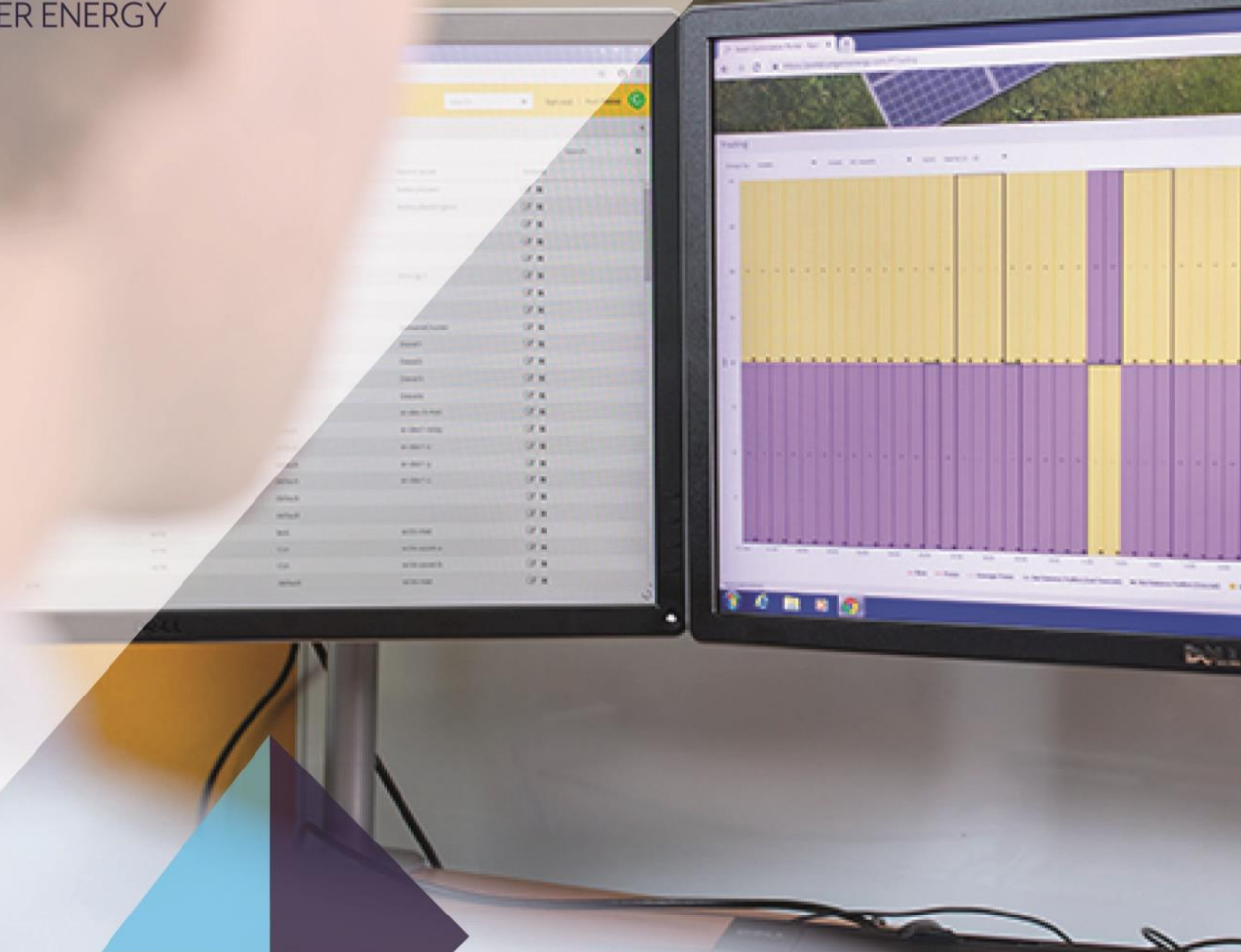




# Origami

POWER OVER ENERGY



## TRANSITION WP4.3

### Use Cases and Services to be Trialled v 1.1

09 October 2020

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## 1 Executive Summary

There has been a significant growth of distributed generation, 13.4GW of solar capacity<sup>1</sup> and 13.6GW of onshore wind capacity<sup>2</sup>, connected at various voltage levels. Electricity demand has changed in both the level and pattern of usage as a result of energy efficiency and moves towards the electrification of heat and transport. These changes have changed the distribution network from a unidirectional system to one that is multi-directional throughout the day and this has created a number of issues, including overvoltage, protection and thermal ratings of network assets. Without new innovative approaches, the increase in distributed generation and demand would result in significant new infrastructure to address the twin issues of demand peak in winter and embedded generation peak in summer. As a result, distribution network operators (DNOs) are slowly starting to use embedded flexibility as a commercial tool to address these issues. In addition, there is also a need to facilitate peer-to-peer (P2P) trading between organisations that can or could participate in the market (Market Actors). This can minimise the effects of constraints on generation customers and demand customers and enable new projects to achieve financial close, supporting GB on its transition towards a net-zero target by 2050. As all of these services come into effect, there will be an increased need for interactions between all Market Actors to avoid any unintended consequences.

The TRANSITION report "Services in a Facilitated Market"<sup>3</sup> considered the issues facing Market Actors that would need to be addressed in a future facilitated market. The process for determining the services to be trialled during TRANSITION are summarised in the figure below;

