

FLEXIBILITY PRODUCT SPECIFICATION

Flexibility Services

Document Reference: NIEN-FPS-01

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VERSION CONTROL

Version Number	Document Reference	Description	Date
1.0	NIEN-FPS-01	Public Release Ahead of Procurement	12/02/2021

GLOSSARY

Term	Definition
Flexibility Product	A specific mechanism in which Flexibility is operated to help resolve network congestion
Flexibility Provider	A commercial operator of a Flexible Unit which owns or has rights to operate Flexible Assets
Flexibility Services	Commercial arrangements that help in the running of the network
Flexible Asset	A single standalone Distributed Energy Resource (DER) and/or installation capable of providing Flexible Capacity
Flexible Unit	A unit capable of providing Flexible Capacity which may be an aggregated unit comprising multiple Flexible Assets or a non-aggregated unit comprising a single Flexible Asset

Acronym	Meaning
ENA	Energy Networks Association
FTZ	Flexibility Trial Zones
MRPN	Meter Point Reference Number
MW	Megawatt (1,000,000 Watts of Power)
MWh	Megawatt hour (1,000,000 Watthours of Energy)

1. INTRODUCTION

Northern Ireland Electricity Networks (NIE Networks) is the owner of the electricity transmission and distribution network and operator of the electricity distribution network in Northern Ireland, transporting electricity from the point of generation, including over 1.6 GW of renewable generation, to over 895,000 customers including homes, businesses and farms.

Our role is to maintain and develop the electricity infrastructure across Northern Ireland, connect customers to the network and ensure that our equipment is safe and reliable. As meter operator, we also provide metering data to electricity suppliers and the Single Electricity Market (SEM) operator.

NIE Networks is seeking to procure Flexibility Services, as part of its FLEX innovation project, developing an alternative method to cost-effectively operate and maintain its electricity network, maximising value for money for its customers placing downward pressure on bills. Flexibility Services are provided by any Flexible Asset (customer technology and/or process, sites, facilities and Distributed Energy Resource) that can alter its consumption or generation pattern to support NIE Networks in its role of delivering a safe, secure and efficient distribution system.

NIE Networks is seeking to procure Active Power Flexibility Services from Flexible Assets connected within specific sections of the electricity network, encompassing corresponding geographic areas. These Flexibility Services will either be scheduled for delivery or be available to NIE Networks during pre-agreed Service Windows and will, as necessary, be utilised to manage network conditions (see Figure 1).

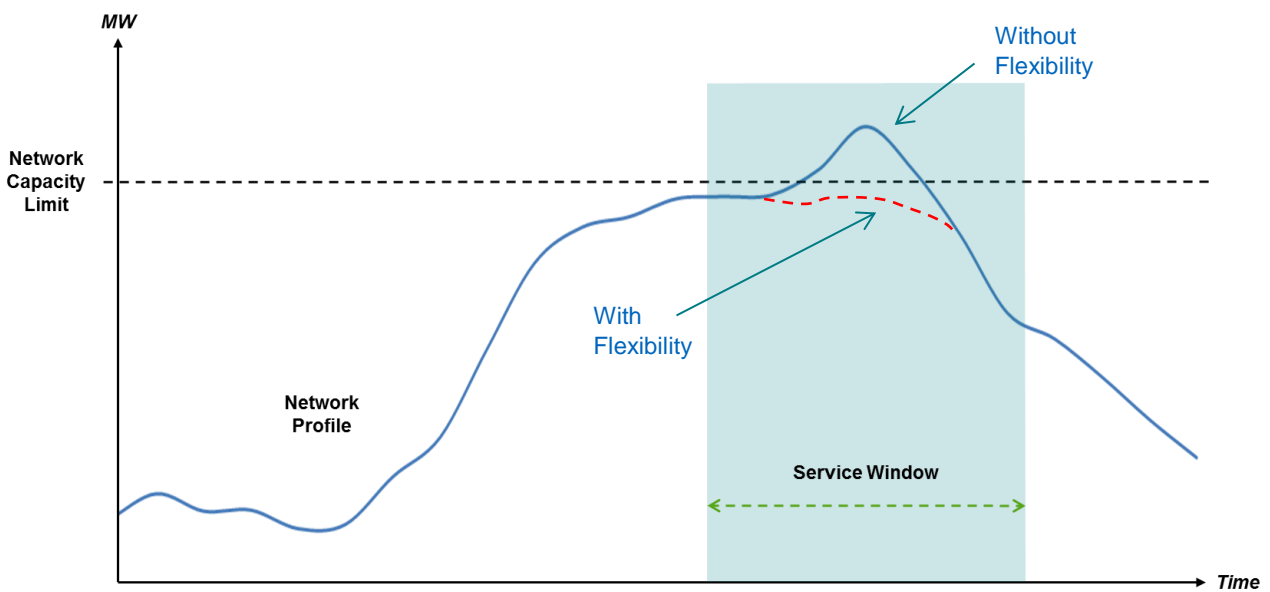


Figure 1 USE OF ACTIVE POWER SERVICES

1.1 Document Purpose

This Flexibility Product Specification document (NIEN-FPS-01) provides the detailed technical specification for the generic Flexibility Products being procured and how they will be operated and settled by NIE Networks. Flexibility Providers should read this document, in conjunction with the Flexibility Competition Requirements document (NIEN-FCR-21), which contains the Flexibility Trial Zone specific requirements e.g. Service Windows, Flexibility volume requirements and Utilisation estimates, in their entirety and satisfy themselves that they fully understand NIE Networks' Flexibility Service requirements.

Table 1 TECHNICAL DOCUMENTS

Document	Document Reference
Flexibility Competition Requirements	NIEN-FCR-21
Flexibility Product Specification (this document)	NIEN-FPS-01

2. FLEXIBILITY PRODUCTS

When considering how best to solve network congestion using Flexibility Services, differing Flexibility Products may be more suitable depending on the specific network scenario. These Flexibility Products can primarily be differentiated by their intended Utilisation condition and notice period. NIE Networks has committed to branding all their current Flexibility Products in alignment with the Energy Networks Association’s (ENA) Open Networks Project¹ definitions for simplicity, standardisation and alignment with Flexibility markets in Great Britain.

High-level description of the Flexibility Products being procured by NIE Networks and their use cases are as follows:

- **Sustain** (scheduled congestion management) – scheduled to regularly support security of supply during system intact conditions. NIE Networks procures, ahead of time, a pre-agreed change in the import or export of a Flexibility Provider over a defined Utilisation period to prevent a breach of network limits.
- **Secure** (pre-fault congestion management) – used to support security of supply if and when a network limit is forecast to be breached. NIE Networks procures, ahead of time, the ability to access a pre-agreed change in a Flexibility Provider’s import or export during pre-defined Service Windows. Utilisation is instructed by NIE Networks, close to real-time, based on loading forecasts or network conditions (e.g. when loading is expected to exceed network limits).
- **Dynamic** (post-fault congestion management) – used to support the network following a system fault to maintain system security. NIE Networks procures, ahead of time, the ability to access a pre-agreed change in a Flexibility Provider’s import or export during pre-defined Service Windows. Utilisation is then instructed by NIE Networks if and when a fault occurs on the network and loading is beyond the rating of the remaining intact network assets.

