard across all DNOs.

- ▶ **SPEN, UKPN, SSEN, WPD and NPG** use standard connection agreements, with either an appendix that provides specific details of the ANM scheme or alternatively relevant text from the standard connection agreement is removed/added where appropriate.
- ▶ **ENWL** use the Bespoke Connection Agreement template from DCUSA
- ▶ **NIE** do not currently offer Flexible Connections (ANM), however, this may be a future offering.

##### Other points of note:

- ▶ As part of their ARC project **SPEN** made two-stage connection offers, whereby customers in the first stage of the agreement signed-up for a Flexible Connection (ANM) ahead of Transmission reinforcement work.
- ▶ Stage two of the offer provided an option to move to a standard connection (removing ANM restrictions) once the relevant Transmission reinforcement works were completed. (**Appendix 1a**)
- ▶ Customers have welcomed this solution.

#### 4.2 When are sites curtailed and under what conditions?

The circumstances for curtailment are generally the same across all DNOs, with curtailment occurring when there is a breach of network limits (power flows, voltage levels, or export capacity). **Appendix 1b** outlines some of the key factors that can impact on the curtailment level experienced by a customer.

- ▶ **SPEN, UKPN, SSEN, WPD and NPG** connection agreements set out how the sites are curtailed incrementally and whether they are curtailed to 0kVA instantaneously or phased (**Appendix 1c**).
- ▶ Whilst **UKPN** has a similar set of terms, some **UKPN** customers may have a pre-agreed 'Planned Interruptible Capacity' that they are able to use at times of constraint.
- ▶ In addition to n-1 ANM connections, **WPD** also offer system normal ANM connections but these will still be pre-curtailed for next credible outages.
- ▶ **ENWL** connection agreements are based on the available export at the point of connection. Their contracts stipulate that generation can only operate in parallel with the Company's system when the system is operating normally, i.e. no faults or planned outages. **ENWL** currently offers 'system normal' flexible connections, meaning whenever the system is running abnormally, the generation will be curtailed to 0kVA, similar to conventional load management schemes.
- ▶ **NIE** do not currently offer Flexible Connections (ANM), however, this may be a future offering.

##### Other points of note:

- ▶ **UKPN** state that if they curtail the Customer for any other reasons than those identified in the contract, then **UKPN** are liable to pay DGNU Payment (Distributed Generation Network Unavailability Payment) to the customer.
- ▶ **UKPN, SPEN, WPD and NPG** customers are generally provided with information on the specific network constraint that they are impacted by: the 'Location of Constraint', 'Substation or Circuit

Reference', 'Description of Constraint', and in instances where LIFO is operated, the 'LIFO position' for each individual constraint. WPD also provides last few years outage history of the local network. **Appendix 1d** provides an extract from **UKPN** contract highlighting how this information is presented.

- ▶ **UKPN and NPG** also has a few customers that have both a Flexible Connections and a Standard Connection for the same site. This can occur when a customer with a Standard Connection wants to add more capacity and the only means of facilitating this is with an ANM scheme. The additional capacity will have a Flexible Connection agreement whilst the original capacity remains on a standard agreement.

#### 4.3 How has curtailment been implemented within each DNO organisation?

- ▶ **SPEN, UKPN, SSEN, WPD and NPG** operate ANM technology in certain constrained areas of their network. ANM curtails generation in an effective and incremental manner. These four DNOs operate ANM schemes using a LIFO stack, where the last site to contract in a constraint location is the first site to be curtailed. There is no limit to the level of curtailment a site can experience (provided that the reasons for the curtailment are those outlined in their agreement). Some legacy flexible connections in **UKPN** operate on a pro-rata principle of access, whereby all customers are curtailed based on their proportional contribution to the constraint.
- ▶ **WPD** and **UKPN** provide a curtailment report with the connection offer letter which will give the customer an idea of expected percentage of curtailment of their particular generation technology for a 12 month period.
- ▶ **ENWL** commit to using reasonable endeavours to request that generation be run down in a controlled manner, but reserve the right, depending upon system conditions at the time, to undertake the constraint of the generation without notice. Connection/disconnection can occur via the circuit breaker, if required. This is the same for the other DNOs in areas where they have Flexible Connections, but do not have ANM installed in the area.
- ▶ Once the fault of planned outage is over **ENWL** will close the nominated circuit breaker and after 20 seconds the customer can restart their generation. **WPD** operates similarly and offers a set point at which the customer can re-energise. **SSEN** gives customers three [30 secs] attempts to reconnect but will then trip the asset if problems continue.
- ▶ **ENWL** have specific curtailment caps for each voltage level. If the limits are breached, they will 'seek to intervene' by looking into the events that caused the curtailment cap to be breached, and if necessary, consider need for reinforcement. **ENWL** do not operate a LIFO stack, instead curtailment is based on the actual curtailment value, where a customer who is nearing their curtailment cap would move towards the bottom of the list to be curtailed. (**Appendix 1e**)
- ▶ **NIE** do not currently offer Flexible Connections (ANM), however, this may be a future offering.