- determine the Market Actors to be considered during the TRANSITION trials;
- identify the issues affecting the Market Actors and group them;
- identify services that can address the issues and determine how many are repurposed or new; and
- identify the five services to be trialled by TRANSITION that cover the areas of; whole system value (DSO flexibility services), coordination and interaction between the DSO-Electricity System

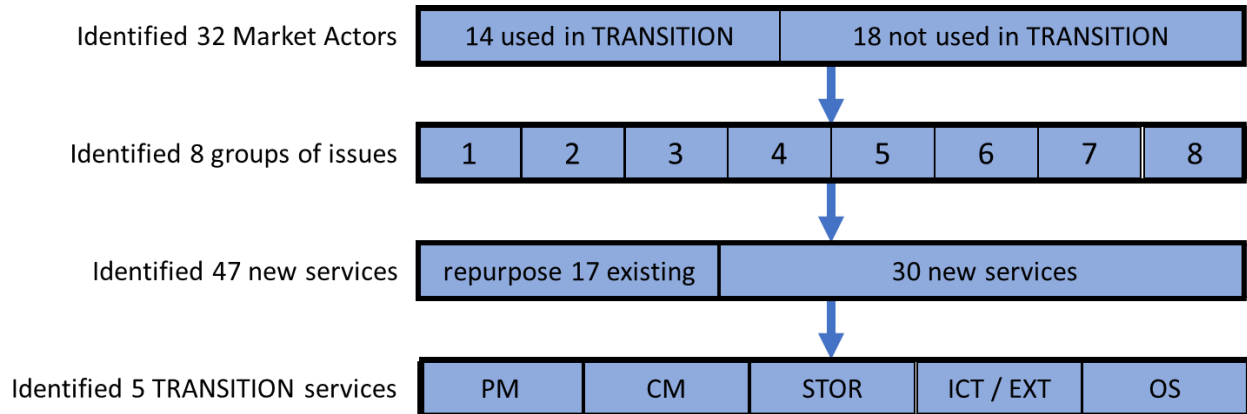
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<sup>1</sup> <https://www.gov.uk/government/statistics/solar-photovoltaics-deployment>, report published 26 March 2020

<sup>2</sup> "Digest of UK Energy Statistics (DUKES)", published by Department of Business, Energy and Industrial Strategy, 25 July 2019 (Table 6.4)

<sup>3</sup> <https://ssen-transition.com/library/>, 21 August 2019

Operator (ESO-DSO coordination), and services that allow Market Actors to address their own issues (P2P services).



PM = Peak Management; CM = Capacity Management; STOR = Short Term Operating Reserve;  
ICT = Import Capacity Trading; EXT = Export Capacity Trading; OS = Offsetting;  
WPOR = Wholesale Portfolio Optimisation Reduction; WPOI = Wholesale Portfolio Optimisation Increase

*Summary of the process used to identify the five services to be trialled by TRANSITION*

The five services to be trialled by TRANSITION will affect the physical position of Market Actors (for example, changes to the import or export level of a customer and affect the supplier imbalance position) and the financial position of Market Actors (for example, increasing export from a constrained generator will benefit the customer, supplier and trader). The 14 Market Actors to be used in TRANSITION each have a subtly different definition depending on the source used and these are summarised in Appendix 2 – Market Actor (sources). These 14 roles were used to help define how services can affect Market Actors; the remaining 18 roles are identified only, as they are considered out of scope for the purpose of this report.