Figure 2 summarises the high-level characteristics of NIE Networks’ Flexibility Products and correlates these to past and current names of Flexibility Products observed in a UK context.

	Flexibility Products				
Product Name	Sustain		Secure	Dynamic	
Product Type	Scheduled Congestion Management		Pre-Fault	Post-Fault	
When to Act	Pre-Fault		Pre-Fault	Post-Fault	
Trigger	Scheduled		Forecast/ Loading	Network Fault	
Other Names in Marketplace	CMZ Prevent	Continuous	Scheduled Constraint Management	Pre-Fault CMZ	Post-Fault CMZ

Figure 2 CHARACTERISTICS OF NIE NETWORKS’ FLEXIBILITY PRODUCTS

2.1 Flexibility Product Parameters

Flexibility Products can be understood in the context of their technical and commercial parameters. This section of the document will introduce these parameters.

Minimum requirements and guidance for each parameter competition are stipulated in Section 3.

¹ www.energynetworks.org/creating-tomorrows-networks/open-networks

2.1.1 Technical Parameters

Figure 3 provides a general diagrammatic representation of some of the key Flexibility Product technical parameters which are described more fully in Table 2.

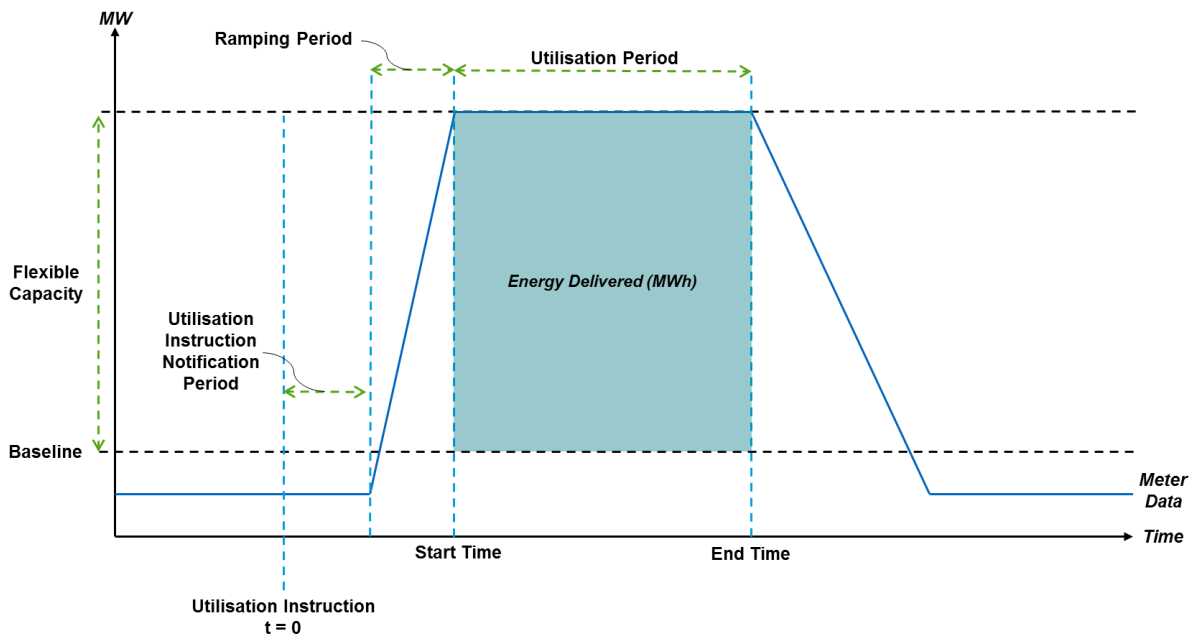


Figure 3 EXAMPLE TECHNICAL PARAMETERS OF FLEXIBILITY PRODUCTS

Table 2 KEY TECHNICAL PARAMETERS AND DEFINITIONS

Term	Definition
Aggregated Flexible Unit Capacity (MW)	The capacity of Flexible Unit a Flexibility Provider makes available from its portfolio of Flexibility Assets in a single competition
Availability	The state of a Flexible Unit being available or not to deliver is contracted Flexibility Services
Baseline Position	The counterfactual consumption and/or generation of a Flexibility Unit against which Flexible Capacity and Energy Delivered is measured.
Metering Resolution (minutes)	The time interval/resolution for the measurement of electrical energy consumed or generated by the Flexibility Unit
Minimum Utilisation Duration Capability (minutes)	[Minimum Run Time] The minimum duration a Flexible Unit must be able to continually hold its contracted Flexible Capacity. (Longer Utilisation Capability is preferable)
Minimum Utilisation Period Duration (minutes)	The minimum duration NIE Networks will issue an Utilisation Instruction for e.g. End Time minus Start Time
Ramping Period (minutes)	The allowed time, following the Utilisation Notification Period for a Flexibility Provider to deliver their instructed Flexible Capacity
Ramping Rate (MW per	The allowed rate of change of import/export, once a Utilisation Instruction has been issued, for a Flexibility Provider to reach their contracted Flexible

minute)	Capacity
Recovery Time (minutes)	The allowed time between the end of one Utilisation event and readiness to respond to another Utilisation Instruction (within a single Service Window)
Service Window(s)	Sustain: The time period during which a Flexible Unit must deliver their contracted Flexible Capacity Secure/Dynamic: The time period during which a Flexibility Provider must be available to deliver their contracted Flexible Capacity, following a Utilisation instruction
Utilisation Duration Capability (minutes)	[Run Time] The duration a Flexibility Provider can continually hold/deliver their contracted Flexible Capacity
Utilisation Instruction Method	The communications method/medium through which a Utilisation instruction is issued by NIE Networks to a Flexibility Provider for the delivery of Flexibility Services
Utilisation Instruction Notification Period	The time period between NIE Networks issuing a Utilisation Instruction and when the Flexible Unit is due to commence the delivery of Flexibility Service

At its discretion, NIE Networks may stipulate requirements for additional technical parameters or requirements within a Flexibility competition. See Flexibility Competition Requirements document (NIEN-FCR-21).

2.1.2 Commercial Parameters

Flexibility Products are further defined through their commercial parameters (i.e. how they are remunerated).

Flexibility Providers are paid a combination of:

- **Availability Fee** – remuneration to Flexibility Providers to be in a state of readiness within Service Windows to deliver Flexibility Services following a Utilisation Instruction from NIE Networks, paid for each MW of Flexibility made available per hour.
- **Utilisation Fee** – remuneration to Flexibility Providers for each MWh of Energy Delivered (Flexibility) following a Utilisation Instruction, from NIE Networks, capped at the level of delivery instructed through the Utilisation Instruction.

Availability Fees are payable for each MW of Flexibility made available per hour during the pre-agreed Service Window paid in £/MW/h. Utilisation Fees are payable for each MWh of Energy Delivered during a Utilisation event and are paid in £/MWh.

Note Availability Fees are for Capacity (MW) while Utilisation Fees are for Energy Delivered (MWh).

Table 3 shows the fee structure for Flexibility Products being procured by NIE Networks.