#### 4.4 What technical or commercial requirements are there for Flexible Connections (ANM)?

The DNOs operating ANM schemes have the same type of stipulations listed in their contracts (a comprehensive list can be found in **Appendix 1f**):

- ▶ The customers must have the relevant Control Equipment installed and connected to the DNO Control Equipment.

- ▶ The DNO has the right to de-energise or reduce export if the Customer has failed to comply with any of the ANM instructions.
- ▶ The DNOs are responsible for maintaining and updating the LIFO register for each constrained location, ensuring that all new applicable customers have the necessary ANM equipment installed and are added to the LIFO register.
- ▶ Customers are required to tell their DNO if the generation technology changes by submitting an Application for a Modification. For instance, if a solar Flexible Connection (ANM) customer adds a storage asset to the site then this would change its generation profile / timing of its electricity production and could adversely impact customers further down the LIFO queue.
- ▶ **NIE** do not currently offer Flexible Connections (ANM), however, this may be a future offering.

Other points of note:

- ▶ **ENWL** provide customers with an updated curtailment forecast annually. It also informs the customer of their curtailment levels experienced in the previous year. The forecast curtailment references a curtailment cap – if the expected forecast rate is greater than this cap then **ENWL** will review to identify the root cause and consider whether reinforcement is now necessary. **ENWL** offer customers a 6 year rolling curtailment average cap.

#### 4.5 What Information is Provided to Customer – specific to the Flexible Connection (ANM) Contract?

Please note that WS1A P9 is undergoing a full review of curtailment information provision.

- ▶ **SPEN, UKPN, ENWL and WPD** carry out in-house network modelling and provide the Flexible Connection (ANM) customers with Curtailment Assessments that set out estimates of curtailment risks. Because of the complexity and external sensitivities associated with these Curtailment Assessments the DNOs do not offer any guarantee of accuracy.
- ▶ **NPG** do the same as above but use an ANM service provider to carry out the modelling and Curtailment Assessment. This assessment is issued at the time of the connection offer. Its cost is included in the Connection Offer Expenses.
- ▶ **SSEN** are moving from curtailment data only provision to curtailment assessments and this will bring it in line with all the other DNOs. However, the Flexible Connection (ANM) customer will be charged for the curtailment assessment. Customers will have choices; they can opt to receive just the raw data (as currently) and complete the analysis themselves (or via a third party such as SGS) or request an assessment (for a fee) or both. **SSEN's** provision of Curtailment Assessments is expected to go live from April 2021. Despite this being a paid service, for the reasons set out above, there will be no accuracy guarantee provided. It's also not clear what assurance a 3rd party provider of curtailments analysis provides.
- ▶ DNOs provide updates to their networks, including reinforcements, via their websites to help developers determine where best to connect etc. Existing Flexible Connection (ANM) customers could (in theory) use this to determine whether there is an opportunity to move to a standard connection.
- ▶ **NIE** do not currently offer Flexible Connections (ANM), however, this may be a future offering.

## 4.6 Can Customers with Flexible Connection (ANM) Contracts move to a standard Connection?

Customers can, at any time, request changes to their connection agreement and a formal process already exists. Customers can re-apply for a Firm connection, or they can request changes to the size of their site through the modification request (via G99 Form) process which enables customers to request a review of their current connection, with a view to obtaining a 'Standard' connection. The customer is required to pay the normal modification fee, in line with standard Assessment and Design charges, and in return the DNO provides the current connection options for the site including the revised connection charges for any required reinforcement works to facilitate a 'Standard' connection.

There is no formal planned review of the customers contracts by the DNOs, however, the DNOs will discuss a customer's contract when requested through a modification request (via G99 Form). The DNOs also offer Connection Surgeries and/or stakeholder events where such options can be discussed ahead of a formal request. Customers have opportunities to raise concerns about their contracts at these events or by directly contacting their DNO.

## 5. Stakeholder Feedback

This Product focuses on the extent of standardisation amongst Flexible Connection contracts across DNOs, as well as the main commercial and technical underpinnings of the agreements.