This report introduces the concept of Use Cases and how they can be applied to TRANSITION. A use case is a description of how a Market Actor who uses a process (or system) will accomplish a goal, much like a recipe with a goal of preparing an item which describes a series of written steps how to prepare that item. A use case helps to understand where errors could occur in the process and is written to engineer out those errors.

Twenty-seven use cases were identified for the five services to be trialled by TRANSITION with an additional two use cases included in the final submission to Ofgem for TRANSITION in 2017. From this list, eight Use Cases have been selected to represent the services as they are likely to be trialled and these defined are summarised in Table 1. A template for defining each Use Case in a user-friendly format is provided in Table 2.

Table 1 - Use Cases defined in this report by Category

Category		
DSO flexibility services	ESO-DSO coordination	P2P services
<p><b>Constraint Management;</b></p> <ul style="list-style-type: none"> <li>the delivery of flexibility during a fault following an outage which involves the loss of a critical asset that puts the local network at risk and requires the immediate delivery of flexibility</li> </ul> <p><b>Peak Management;</b></p> <ul style="list-style-type: none"> <li>the delivery of flexibility to cater for the forecast overload where a planned delivery of flexibility is required.</li> </ul>	<p><b>Short-Term Operating Reserve;</b></p> <ul style="list-style-type: none"> <li>conflict arising from the use of or the planned use of flexibility used by the ESO or DSO on the other party.</li> </ul>	<p><b>Minimum Import Capacity Trading;</b></p> <ul style="list-style-type: none"> <li>increase demand above authorised level</li> </ul> <p><b>Maximum Export Capacity Trading;</b></p> <ul style="list-style-type: none"> <li>increase export above authorised level</li> </ul> <p><b>Offsetting;</b></p> <ul style="list-style-type: none"> <li>planned increase demand prior to enable an equal level of increase in generation</li> </ul> <p><b>Wholesale Portfolio Optimisation;</b></p> <ul style="list-style-type: none"> <li>planned reduction of demand to provide trading optionality</li> <li>planned increase of demand to provide trading optionality</li> </ul>

The latest thinking from ON-P, together with the review of Future Worlds, and the Use Cases defined in this report will all assist with the development of tests and trials through TRANSITION and another project led by Scottish and Southern Electricity Networks (SSEN), Local Energy Oxfordshire (LEO)<sup>4</sup>. Together, these projects will maximise the feedback to ON-P and the value to the electricity industry.

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<sup>4</sup> LEO is one of the most ambitious, wide-ranging, innovative, and holistic smart grid trials ever conducted in the UK. The project will improve the understanding of how opportunities can be maximised and unlocked from the transition to a smarter, flexible electricity system and how households, businesses and communities can realise its benefits.

## 2 Introduction

Traditional power systems are undergoing transition from a centralised to a distributed system. In contrast to the centralised generation and unidirectional power flow, the decentralised system relies on an increasing capacity of embedded generation in the distribution network, improving energy efficiency and accommodating low carbon technologies (including generation and electrification of heat and transport). This creates significant variability in the level and direction of power flows that can cause issues related to spare capacity, delivery of services and balancing the system in real-time. However, the increase in low carbon technologies also creates opportunities to use the inherent flexibility to support the management of network issues for the Distribution Network Operator (DNO) and the needs of the Market Actors affected by that network.

TRANSITION is looking at the implications of a properly functioning market in flexibility that enables flexibility providers to stack value across the various existing markets for flexibility services and new peer-to-peer and third party to third party (P2P) services. It will also evaluate how the use of flexibility can contribute to the efficient and economic operation of their infrastructure under a number of scenarios. TRANSITION will inform Energy Network Association (ENA) Open Networks Project (ON-P) in relation to the following areas: design requirements for the flexibility platform, developing future roles and responsibilities within the marketplace, developing new market rules required for the trials, and implement and test the concept of the flexibility platform.

The ON-P, launched in January 2017, is playing a key role in the transition from a reactive DNO to a proactive Distribution System Operation (DSO). DSOs will participate in new flexibility markets to proactively manage their networks using local flexibility to address the increasing demand from the decarbonisation of transport and heat and the bi-directional electricity flow from (low carbon) distributed generation. It has been successful in engaging with all stakeholder groups through consultations, highlighting the main areas of work through a number of different workstreams.

This report will discuss Use Cases in relation to the five flexibility services to be trialled by TRANSITION and those identified in the NIC Final Submission<sup>5</sup>. These Use Cases will be tested under different market scenarios to provide an evidential base that will inform both the costs and risks as well as the ease with which value can be accessed to the ultimate benefit of consumers under each market model.