Table 3 FEE STRUCTURES FOR FLEXIBILITY PRODUCTS

	Sustain	Secure	Dynamic
Description	Scheduled	Pre-Fault	Post-Fault
Availability Fee	N/A	✓	✓
Utilisation Fee	✓	✓	✓

The Sustain product pre-schedules a set Utilisation profile determined at the point of procurement. There is no uncertainty about Utilisation and so Availability Fees are not applicable.

Pre and post-fault Flexibility Products (Secure and Dynamic) do not have certainty of Utilisation and so Availability Fees are made to Flexibility Providers to remain in a state of readiness to respond to a Utilisation Instruction during the Service Window(s).

Proposed Availability and Utilisation Rates are submitted by each Flexibility Provider for each Flexible Unit in a competition and will be accepted or rejected by NIE Networks on a competitive basis. Details of how Availability and Utilisation Fees are calculated based on accepted rates and how performance scalars are applied during settlement are outlined in Section 4.4.

3. FLEXIBILITY REQUIREMENTS

NIE Networks' specific Flexibility Trial Zone requirements such as Service Windows, Flexibility volume requirement and Utilisation estimates are found in the Flexibility Competition Requirements document (NIEN-FCR-21). Flexibility requirements are partitioned, based on network topology and local geography, into discrete Flexibility Trial Zones (FTZs). Within each FTZ, Flexibility requirements may be further portioned into discrete competitions. NIE Networks will consider any Flexibility Provider with a Flexible Unit that can meet the minimum zone requirements and successfully complete a Proving Test prior to the commencement of the first contracted Service Window.

In order to effectively deliver Flexibility, Flexible Assets that a Flexibility Provider wishes to nominate to provide Flexibility must be electrically connected within a FTZ boundary at or below the voltage nominated by NIE Networks. Individual Flexible Assets can be aggregated together into a single Flexible Unit controlled by the Flexibility Provider where all Flexible Assets meet the relevant minimum requirements. Flexible Units must have a single set of technical parameters and a single point of communications/control for NIE Networks. Where multiple competitions are active within a single FTZ and Service Windows overlap, Flexibility Providers are not permitted to submit any given Flexible Asset into more than one competition. This measure avoids double counting Flexible Capacity.

Where the required Service Windows for multiple competitions within a FTZ do not overlap, a Flexibility Provider is free to submit the same Flexible Asset for each competition provided that it could technically deliver the requirements for both competitions.

A Flexible Unit operated by a Flexibility Provider shall be able to or be available to deliver the required Flexibility Product for the duration of the Service Window(s). Where Sustain is procured, a Flexible Unit shall deliver the nominated Flexible Capacity for the duration of the Service Window, and where Secure and Dynamic are procured a Flexible Unit must remain available for the duration of the Service Window. Where a Flexible Unit cannot fulfil this requirement i.e. deliver or be available for the full duration of Service Windows, Flexibility Providers should submit a partial bid during Tender stating the period during which they are available. NIE Networks will consider these partial bids at its sole discretion.

The Flexibility Service requirements for each competition will vary and each Flexibility Provider's submission will be evaluated against the requirements of the specific competition they wish to participate in.

3.1 Basic Criteria

Flexible Assets must meet the following basic criteria:

1. Connection situated within the boundary of the FTZ (confirmed by NIE Networks following MPRN verification at pre-qualification, ahead of Tender)
2. Connection at or below the nominated voltage
3. Able to offer Flexibility in the direction specified

3.2 Connection and Generation Agreements

Flexible Assets must have a valid Connection Agreement or Generator Agreement between NIE Networks and customers in place and in providing Flexibility Services no terms of the relevant Connection Agreement or Generation Agreement shall be breached. This includes demand sites providing an on-site demand reduction which shall remain within their contracted Maximum Import Capacity (MIC) with NIE Networks.

Any generators and storage assets operating in parallel with the Distribution System, greater than 16 Amps per phase shall be compliant with the requirements of EREC G59/1/NI or G99/NI. Generators or storage assets less than or equal to 16 Amps per phase shall be compliant with the requirements of EREC G83 or G98/NI. These requirements are for the protection of the Distribution System and do not constitute a valid Connection Agreement.

At its discretion, NIE Networks shall check for valid Connection Agreements and Generator Agreements. Any costs associated with applications and connections shall be borne in full by the Flexibility Provider or Flexible Asset owner.

3.3 Detailed Technical Requirements

Specific Flexibility requirements will vary between competitions as outlined in the Flexibility Competitions Requirements document (NIEN-FCR-21). The minimum or maximum requirements for the key technical parameters for each Flexibility Product listed in Section 2.1.1 of this document are presented in Table 4.

Flexible Units must comply with the relevant minimum and maximum technical requirements detailed in Table 4. This is subject to the specific technical requirements of each competition as NIE Networks may list additional or more onerous technical requirements at its own discretion.

Unless otherwise stated, technical requirements are assessed against the aggregate capability of the Flexible Unit nominated by a Flexibility Provider and not individual Flexible Assets.

Nominated Flexible Capacities shall persist for the duration of the contract period and cannot be amended through declarations on a normal operational basis.

Table 4 MINIMUM TECHNICAL REQUIREMENTS FOR NIE NETWORKS' FLEXIBILITY PRODUCTS

Parameter	Flexibility Product		
	Sustain	Secure	Dynamic
Description	Scheduled service	Pre-fault service	Post-fault service
Minimum Flexible Unit Capacity	50 kW (Aggregate or single asset)		
Minimum Flexible Asset Capacity	0 kW (There is NO lower limit on the capacity of individual Flexible Assets which may be part of an aggregated Flexible Unit)		
Service Window(s)	Competition specific ² (Agreed at Procurement)	Competition specific ³ (Agreed at Procurement)	
Utilisation Instruction Notice Period	Utilisation schedule agreed at procurement	24 hours	3 minutes ⁴
Utilisation Instruction Method	N/A	Open (See Section 4.2.1)	Open (See Section 4.2.1)
Maximum Utilisation Duration Capability	No limit but capped at Service Window duration for commercial evaluation purposes		
Minimum Utilisation Duration Capability	Service Window duration	30 minutes	
Minimum Utilisation Duration	N/A (Service Window duration)	30 minutes	

² Flexibility Provider must deliver their contracted Flexible Capacity for the entire duration of Service Window for the Sustain Flexibility Product

³ Flexibility Provider contracted Flexible Capacity must be available for the entire duration of Service Window for the Secure and Dynamic Flexibility Products

⁴ Where NIE Networks is unable to fulfil its total requirement, submissions with variations may be considered. Such variations shall be considered and granted solely at the discretion of NIE Networks.

Maximum Ramping Rate	1 MW per minute	5 MW per minute
Maximum Ramping Period	N/A (Ramping Period integrated within Utilisation Instruction Notice Period)	1 minute per MW
Minimum Flexible Unit Metering	30 minutes (half-hourly metering) (1 minute resolution preferred)	
Minimum Flexible Asset Metering	30 minutes (half-hourly metering) (1 minute resolution preferred)	
Maximum Recovery Time	See Footnote ⁵	

Following delivery of Flexibility Services and for the remainder of that Service Window, a Flexible Unit must not exceed its Baseline Position consumption or generation value (Baseline Position is discussed in Section 4.3) by more than 15% i.e. 115% of their calculated Baseline Position. This requirement is necessary to avoid a Flexible Unit exacerbating network congestion as part of any recovery process following delivery of Flexibility Services.