With the addition of feedback from the Flexible Connection (ANM) Focus Group, this report also summarises the key findings to date, and the areas identified for improvement or development. It also highlights best practices that the WS1A P3 Product Team plan to explore further in deliverable Ref C (Table 2).

### 5.1 Feedback from the Flexible Connection (ANM) Focus Group Workshop

- ▶ **TWO-STAGE CONNECTION OFFERS: SPEN and SSEN** have previously made two-stage connection offers, whereby customers in the first stage of the agreement sign-up for Flexible Connection (ANM), and subsequently have the option to remove themselves from the ANM scheme once the relevant transmission/reinforcement works have been completed and move to a Standard Connection (stage two).
- ▶ Stakeholders like this idea as it gives them more certainty over when they can move from a Flexible Connection/ANM scheme.
- ▶ **REINFORCEMENT INFORMATION SHARING:** The Product Team's working assumption has been that sharing information on changes to the network due to reinforcement / technology should be shared publicly and not limited to Flexible Connection (ANM) customers. The latter would be discriminatory and could impact the connections / market processes.
  - Stakeholders agreed with this point of view.
- ▶ **EXITING A FLEXIBLE CONNECTION (ANM) CONTRACT:** Are customers aware that they can request information on or apply for a Firm Connection at any time?
- ▶ There was a mixed response to this question. It is clear that more clarity needs to be provided by DNOs over customer options/processes for moving to a Firm Connection.

- This also highlighted the need for further information on ‘second-comer charges’ whereby a customer may be the beneficiary of another customer paying for network reinforcement costs, however, a second-comer charge may apply.
- ▶ **UNDERSTANDING ANM SCHEMES:** Customers would like clarity over the reasons why an ANM scheme has been installed, and how this may impact their ability to move off of the ANM scheme.
- ▶ Customers see ANM being installed in different areas for different network reasons – they would like clarity over the differences between each scheme, and the potential consequences of being part of one type of ANM scheme versus another.

## 6. Conclusion and Next Steps

The interim report captured the current contractual arrangements for Flexible Connections (enabled with ANM). It covered: the degree of standardisation; provided an overview of curtailment practices; and set out major differences / best practice / learnings from the review. The main headlines included:

- ▶ **Standardisation:** FC(ANM) contracts tend to be fairly standard; most use a standard contract with the details of the ANM scheme included in an appendix or have the same information contained within the connection agreement.
- ▶ **Technical and Commercial arrangements:** at high level, the arrangements / requirements for the Flexible Connections are similar.
- ▶ **Curtailment information:**
  - Curtailment information provided to the customers at connection tend to vary significantly by DNO (due to modelling and charging differences) although the core principles are the same.
  - Ongoing curtailment information / annual reviews also vary by DNO.
- ▶ **Customer FC(ANM) Contract Exit:** options exist currently via the modification request (G99 Form) process often supplemented with DNO Surgeries (or equivalent).

These findings were discussed with the Flexible Connection (ANM) Focus Group and, as a result, a number of opportunities were identified for further exploration.

### 6.1 Next Steps: Opportunities to explore with ENA Open Networks Project and DNOs

- ▶ Consider whether the two-stage connection offer from **SPEN** and **SSEN** could be a solution for time limiting Flexible Connection (ANM) options.
- ▶ Consider whether DNOs should signpost better the option to request a modification to their connection agreement more proactively. Areas to cover include:
  - Impact on DNO Customer Connection Teams and managing any associated growth in workload.
  - The use of Connection Surgeries / 1-2-1s, ahead of a modification request (via G99 Form), as more efficient means of assessing whether a revised Connection Agreement is likely to provide any material changes for the customer.