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<sup>5</sup> These Use Cases are from the Electricity NIC submission: Scottish and Southern Electricity Networks – TRANSITION (NIC Submission, [https://www.ofgem.gov.uk/system/files/docs/2017/11/transition\\_public\\_v1.0\\_0.pdf](https://www.ofgem.gov.uk/system/files/docs/2017/11/transition_public_v1.0_0.pdf), 30-Nov-17)

### 3 Overview of TRANSITION

TRANSITION is designed to help understand the changes required to the traditional distribution network design, maintenance and operation model, to consider new market models, and to trial new services under various scenarios. TRANSITION is partnered with project LEO, facilitating a greater breadth of learning. The outcomes from TRANSITION and project LEO will inform the Energy Networks Association Open Networks Project (ON-P) to which TRANSITION is dynamically aligned. TRANSITION will inform a number of ON-P Workstreams and the most applicable to the development of the market rules are;

- Workstream 3 which is developing a more detailed view of the transition from DNO to DSO, including the impacts on existing organisational capabilities to implement the DSO; and
- Workstream 1A which is considering all aspects of flexibility.

TRANSITION will be completed in three stages:

- Phase 1 - design the solution for the Neutral Market Facilitator (NMF) and Whole System Coordinator (WSC) and how they will interact with the existing DNO IT systems; develop the roles and responsibilities of Market Actors; develop simple rules to enable the delivery of selected services; and determine the location and requirements of a trial in Phase 2.
- Stage Gate (aligned with EFFS and FUSION<sup>6</sup>) - a formal opportunity to review progress, compare outcomes and ensure the programme is still aligned with wider industry initiatives and to determine whether it is still valuable to continue with TRANSITION and continue with Phase 2.
- Phase 2 – procure DSO systems required to undertake the TRANSITION trials, implement an NMF and WSC solution that enables data exchange between industry actors participating in the trials and trading of flexibility services and conduct a wide scale trial to test the services, roles and rules and inform ON-P.

The outcomes and learnings from TRANSITION will inform ON-P, particularly Workstream 3, which is developing a more detailed view of the requirements for transition from a largely reactive DNO model to a more proactive DSO model.

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<sup>6</sup> The 2017 Network Innovation Competition funded projects "Electricity Flexibility and Forecasting System" (awarded to Western Power Distribution to develop an IT platform to forecast network capacity and identify opportunities to trade flexible network services) and "FUSION" (awarded to SP Energy Networks to test a technical and commercial solution developed in Europe to resolve constraints on the distribution network), [https://www.ofgem.gov.uk/system/files/docs/2017/11/ofg1031\\_innovation\\_competitions\\_brochure\\_web.pdf](https://www.ofgem.gov.uk/system/files/docs/2017/11/ofg1031_innovation_competitions_brochure_web.pdf), 30 November 2017.

## 4 Introduction to Use Cases

This report will consider Use Cases as a precursor to completing a template for each service and how it affects or is affected by each Market Actor. Later in the development of TRANSITION, the Use Cases developed will be considered as the basis for developing Smart Grid Architectural Models to visualise the delivery of flexibility services to ensure more value can be obtained from the activity.

### 4.1 Introduction to Use Cases

The main purpose of a Use Case is to articulate, simply and clearly, the functional requirements of a process and describe how that process behaves to provide benefit (goals) to actors (people, systems or organisations). This allows the requirements to be easily understood by a wide audience and provides a common understanding between various stakeholder groups from those who have a detailed understanding of the requirements to those who do not understand the system but have to design and build the solution.

Use cases are written at different levels for different purposes. High level or summary Use Cases provide an overview of requirements or more strategic goals whilst detailed, or user level Use Cases describe an individual use of a system to achieve a more immediate goal.

A Use Case should address the following areas:

- The **scope** of the system being considered, including boundaries;
- The **goal** (objective) of the system;
- The **primary actor** who usually initiates the Use Case;
- The **actors** that interact with the system to achieve the goal;
- The **pre-conditions**, constraints or requirements before the Use Case can commence;
- The **post-conditions**, the conditions that should exist when the Use Case ends;
- The **flow of events** when the Use Case is performed which includes basic flows (the expected outcome) and alternative flows (optional or exceptional outcomes which may return the actor to an earlier point in the flow of events or end of the Use Case).
- Any other useful and contextual Information, including relationships with other Use Cases, business rules, assumptions and performance requirements.