Service meters shall be located at the junction between the customer facility containing Flexible Assets and the electricity distribution network. Service meters may be located within customer facilities, at the terminals of the Flexible Assets where permission is given by NIE Networks.

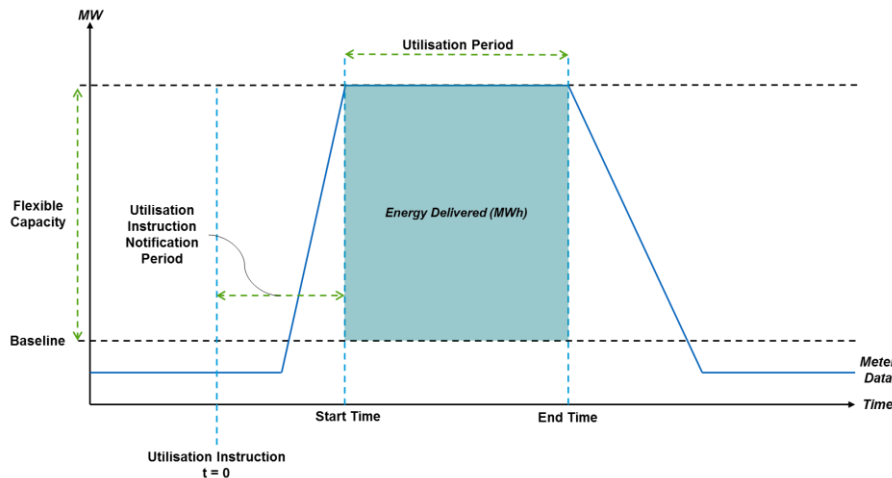


Figure 4 SUSTAIN AND SECURE PARAMETERS

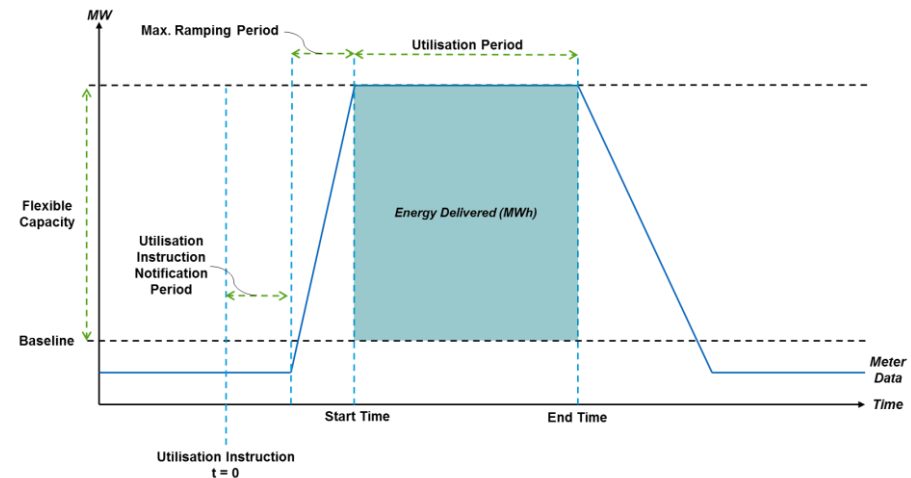


Figure 5 DYNAMIC PARAMETERS

⁵ Flexible Units are obligated to have a Recovery Time less than or equal to the period between one Service Window ending and the next Service Window commencing. Flexibility Providers can choose whether or not to nominate a Recovery Time that would enable NIE Networks to utilise that Flexible Unit more than once during a given Service Window.

4. DEPLOYMENT

Once Flexibility has been procured and contract(s) awarded, NIE Networks will coordinate with Flexibility Providers to operate their Flexible Units.

4.1 Proving Test

In agreement with NIE Networks, and no less than thirty (30) days before contract commencement, Flexible Units will complete Proving Tests. The Proving Test will verify a Flexible Unit's capability to:

- Receive and respond to NIE Networks' Utilisation Instructions
- Deliver instructed Flexible Capacity between the instructed Start Time and if applicable instructed End Time
- Deliver its contracted Flexible Capacity for the instructed duration (up to the nominated Maximum Utilisation Duration Capability)
- Demonstrate delivery through metered data submission

Proving Tests will be carried out under conditions that reflect normal operation for the contracted Flexibility Product e.g. 24 hours notice for Secure. Flexibility Providers will be required to submit meter data for the relevant Proving Test period via the agreed communication mechanism within five (5) Business Days of Proving Test completion. NIE Network reserves the right to request meter data for individual Flexible Assets from Flexibility Providers and to access NIE Networks' customer billing meter data for verification.

Upon receipt of the relevant meter data, the Company has five (5) Business Days to determine if the Flexible Unit has passed or failed the Proving Test and notify the Flexibility Provider accordingly.

As calculated in accordance with the methodology in Section 4.4.2, an Event Performance Factor of 0.8 or greater will constitute satisfactory performance and pass the Proving Test (80% or more of the Energy Instructed is delivered). An Event Performance Factor of less than 0.8 will constitute unsatisfactory performance and fail the Proving Test. Where a Flexibility Provider fails a Proving Test, a repeat Proving Test shall be arranged. Should a Flexibility Provider fail on three (3) occasions, NIE Networks reserves the right to terminate the Flexibility Services Agreement. Any further Proving Tests will be at the discretion of NIE Networks.

Only upon successful completion of the Proving Test can the Flexibility Services be deemed available. No Fees will be due or payable until the Flexible Unit has successfully completed the Proving Test.

Each party shall bear all its own costs in relation to Proving Tests.

During the contract period, where a Flexibility Unit has failed to deliver its Flexible Capacity in accordance with Section 4.4, NIE Networks may request a repeat Proving Test.

4.2 Flexibility Operation

The detailed operation of each Flexible Unit is dependent on the specific Flexibility Product design and competition requirements.

4.2.1 Utilisation Instruction

As detailed in Table 4, Utilisation Instruction Notification Period varies by Flexibility Product. Table 5 summarises the notice given for Utilisation Instructions to Flexibility Providers for each Flexibility Product.

Table 5 UTILISATION NOTICE DETAIL

Flexibility Product	Utilisation Notice	Further Detail
Sustain	N/A	Delivery schedule is agreed at procurement and is as per NIEN-FCR-21. Utilisation is for the full duration of all Service Windows. NIE Networks will not issue any Utilisation Instructions.
Secure	24 hours	NIE Networks may issue a Utilisation Instruction for any time during a Service Window. NIE Networks will issue Utilisation Instructions at least 24 hours ahead of the Instructed Start Time.
Dynamic	3 minutes*	NIE Networks may issue a Utilisation Instruction for any time during a Service Window. NIE Networks will issue Utilisation Instructions at least 3 minutes ahead of the Instructed Start Time.

*Within the scope of the initial FLEX project trial, variations may be agreed. Such variations shall be considered and granted solely at the discretion of NIE Networks.