- ▶ On a case by case basis, **UKPN** can offer customers a pre-agreed ‘Planned Interruptible Capacity’ that they are still able to use at times of constraint; in many cases this can be the entire connection capacity. Consider whether this should be a feature offered by all DNOs in their Flexible Connections (ANM) contracts.
- ▶ The WS1A Product 9 (Curtailment Information) questionnaire highlights that customers want consistency generally and more granular curtailment information with their Flexible Connection (ANM) Contracts.
  - Given how similar the existing Flexible Connection (ANM) contracts are currently the Product Team should consider the benefits of a common Flexible Connection (ANM) agreement (similar to the P4 (Common Contract) activity).
  - Product 9 (Curtailment Information) Team should explore the feasibility of a common means of modelling / forecasting / presenting curtailment risk for use in all Flexible Connection (ANM) Contracts.
  - Consider whether DNOs should offer an (additional) service where a far more granular view of curtailment risk with additional sensitivities etc. is provided with the Flexible Connection (ANM) contract. Consider whether this is a paid service targeted at those benefitting from the additional modelling and analysis. This will also require a decision on what is included in the standard curtailment assessment versus a more in-depth chargeable assessment.
  - Some Flexible Connection (ANM) customers have suggested the DNO curtailment forecasts are too conservative requiring them to carry out their own assessments. WS1A Product 8 (Apportionment of Curtailment Risk) will review the conservatism applied to curtailment assessments and risks as part of its activity.
  - If customer own curtailment assessments are widespread, consider whether third party routes offer useful alternatives to the DNO curtailment assessment. (E.g. Third parties offer alternatives to the ESO’s Triad / BSUoS Forecasts). DNOs would publish the raw data and third parties carryout the assessments. SSEN has provided this service how feasible would this be for other DNOs?
- ▶ ENWL review their customer curtailments and curtailment caps annually. They provide customers with details of their curtailment levels experienced in the previous year. They also provide a curtailment forecast, based on the average forecast curtailment over a 6-year period. If the curtailment cap is breached and reinforcement is required, then the reinforcement will be funded under General Reinforcement. Is this something customers value and should considered by other DNOs?

## Appendix A – Contract Samples

### Appendix 1a: Example of the Two-stage connection offer from SPEN

#### CONNECTION OFFER IN RESPECT OF THE AGREEMENT TO CONNECT GENERIC GENERATOR PLANT (THE “DEVELOPMENT”) TO THE SP DISTRIBUTION PLC DISTRIBUTION SYSTEM

This connection offer is provided to you in response to your request to be connected in advance of the Stage 2 NGET Transmission Works via an ANM Scheme.

SP Distribution reserves the right to modify the provisions of the Agreement to take account of any works, costs or restrictions imposed upon it by NGET.

#### NGET Offer Summary

The NGET Offer provides for the connection of Generic Generation Customer Ltd which includes the associated wider works necessary to facilitate the connection, subject to the derogation from the National Electricity Transmission Systems (NETS) SQSS being granted.

Stage 1 Registered Capacity	Estimated Completion Date
[X] MW (Active Network Management Basis)	.../.../...

Stage 2 Registered Capacity	NGET Completion Date
[X] MW (Firm Basis)	.../.../...

### Appendix 1b: Example list of factors that can influence curtailment, provided by WPD

Curtailment of the network will occur at a varying level based on a real-time assessment on the Distribution System. The level of curtailment will depend on a number of factors, including (but not limited to) those listed below and may increase or decrease over time:

- (i) changes in operational running of the Distribution System;
- (ii) changes in the level of demand;
- (iii) increases in the number of connecting small scale embedded generation;
- (iv) reinforcement of the Distribution System triggered by demand;
- (v) reinforcement of the Distribution System triggered by conventional generation connections;
- (vi) any Active Network Management system or associated communications systems outage;
- (vii) any reduction in the normal ability of the Distribution System to absorb generation export and/or supply load.
- (viii) Technology of the connection and its standard profile.
- (ix) In some ANM enabled distribution network, transmission constraints at GSP level also play an important part (TANM).

### Appendix 1c: Curtailment instruction example

**3. MAXIMUM CAPACITY AND DEFINED INTERRUPTIBILITY**

- 3.1 In addition to the Company's rights of Curtailment under the Terms and Conditions, and notwithstanding clause 12 of the National Terms of Connection, the Company shall be entitled (at no cost to the Company) to instruct the Curtailment of the flow of electricity through the Connection Point in accordance with Clause 3.2 in the event that:
  - 3.1.1 the Protected Import Capacity is less than the Maximum Import Capacity; and/or
  - 3.1.2 the Protected Export Capacity is less than the Maximum Export Capacity.
- 3.2 Subject to Paragraph 3 of Schedule 2, the Company shall be entitled to issue an Instruction to:
  - 3.2.1 specify a level of import capacity expressed in kVA ("Adjusted Import Capacity") which may be less but not greater than the Maximum Import Capacity provided that the Adjusted Import Capacity shall not be less than the level of the Protected Import Capacity unless all or part of the Protected Import Capacity is offered as voluntarily interruptible through an Ancillary Capacity Services Agreement; and
  - 3.2.2 specify a level of export capacity expressed in kVA ("Adjusted Export Capacity") which may be less but not greater than the Maximum Export Capacity provided that the Adjusted Export Capacity shall not be less than the level of the Protected Export Capacity unless all or part of the Protected Export Capacity is offered as voluntarily interruptible through an Ancillary Capacity Services Agreement.
- 3.3 Upon receipt from the Company of an Instruction in accordance with Clause 3.2 above and for so long as this Instruction remains in force, the Customer shall not whether by act or omission:
  - 3.3.1 cause or permit the flow of electricity from the Company's Distribution System to the Customer's Installation to exceed the Adjusted Import Capacity; or
  - 3.3.2 cause or permit the flow of electricity from the Customer's Installation to the Company's Distribution System to exceed the Adjusted Export Capacity.
- 3.4 If the Customer fails to comply with Clause 3.3 above, the Company shall be entitled to De-energise the Connection Points or isolate the Customer's Installation as is appropriate.