The main benefit of Use Cases is a significant improvement in communication between all stakeholders by providing a focus on what the system is supposed to do within its boundaries to avoid the introduction of inadvertent design constraints, but which support incremental development that is aligned from one step to the next.



Use cases are often represented in diagrams that consider the world from the perspective of different actors and can vary in complexity which may support or hinder engagement. This is illustrated in Figure 1.

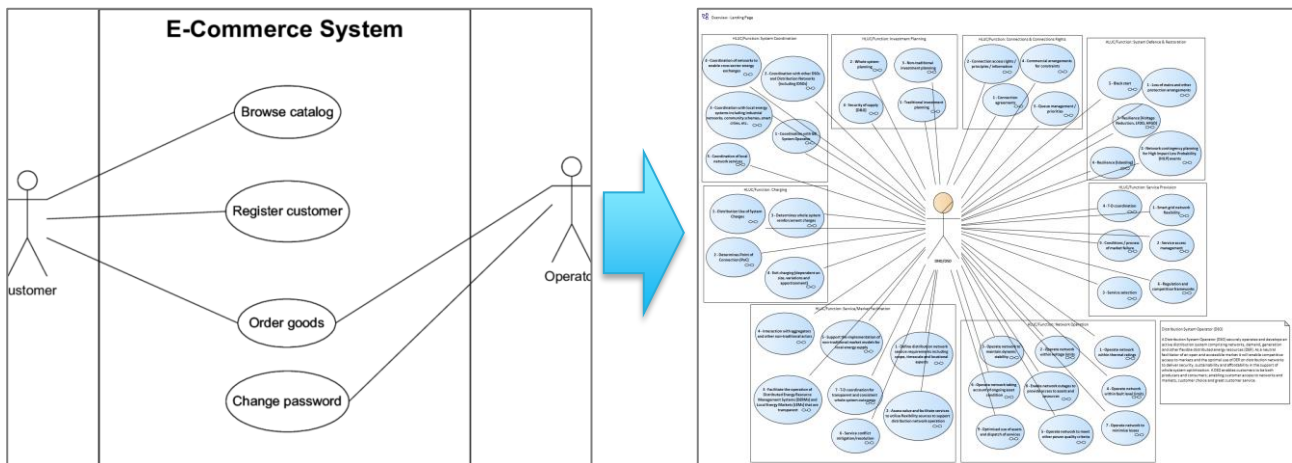


Figure 1 - Simple versus Complicated Energy Use Case Diagram

The Use Cases identified will be used in a number of ways, including;

- inform the design of early TRANSITION trials;
- iterate future TRANSITION trials (including learnings from testing during LEO);
- refine the basic market rules; and
- provide learnings to ON-P.

#### 4.2 Use Case Template

As can be seen from Figure 1, Use Cases range from the simple to the complex and can be incredibly complex and can take significant effort to create and be difficult to understand.

It is proposed to develop the simpler tabular form presented in the NIC Submission<sup>5</sup> as it;

- standardises the presentation of Use Cases;
- provides clarity to the reviewer of Use Cases; and
- allows changes to be made easily and quickly.

The revised Use Case template provided in Table 2 captures the salient points from Use Case workshops that considered how each Use Case affects the actions of Market Actors and is affected by the actions of Market Actors. The template was used to define the eight Use Cases outlined in Table 1 (see Appendix 1).

Table 2 - Use Case Template

Use Case # - Service Description		
Pre-Condition(s)		
Trigger(s)		
Network		
Data	Inputs;	Outputs;
Market Actors Position		
Business Rules		
Potential Conflicts and Management		
Post-Condition(s)		
Other		

The Use Cases developed in this report will be used as the basis for developing Smart Grid Architectural Models<sup>7</sup> later during TRANSITION

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<sup>7</sup> <https://sgam-toolbox.org/>

## 5 Market Actors

The Market Actors identified in the “Services in a Facilitated Market”<sup>3</sup> were considered further for inclusion in the Use Case report and each of these 32 Market Actors is either;

- used in the development of Use Cases as they exist within the TRANSITION project or trials (14; in which case the role is described and the DSO functions they can support highlighted); or
- not used in the development of Use Cases as they are not pertinent to the TRANSITION trials, there is duplication with the Market Actors selected above, or there is uncertainty of their role in a future world (18; in which case the role is included for completeness but not defined further).