Utilisation Instructions are required for the Secure and Dynamic Flexibility Products when it is necessary to signal a Flexibility Provider to deliver their Flexible Capacity.

Utilisation Instructions will be issued in a manner agreed between NIE Networks and the Flexibility Provider through phone calls, automated email or text messages or via an Application Programming Interface (API) in accordance with the format in Table 6.

Where applicable, NIE Networks will require appropriate contact information to issue Utilisation Instructions to Flexibility Providers. For phone call and automated email and text message based communications, NIE Networks will provide and request contact details following contract award.

NIE Networks' API is currently in development. Any development of an API is for the FLEX project trial alone and Flexibility Provider integration or system development own cost and risk. NIE Networks does not commit to continue using this API for any future Flexibility Services. On this basis, Flexibility Providers may wish to nominate an alternative communications method.

Following contract award, and where it has been agreed that Flexibility Providers will use NIE Networks' API, more information will be provided. Where necessary, NIE Networks will agree variations to Flexibility Service Agreements, deemed necessary due to the state of readiness of NIE Networks' API. Where this occurs, one of the alternative communications methods will be agreed and adopted.

Indicative communications formats have been provided and NIE Networks will agree final arrangements and formats with successful Tenderers.

Table 6 INDICATIVE UTILISATION INSTRUCTION FORMAT

Element	Format / Example
Unique Instruction ID	Alpha-numeric string
Instruction Sent Time	hh:mm:ss dd/mm/yyyy
Zone ID	TBC (alpha-numeric string)

Flexible Unit ID	TBC (alpha-numeric string)
Discretionary Service ⁶	(+1 (Yes)
	0 (No)
Start Time	hh:mm:ss dd/mm/yyyy
Flexible Capacity	± 1,000,000 kW
Direction	(+1 (Demand decrease/Generation increase)
	-1 (Demand increase/Generation decrease)
End Time	hh:mm:ss dd/mm/yyyy

Utilisation Instructions will specify the Start Time and optionally the End Time of delivery. If an End time is not specified in the Utilisation Instruction, the End Time shall be the end time of the Service Window.

In the event that the period between the Start Time and End Time is greater than the nominated Maximum Utilisation Duration Capability of a Flexible Unit (as nominated by the Flexibility Provider), the Flexibility Provider shall only be expected to deliver up to its nominated Maximum Utilisation Duration Capability.

During FLEX project trial, NIE Networks will treat a Flexibility Provider's nominated Flexible Capacity as indivisible (or static). As a result, NIE Networks will only issue Utilisation Instructions for a Flexibility Provider's full contracted Flexible Capacity e.g. NIE Networks will not instruct Flexibility Providers to deliver a proportion of a Flexible Unit's contracted Flexible Capacity.

Flexibility Providers must confirm receipt of Utilisation Instructions from NIE Networks immediately after receiving a Utilisation Instruction in the format outlined in Table 7 via the agreed communications method. For unplanned technical reasons, or whether there is an apparent error in Utilisation Instructions or its transmission, Flexible Units may not be able deliver the instructed Flexible Capacity (see Section 4.5 for Unavailability). In this scenario, Flexibility Providers must also immediately respond to the Utilisation Instruction, noting a Receipt Error.

Table 7 INDICATIVE UTILISATION INSTRUCTION RECEIPT CONFIRMATION FORMAT

Element	Format / Example
Unique Instruction ID	Alpha-numeric string
Receipt Confirmation Sent Time	hh:mm:ss dd/mm/yyyy
Zone ID	TBC (alpha-numeric string)
Flexible Unit ID	TBC (alpha-numeric string)
Receipt Confirmation	(+1 Receipt Confirmation
	0 Receipt Error

⁶ See Section 4.7

4.2.2 Meter Data Submission

NIE Networks requires Flexibility Providers to submit aggregate meter data for any Flexible Unit for the purposes of performance assessment and settlement (detailed in Section 4.4). Each meter data sample should include, and be limited to, the information outlined in Table 8 and in the specified format. Meter data submitted by the Flexibility Providers should be the aggregated meter data for all nominated Flexible Assets within the Flexibility Unit although NIE Networks reserves the right to request meter data for individual Flexible Assets.

Table 8 INDICATIVE METER DATA SUBMISSION FORMAT

Element	Format / Example
Sent Time	hh:mm:ss dd/mm/yyyy
Zone ID	TBC (alpha-numeric string)
Flexible Unit ID	TBC (alpha-numeric string)
Consumption Timestamp	hh:mm:ss dd/mm/yyyy
Consumption	± 1,000,000.00 kWh

For meter data submission, import/demand shall be denoted as positive (+ve) and export/generation shall be denoted as negative (-ve). Meter data should be submitted via comma separated value (CSV) file format and sent to an email address nominated by NIE Networks within the timeframe outlined in Section 4.4. Subject to development, meter data may be submitted via the API on a continual basis. Both CSV and API based submissions shall be in the indicative format in Table 8 and finalised following contract award.

4.2.3 Utilisation Optimisation

Where the volume of contracted Flexibility exceeds NIE Networks' needs at any given time within a FTZ, fair and transparent decision-making criteria will be followed to determine the order of Utilisation Instructions to be issued for Flexibility Service delivery. Note, this is not applicable to the Sustain Flexibility Product as no Utilisation Instructions are issued.

NIE Networks has adopted the ENA Open Network Project's guiding principles on Utilisation Instruction decisions, as listed below⁷:

- Network Security – the needs of the network will be met using Flexibility in such a way that security of supply is maintained
- Cost – Flexibility will be operated, without undue discrimination against any Flexibility Provider, to meet network needs at the minimum level of cost
- Operability – NIE Networks will seek to utilise services that offer compatible levels of operability
- Competition – NIE Networks will provide transparency of Utilisation decisions and activities. By sharing this methodology in advance, Flexibility Providers may be able to align their Flexibility offering to best meet requirements
- Fairness – NIE Networks will operate a fair Utilisation instruction methodology and provide equal opportunities to participate

In normal operation situations, Cost will be the primary factor in determining the order for issuing Utilisation Instructions amongst contracted Flexible Units within a given FTZ.

⁷ www.energynetworks.org/electricity/futures/open-networks-project/workstream-products-2020/ws1a-flexibility-services.html

4.3 Baseline Position

In order to accurately assess a Flexibility Unit's Flexible Capacity and performance during Utilisation events, a Baseline Position for the Flexibility Unit and constituent Assets must be calculated. A Baseline Position is the counterfactual consumption and/or generation value against which delivery of Flexibility is measured. Flexible Capacity is the observable change in consumption and/or generation provided by a Flexibility Unit relative to its Baseline Position.

The approach to Baseline Position has the effect of creating an 'inferred set-point' or target consumption/generation value (Baseline Position \pm Flexible Capacity as appropriate) upon which reaching, a Flexibility Unit will be deemed to have successfully achieved its nominated Flexible Capacity.

Baselining Flexible Units will be undertaken using historical meter data for all Flexible Asset(s). NIE Networks' methodology calculates the Baseline Position as the sum of the average consumption and/or generation of individual Flexible Assets based on the most recently available historical half hourly meter data for the required Service Windows from comparable period in a previous year.