**Appendix 1d: Example of the Constraint information provided in a connection agreement, UKPN contract**

Constrained Location Reference	Grid Reference or General Location of	Substation or Circuit references	Description of Constraint
--------------------------------	---------------------------------------	----------------------------------	---------------------------

**P3 Principles to Review Legacy Flexible Connections (ANM) contracts**  
 Review of Existing ANM Contracts, Stakeholder Feedback and Recommendation  
 May 2021

	Constraint		
[HERE]	[HERE]	[HERE]	[HERE]

**Appendix 1e: Example of the Actual and Forecast Curtailment information, provided by ENWL**



**Electricity North West Limited**  
Borron Street, Portwood  
Stockport,  
Cheshire East  
SK1 2JD

Email: flexible.contracts@enwl.co.uk  
Web: www.enwl.co.uk  
Direct line: 08433 114 24651

(NAME)  
Address  
Address  
Address  
Address  
Address

Date

Dear Sirs,

**ANNUAL CURTAILMENT UPDATE**

Please find below information relating to the curtailment aspect of your **HV/EHV** connection contract. This information provides an update of your actual curtailment over the last 12 months, and your average position within the 6 year duration:



Actual Curtailment		
	Last 12 Months	6 Year Average*
%	3.0%	1.09% (6 yr average)
Days	11.4 days	24 days (6 yr cumulative)

\*This average is over the total 6 year period.

The below figures are provided for information only, and show the 6 year average forecasted curtailment for **HV/EHV** customers in your area, and your actual curtailment index as outlined in your contract.

	Forecasted Curtailment	Curtailment Index
%	2.5%	3%
Days	9.2 days per annum	11.4 days per annum

The above figures illustrate that you are within parameters of your curtailment cap; therefore there is no requirement for Electricity North West to intervene at this time. If you require any additional information, please do not hesitate to contact me.

Yours faithfully,

Lois Clark  
DSO Commercial Lead

Electricity North West Limited | Registered in England & Wales No: 2366949 | Registered Office: Borron Street | Portwood | Stockport | Cheshire East | SK1 2JD

## **Appendix 1f: Example of the technical requirements for customers participating in an ANM scheme, provided by UPKN**

- 1 TECHNICAL REQUIREMENTS FOR IMPLEMENTING CURTAILMENT FOR QUALIFYING GENERATION PLANT
  - 1.1 The Customer's Generating Equipment shall be paralleled to the Company's Distribution System.
  - 1.2 Company Control Equipment shall be installed at the Connection Points to:
    - 1.2.1 interface the Customer's Installation and/or equipment therein with the Company's Supervisory Control Alarm and Data Acquisition (SCADA) systems
    - 1.2.2 conduct measurement of current and voltage in real time or accept measurements from the Customer's equipment in agreed signal formats
    - 1.2.3 convey an Instruction in digital format, to the Customer's control equipment to communicate the Adjusted Import Capacity and/or Adjusted Export Capacity that may be utilised. The specification for such Instructions is set out in Part 5 of this Schedule 2.
    - 1.2.4 provide volt free trip contacts, for operation upon failure of curtailment of interruptible import capacity, which shall be connected to the Company's Connection Point isolator or circuit breaker in respect of curtailment of import capacity.
    - 1.2.5 provide volt free trip contacts, for operation upon failure of curtailment of interruptible export capacity, which shall be connected to the Company's Connection Point isolator or circuit breaker or if appropriate to equipment under the control of the Customer that may isolate the Customer's generating equipment.



**Energy Networks Association**

4 More London Riverside  
London SE1 2AU

t. +44 (0)20 7706 5100

w. [energynetworks.org](http://energynetworks.org)

 [@EnergyNetworks](https://twitter.com/EnergyNetworks)

© ENA 2020

Energy Networks Association Limited is a company registered in England & Wales No. 04832301  
Registered office: 4 More London Riverside, London, SE1 2AU

**The voice of the networks**