A literature search was conducted to define each of the 14 Market Actors used in the development of the Use Cases. The literature search reviewed numerous documents and the definitions are summarised in Appendix 2 for sources that identified one or more of the 14 Market Actors; sources that did not define at least one Market Actor were excluded. Some definitions overlap whilst others iterate definitions of a Market Actor and Appendix 2 proposes definitions to be used; some are suitable for use as drafted whilst others are an iteration of an existing definition of a Market Actor. Table 3 provides a summary of each of the 14 Market Actors used in the development of the Use Cases and;

- identifies a description of that Market Actor from Appendix 2; and
- considers the DSO Functions each Market Actor supports (directly or indirectly).

Table 3 - Market Actors and DSO Functions they support directly or indirectly via a third party

Market Actor	Market Actor Description	System Coordination	Network Operation	Investment Planning	Connections and Connection Rights	System Defence and Restoration	Services/Market Facilitation	Service Optimisation	Charging
Aggregator	Bring together one or more small assets to allow them to transact collectively with other market actors or in larger markets than they would otherwise have been able to. There is potential for community and third sector involvement in delivering aggregation through local services or flexibility tariffs and shared DER equipment	X	X	X		X	X	X	
Balance Responsible Person	A market actor with responsibility for balancing energy volumes used, or paying for imbalances, compared to declared forecasts	X	X	X		X	X	X	
Community Energy Scheme	A community energy scheme emphasis on local engagement, local leadership and control and the local community benefiting collectively from the outcomes and covers aspects of collective action to reduce, purchase, manage and generate energy.	X	X	X	X	X	X	X	X
Consumer (Domestic)	This role refers to end-users with MPAN Profile Class 01 or 02 who either (i) only consume energy, (ii) both consume and produce energy, or (iii) only produce energy.				X		X		X
Consumer (Non-Domestic)	This role refers to end-users with MPAN Profile Class 00 or 03-08 who either (i) only consume energy, (ii) both consume and produce energy, or (iii) only produce energy.	X		X	X	X	X	X	X

Market Actor	Market Actor Description	System Coordination	Network Operation	Investment Planning	Connections and Connection Rights	System Defence and Restoration	Services/Market Facilitation	Service Optimisation	Charging
Data Communications Company	Responsible for establishing and managing the data and communications network that connects smart meters to the business systems of energy suppliers, network operators and other authorised service users of the network.	X	X					X	
Directly-Connected Generation	Generation connected to the distribution network on a site that normally exports electricity and whose only demand is for the ancillary load of the facility.	X	X	X	X	X	X	X	X
Directly-Connected Storage	Electricity storage connected to the distribution network on a site whose import is for charging the storage units and / or the ancillary load of the facility and export for discharging the storage units.	X	X	X	X	X	X	X	X
DNO	Owner and operator of assets that comprise the distribution system who is responsible for the safe delivery of electricity to and from MPANs. May use flexibility from assets connected to the distribution network to manage constraints and issues.	X	X	X	X	X	X	X	X
DSO	A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible DERs. As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DERs on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers, enabling customer access to networks and markets, customer choice and great customer service.	X	X	X	X	X	X	X	X
Electricity Suppliers	The organisation that buys or sells electricity to consumers (domestic and non-domestic), generators and storage organisation	X							X

Market Actor	Market Actor Description	System Coordination	Network Operation	Investment Planning	Connections and Connection Rights	System Defence and Restoration	Services/Market Facilitation	Service Optimisation	Charging
Electricity System Operator	The operator of the electricity system who is responsible for balancing generation and demand in real time using flexibility services. The ESO could compete with the DSO for the same flexible assets and the ESO and DSO will coordinate to achieve a more efficient overall outcome.	X	X	X	X	X	X	X	X
Energy Traders	Organisations that purchase and sell electricity between participants in the energy industry over timescales from intraday to long-term and who usually will not take physical delivery of electricity. May have a financial interest in the performance of assets.						X		
Neutral Market Facilitator	The party that facilitates the market whilst demonstrating neutrality to ensure benefits are realised for all consumers through effective competition that ensures a level playing field for all.	X	X		X	X	X	X	
Active Customer	Not Used								
Active Participant	Not Used								
Central Government	Not Used								
Customer Protection Party	Not Used								
Energy Regulator	Not Used								
Gas energy resources	Not Used								