Flexibility Providers must submit to NIE Networks the most recent 12 months meter data for each Flexible Asset. Baseline Position calculation takes place during the Tender process and meter data must not contain incomplete entries, or be redacted or edited in any way.

Example: where a Service Window requirement is 1 October 2020 to 31 March 2021, Monday to Friday (excluding Bank Holidays), 16:00 – 20:00, a Flexible Asset's corresponding half hourly meter data from 1 October 2019 to 31 March 2020, Monday to Friday (excluding Bank Holidays), 16:00 – 20:00 from the previous year or as recently as available will be averaged to form a single Baseline Position value for that given Flexible Asset.

A Flexibility Unit's Baseline Position is the sum of each constituent Flexible Assets' Baseline Position and the Flexibility Unit's aggregate Flexible Capacity is nominated against this Baseline Position.

To complete the Baseline worksheet during Tender, the following steps are taken for each competition:

- For each nominated Flexible Asset, Flexibility Providers enter half hourly meter data (subsequent 30 minute total MWh consumption or generation) from the last 12 month period is entered into the designated calculation area and input the start date for the data.
 - Service Windows are specified by times of day, days of week, and weeks or months of year e.g. 1 October to 31 March, Monday to Friday (excluding Bank Holidays), 16:00 to 20:00
 - 12 months worth of meter data must be provided
 - The half hour consumption and/or generation value is for the consumption and/or generation during the subsequent half hour e.g. the value for 08:00 is the total consumption/generation from 08:00 to 08:29
- A single average Baseline Position value (in MW) for each individual Flexible Asset, across the relevant Service Window, is calculated using the data provided. This average consumption (or generation) value is used to calculate the Baseline Position for each individual Flexible Asset.
 - This value will be positive for import (net consumption), or negative for export (net generation)
 - Note, this is a simple MWh to MW conversion (average MWh x 2 = MW for half hour sample period)
- A Flexible Unit's single aggregate Baseline Position is then found by summing the contribution from each Flexible Asset.
- The Flexibility Provider must nominate a single aggregate Flexible Capacity to be provided within the Service Window, against the Flexible Unit's calculated Baseline Position (and may nominate a Flexible Capacity for each Flexible Asset).
 - Nominated Flexible Capacity must be in the direction of need required by the competition (e.g. 'demand turn down/generation turn up' or 'generation turn down/demand turn up')

Baseline Positions will persist for the duration of the contract period, but recalculation may be considered at the request of the Flexibility Provider (e.g. if the Flexibility Provider wishes to change its nominated Flexible Assets its Flexible Unit) subject to approval from NIE Networks.

Upon recalculation, significant changes to a Baseline Position may necessitate a reduction in a Flexibility Unit’s nominated Flexible Capacity. Where this occurs, NIE Networks reserves the right to terminate a Flexibility Service Agreements.

As well as the approach described, NIE Networks may consider alternative Baseline Position calculation methodologies proposed by Flexibility Provider if there is sufficient justification for their use.

4.4 Settlement

This section provides details on Flexible Unit performance assessment, payment mechanics and final calculation of Fees payable for Flexibility Services.

Flexibility Providers are required to submit aggregate meter data for their Flexible Units to NIE Networks for performance assessment within ten (10) Business Days of the end of each calendar month. Submitted meter data must not contain any omissions, or be edited or redacted in any way. NIE Network reserves the right to request meter data for individual Flexible Assets from Flexibility Providers and to access NIE Networks’ customer billing meter data for verification. NIE Networks will use the meter data provided to assess Flexible Unit performance and determine remuneration for Flexibility Services during each Settlement Period within the calendar month period.

Settlement Periods are defined as weeklong periods commencing Sundays at 00:00 and ending Saturdays at 23:59 and are used for the purpose of performance assessment and settlement. Settlement Periods that end within a calendar month are considered for settlement at the end of that month i.e. Settlement Periods B, C, D and E in Figure 6 will be considered at the end of the current calendar month while Settlement Period F will be considered at the end of the next calendar month.

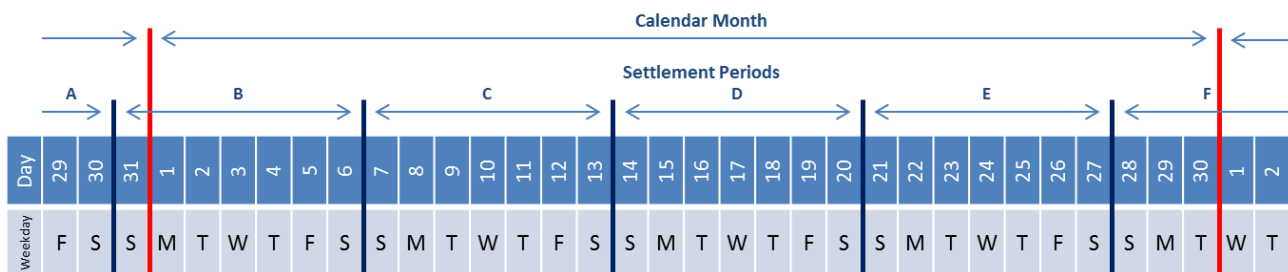


Figure 6 SETTLEMENT TIMELINE

NIE Networks will produce a performance statement within fifteen (15) Business Days of receipt of meter data from Flexibility Providers or the end of a calendar month, whichever is later. The performance statement will detail the total sum payable to a Flexibility Provider for each of its Flexible Units’ performance during each Utilisation event as calculated by NIE Networks, the associated Utilisation and Availability Fees (where applicable), and relevant performance factors.

Flexibility Providers have the right to query the calculations in a performance statement and the associated Fee(s) payable. Where a Flexibility Provider accepts the calculations in a performance statement and the sum payable for Flexibility Services for the calendar month, Flexibility Providers shall submit an invoice to NIE Networks for the Fee(s) payable. NIE Networks will pay the invoice within forty-five (45) days of receipt.

An overview of the Fee calculation process is provided below in Figure 7.