Market Actor	Market Actor Description	System Coordination	Network Operation	Investment Planning	Connections and Connection Rights	System Defence and Restoration	Services/Market Facilitation	Service Optimisation	Charging
Gas System Operator	Not Used								
Generation (transmission connected)	Not Used								
Heat energy resources	Not Used								
Independent DNO	Not Used								
Independent DSO	Not Used								
Local Govt Local Government	Not Used								
Local Market Operator	Not Used								
Non-Domestic Consumer (transmission connected)	Not Used								
Passive Customer	Not Used								

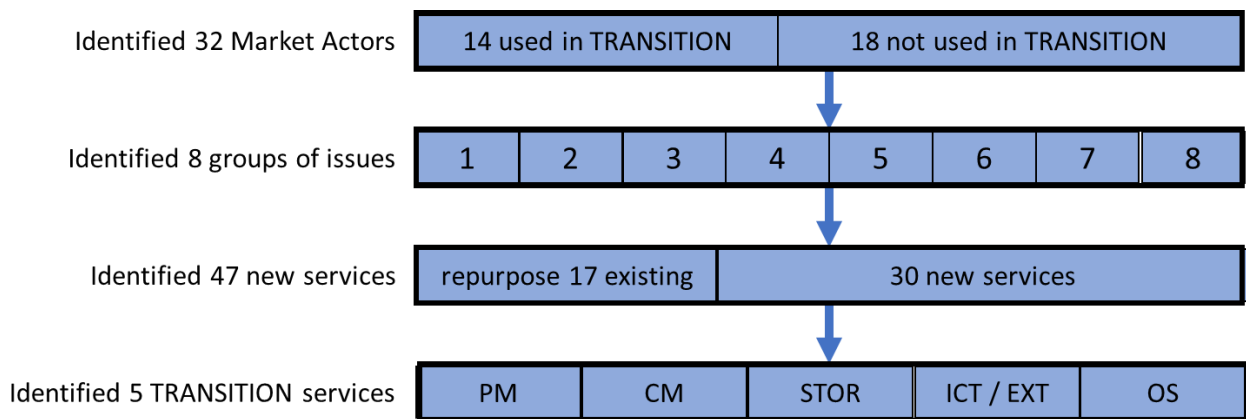
Market Actor	Market Actor Description	System Coordination	Network Operation	Investment Planning	Connections and Connection Rights	System Defence and Restoration	Services/Market Facilitation	Service Optimisation	Charging
Settlement Agent Supply Chain	Not Used								
System Service Providers	Not Used								
Transmission System Operator	Not Used								



## 6 Services to be delivered under TRANSITION

The TRANSITION report “Services in a Facilitated Market” uploaded by SSEN on 21 August 2019<sup>8</sup> considers the issues to be addressed in a future facilitated market to identify potential services to be trialled by TRANSITION.

The process for selecting these services is summarised in Figure 2. The process identified 47 new services of which 17 were repurposed from existing ESO and DNO services and applied to assets connected to the distribution network and 30 services are newly identified services.



PM = Peak Management; CM = Capacity Management; STOR = Short Term Operating Reserve;  
 ICT = Import Capacity Trading; EXT = Export Capacity Trading; OS = Offsetting;  
 WPOR = Wholesale Portfolio Optimisation Reduction; WPOI = Wholesale Portfolio Optimisation Increase

Figure 2 - Summary of the process used to identify the five services to be trialled by TRANSITION

The process in Figure 2 resulted in five services that represented different market requirements in a future facilitated market and the rationale is summarised in Table 4 with the services summarised in Table 5.

<sup>8</sup> <https://ssen-transition.com/library/>

Table 4 - Rationale for selection of the five services to be trialled by TRANSITION

Service Category		
DSO flexibility services	ESO-DSO coordination	P2P services
<p><b>DSO Constraint Management;</b> an existing service which is understood by the market and is representative of unplanned services likely to be sourced by the DSOs.</p> <p><b>Peak Management;</b> an existing service which is understood by the market and is representative of planned services likely to be sourced by the DSOs.</p>	<p><b>Short-Term Operating Reserve;</b> an existing service which is understood by the market and allows the conflicts that could arise between the ESO and DSO in the delivery of services in the future to be explored.</p>	<p><b>Trading of Import and Export Capacity;</b> a new and simple service that is required by Market Actors to address their own issues; it is enabled by the DSO but the DSO is not a counterparty.</p> <p><b>Offsetting;</b> a new and complex service that is required by Market Actors to address their own issues; it is enabled by the DSO but the DSO is not a counterparty.</p>