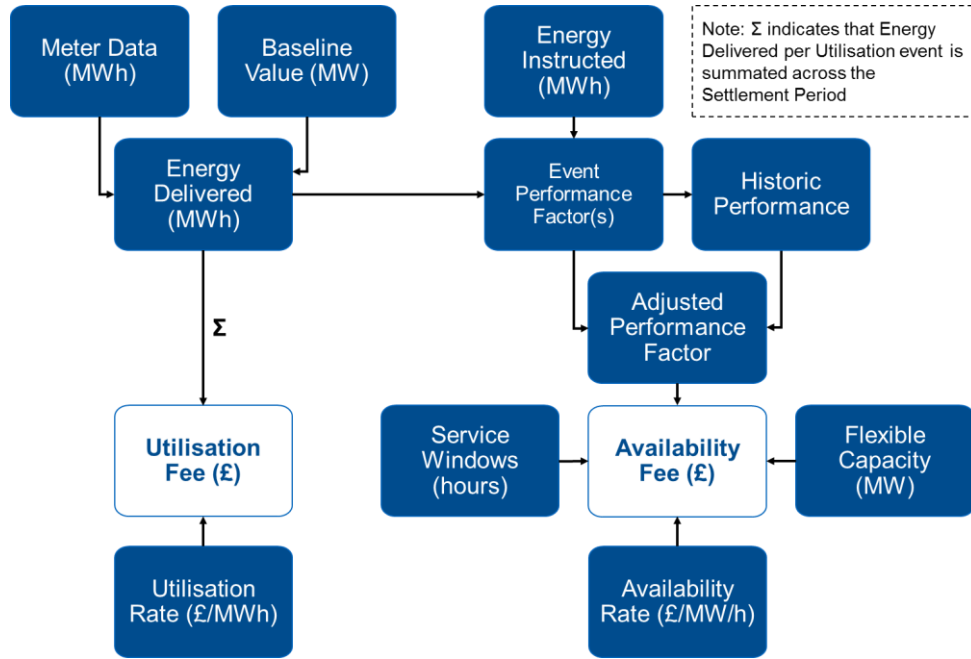


Figure 7 SETTLEMENT PROCESS OVERVIEW

4.4.1 Utilisation

The submitted aggregate meter data is compared to the Flexibility Unit's single aggregate Baseline Position to calculate the Energy Delivered during Utilisation events. The Utilisation fee is then calculated based on the agreed Utilisation Rate (£/MWh) following the Tender exercise, where:

$$Utilisation\ Fee\ (\pounds) = Utilisation\ Rate\ (\pounds/MWh) * Energy\ Delivered\ (MWh)$$

$$Energy\ Delivered = \left(\sum_{Start\ Time}^{End\ Time} Meter\ Data \right) - (Baseline\ Position * Utilisation\ Instruction\ Duration\ (h))$$

$$Utilisation\ Instruction\ Duration = End\ Time - Start\ Time$$

Note, for settlement purposes Energy Delivered (MWh) during any Utilisation Event is capped at Energy Instructed (MWh) and instantaneous Flexibility delivered is capped at nominated Flexible Capacity (MW) such that over-delivery cannot compensate for under-delivery within or between Utilisation events where:

$$Energy\ Instructed\ (MWh) = Flexible\ Capacity\ (MW) * Utilisation\ Instruction\ Duration\ (h)$$

Figure 8 demonstrates examples of under and over-delivery.

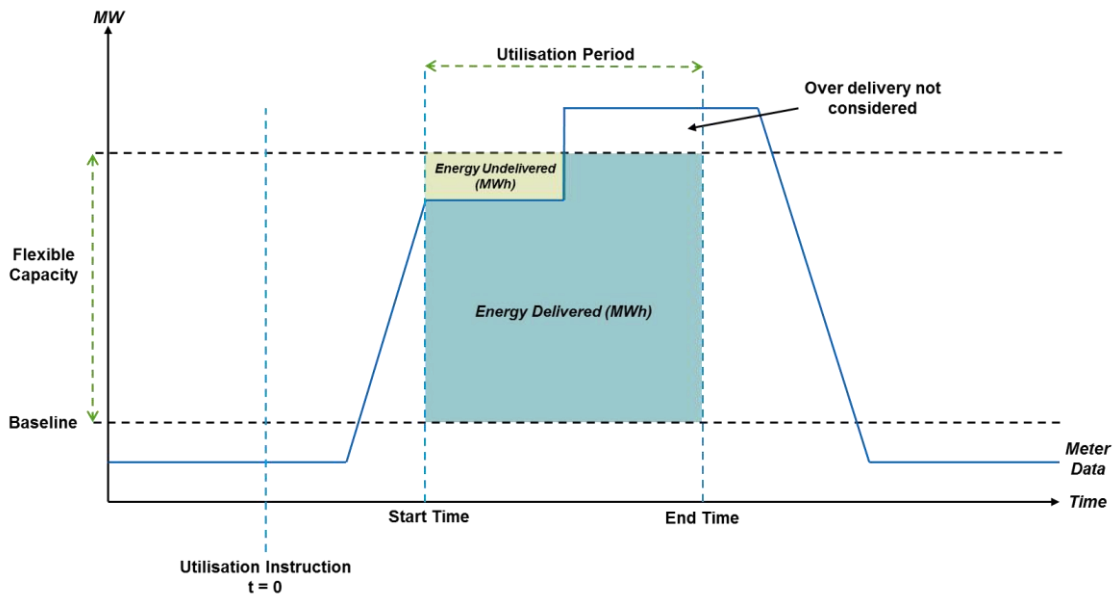


Figure 8 UNDER- AND OVER-DELIVERY EXAMPLE

4.4.2 Availability

For the Secure and Dynamic Flexibility Products where Availability Fees are applicable, the Flexibility Provider shall be paid an Availability Fee for maintaining their Flexible Unit(s) in a state of readiness during Service Windows and available for Utilisation by NIE Networks. The Availability Fee is calculated based on the agreed Availability Rate (£/MW/h) following the Tender exercise.

The true Availability of a Flexible Unit to deliver its Flexible Capacity within the contracted Service Windows can be difficult to empirically judge. Nonetheless, by considering a Flexible Unit's performance during Utilisation events, a performance factor can be calculated to infer a Flexible Unit's actual Availability. Accordingly, an Adjusted Performance Factor (APF) is calculated for each Settlement Period and used to adjust the Availability Fee payable to Flexibility Providers for that Settlement Period where:

$$\begin{aligned} \text{Availability Fee (£)} &= \text{Availability Rate (£/MW/h)} * \text{Flexible Capacity (MW)} * \text{Service Window Duration (h)} \\ &\quad * \text{Adjusted Performance Factor} \end{aligned}$$

The Adjusted Performance Factor (APF) is a scalar value ranging between 1 and 0 and is derived from a function of the Settlement Period Performance Factors (SPPF) for the current and last 4 Settlement Periods.

A Settlement Period Performance Factor (SPPF) is calculated for each Settlement Period representing the average of all Event Performance Factors (EPF) for each Utilisation event during that Settlement Period:

$$SPPF_n = \frac{\sum_{i=1}^x EPF_i}{x}$$

Where:

- SPPF_n is the Settlement Period Performance Factor for Settlement Period n
 - n = 0 for the current Settlement Period
- EPF_i is the Event Performance Factor scalar for Utilisation event i
 - i represents each individual Utilisation event during Settlement Period n
- x represents the total number of Utilisation events during Settlement Period n

The Event Performance Factor (EPF_i) is derived from a function of the Energy Delivered and Energy Instructed and the tiers in Table 9 where:

$$EPF_i \approx \frac{\text{Energy Delivered}_i \text{ (MWh)}}{\text{Energy Instructed}_i \text{ (MWh)}}$$

EPF_i is found using the tiers in Table 9

Table 9 EVENT PERFORMANCE FACTOR TIERS

Ratio of Energy Delivered to Energy Instructed	Event Performance Factor
If ED/EI ≥ 90%	1
If 90% > ED/EI ≥ 80%	0.8
If 80% > ED/EI ≥ 70%	0.7
If 70% > ED/EI ≥ 60%	0.6
If 60% > ED/EI	0

Example: where the Energy Delivered is 86% of Energy Instruction, the Event Performance Factor for that Utilisation event will be 0.8 as per the tiers in Table 9.

Note, an Event Performance Factor of less than 0.6 will be considered failure to deliver contracted Flexibility Services and a repeat Proving Test may be requested.

If there are no Utilisation events within a given Settlement Period then it is not possible to calculate a Settlement Period Performance Factor for that Settlement Period. In such instances, the Settlement Period Performance Factor will be set as:

- The average of the Settlement Period Performance Factors from the two most recent Settlement Periods where there were Utilisation events from the last 6 Settlement Periods; or
- Where this criteria is not met, unity (100%) Settlement Period Performance Factor is assumed for one or both Settlement Period Performance Factors.

To promote consistent compliance across the duration of Flexibility contracts, the Settlement Period Performance Factor for the current Settlement Period will be weighted along with historic Settlement Period Performance Factors and normalised to calculate the final Adjusted Performance Factor.

The Adjusted Performance Factor (APF) is the time weighted average of the current and 4 most recent Settlement Period Performance Factors, where weighting reflects time elapsed and is calculated as follows:

$$APF_n = \frac{[1 * SPPF_n + 0.8 * SPPF_{n-1} + 0.6 * SPPF_{n-2} + 0.4 * SPPF_{n-3} + 0.2 * SPPF_{n-4}]}{3}$$

Where:

- APF_n is the Adjusted Performance Factor for Settlement Period n
 - n = 0 for the current Settlement Period
- SPPF_n is the Settlement Period Performance Factor for Settlement Period n
 - SPPF₀ is the Settlement Period Performance Factor from the current Settlement Period
 - SPPF₋₁ is the Settlement Period Performance Factor from the previous Settlement Period, and so on.
- Settlement Period Performance Factors are weighted such that more recent performance has a larger impact on the final Adjusted Performance Factor value for a given Settlement Period.

- Note that the weighting factors drop off linearly with time and sum to unity as $(1 + 0.8 + 0.6 + 0.4 + 0.2) / 3 = 1$

4.5 Unavailability

The default assumption is that a Flexible Unit is available within contracted Service Windows; therefore Flexibility Providers do not normally need to notify NIE Networks of its Availability.

If a Flexible Unit experiences a reduction in Availability (a reduction in the Flexible Capacity available) or becomes Unavailable, the Flexibility Provider must notify NIE Networks at least 24 hours before the commencement of affected Service Windows, or as soon as possible, and at least within thirty (30) minutes of the reduction in Availability if it relates to a Service Window for which an Instruction has already been issued.

Flexible Units shall only be Unavailable or have reduced Availability due to unplanned technical reasons. For any Service Windows where Availability is reduced, the Flexibility Provider must complete the template Unavailability Notification Form located in Appendix 1 and send it to NIE Networks within one (1) Business Day, providing an explanation for the reduction in Availability and measures to mitigate reoccurrence.

Where an Unavailability Notification Form is submitted inline with the requirements above and an explanation for reduced Availability and mitigation measures against reoccurrence are accepted by NIE Networks, NIE Networks will adjust the Energy Instructed for that Flexible Unit for any Utilisation Events during the period of reduced Availability for the purposes of settlement. In all other circumstances where there is a reduction in Availability and Flexibility Providers have failed to fulfil the above requirements, NIE Networks will treat the Flexible Unit as if it was available and performance will be assessed accordingly.

For all Utilisation events where the Event Performance would be calculated as zero (0) i.e. Energy Delivered is less than 60% of Energy Instructed, the Flexibility Provider must complete an Unavailability Notification Form explaining the circumstances that resulted in this poor performance and measures to mitigate reoccurrence and submit to NIE Networks within one (1) Business Day of the Utilisation event.

For all Utilisation Instructions where the Event Performance Factor is less than 0.6, NIE Networks reserves the right to request a repeat Proving Test. Where there is repeated Unavailability or poor performance, and NIE Networks may terminate Flexibility Service Agreements.

4.6 Flexible Asset Management

Flexible Capacity is the sum of the individual capacities of Flexible Assets within a Flexible Unit. Flexible Assets must be nominated to, approved and have a Baseline Position value calculated by NIE Networks.

Upon request and at its discretion, NIE Networks may accept mid-contract requests from Flexibility Providers for alterations to Flexible Units e.g. changing Flexible Assets, provided the aggregate Flexible Capacity provided by the Flexible Unit remains unchanged.

NIE Networks reserves the right to request a repeat Proving Test when alterations to a Flexible Unit are made.

4.7 Discretionary Utilisation Services

As part of its FLEX project, NIE Networks will not request Discretion Utilisation Services, e.g. Flexibility Services outside the contracted Service Windows.

5. REVENUE STACKING

NIE Networks acknowledges that, in order to maximise their own commercial benefit, Flexibility Providers may wish to explore the stacking of various revenue streams available to them.

Stacking can be achieved through coincident realisation of benefits in the same time period from multiple sources, or by moving between revenue streams in different time periods, e.g. seeking revenue from the provision of Flexibility Services and other markets such as wholesale energy market.

The stacking of coincident revenue streams by Flexibility Providers raises the prospect of creating conflicts between competing interests. Prior to Flexibility contract award it is necessary to identify any such conflicts and set mitigations where appropriate.

NIE Networks has not included any exclusivity clauses in Flexibility Service Agreements, but would reinforce that this does not remove obligations from Flexibility Providers to deliver the contracted Flexibility Services. It is the responsibility of a Flexibility Provider to ensure that the contracted Flexibility Service will be delivered when instructed by NIE Networks while managing any other contractual obligations.

The ENA Open Networks Project has set out a six step 'approach to conflict resolution' which has been adopted by NIE Networks⁸. The steps are as follows:

1. Identify potential for conflict
 - Prospective Flexibility Providers will disclose the existence of any agreement or arrangement it may have in respect of the Flexible Assets nominated to provide Flexibility that could reasonably impact Availability of the Flexible Capacity or the ability of the Flexible Unit to perform its obligations under a Flexibility Service Agreement
 - Specifically, Flexibility Providers should provide details of any ancillary services contracts or energy market related activity that might be coincident with the Service Window of the Flexibility Services required
2. Engage with interactive parties
 - Where a potential conflict has been identified, NIE Networks may engage with other affected parties (e.g. other parties contracted with the perspective Flexibility Provider) as needed
3. Quantify impact (where possible)
 - NIE Networks will evaluate the likelihood, risks, and consequences of the potential conflict
4. Assess options for mitigation
 - NIE Networks will, if appropriate, propose mitigation steps to manage the identified conflict to the prospective Flexibility Provider and also, if appropriate, other affected parties
5. Implement mitigation techniques
 - Appropriate mitigations will be agreed and implemented between NIE Networks, the prospective Flexibility Provider and, if needed, other affected parties
6. Review effectiveness
 - NIE Networks will review the effectiveness of any enacted mitigation to inform future best practice

⁸: www.energynetworks.org/electricity/futures/open-networks-project/workstream-products-2020/ws1a-flexibility-services.html

6. APPENDIX

6.1 Appendix 1 - Unavailability Notification Template

Table 10 UNAVAILABILITY NOTIFICATION TEMPLATE

Unavailability Notification	
Flexibility Provider Name	
Zone ID	
Flexible Unit ID	
Unavailable Flexible Assets	
MPRNs	
Unavailability Start Time	
Unavailability End Time	
Reason	
Reoccurrence Mitigation	
Name	
Signature	
Date	