Table 5 - Five services to be trialled by TRANSITION

Service to be Trialled	Summary of Service
DSO Constraint Management	A service to provide the DSO with an immediate reduction in demand or increase in generation following an unplanned or planned outage of one or more critical assets to maintain security standards and avoid any customer minutes lost.
Peak Management	A service to provide the DSO with a planned reduction in demand or increase in generation in advance of a forecast capacity constraints at peak time, e.g. to reduce the loading on a transformer during winter tea-time peak.
Short-Term Operating Reserve	A service to provide the ESO with a planned reduction in demand or increase in generation in advance of a forecast system imbalance, e.g. to increase the margin of generation over demand following unplanned outages of generation at winter tea-time peak.
Import / Export Capacity Trading (previously Authorised Supply Capacity Trading)	A service where one Market Actor within a constrained area can increase the level of export or import at one of its MPANs through purchasing excess Authorised Supply Capacity for a period of time from another Market Actor in the same constrained area.
Offsetting	A service where one Market Actor in a constrained area agrees to increase its demand ahead of another Market Actor in the same constrained area increasing its generation by the same amount, all with appropriate fail safe mechanisms.

There is further work planned with FUSION and ON-P during mid-2020 to develop the existing knowledge base and provide proposals for the standardisation of terminology, service description and use cases to provide alignment across the market.

## 7 Use Cases for TRANSITION

Use Cases for each of the five services summarised in Table 5 have been formulated on the basis of a roles-based model where any particular Market Actor could fulfil a number of roles, e.g. a Supplier with flexibility could also fulfil the roles of Aggregator, Balance Responsible Party, and Trader.

Twenty-nine Use Cases were identified and are summarised in Table 6; the eight Use Cases developed for TRANSITION are highlighted in Table 6 and detailed in Appendix 2.

Table 6 - Summary of Use Cases (possible and those developed for TRANSITION)

DSO flexibility services	
DSO Constraint Management	<b>Reduce demand, increase generation or discharge energy storage to mitigate the effect of a network constraint*</b>
	Inject or consume reactive power to improve power factor and / or mitigate the effect of a network constraint
	Inject or consume reactive power to manage voltage to mitigate the effect of a network constraint
	Reduce demand, increase generation or discharge energy storage to mitigate the effect of a planned outage
	Increase or decrease real and / or reactive power from generation, demand or energy storage to provide network stability for fault or post-fault management
	Directly connected generation, demand or energy storage achieves an early non-firm connection in exchange for providing flexibility services to mitigate potential constraints that would not have existed if the early connection had not occurred
	Increase or decrease of real or reactive power to optimise the loading on a network asset and increase time to asset intervention or the life of the asset
	Monitor and manage harmonics at the MPAN to mitigate harmonics issues on the network
	Increase or decrease reactive power to increase to maintain voltage within statutory limits
Peak Management	<b>Reduce demand, increase generation or discharge energy storage to mitigate the effect of peak demand on an asset*</b>
	Long-term change in peak demand or demand profile, e.g. following energy conservation measures or alternative fuel for some activities
	Provision of reactive power to reduce losses at substation and mitigate the effect of a peak demand
	Inject or consume reactive power to improve power factor and / or mitigate the effect peak demand
	Discharge energy storage devices (including electric vehicles (EVs)) at peak times to mitigate the effect of peak demand (and, potentially, recharging at outside peak to flatten demand profile)

ESO-DSO coordination	
Short-Term Operating Reserve (STOR)	<b>The use of demand, generation or energy storage to deliver the STOR service to the ESO which could cause issues for the DNO / DSO; highlights the need for conflict management*</b>
	The use of demand, generation or energy STOR response service by ESO; highlights the need for conflict management
	Conflict of need between the potential delivery of an ESO STOR service and the potential delivery of a DSO service; highlights the need for conflict management
P2P services	
Import / Export Capacity Trading	<b>Maximum Import Capacity (MIC) Trading – does not require flexibility use, but one site agrees to restrict the use of its import so another can increase its import capacity*</b>
	<b>Maximum Export Capacity (MEC) Trading – does not require flexibility use, but one sites agrees to restrict the use of its export so another can increase its export capacity*</b>
	Directly connected generation, demand or energy storage achieves an early non-firm connection in exchange for providing flexibility services to mitigate potential constraints that would not have if the early connection had not occurred
	A site gets an earlier demand connection at a reduced MIC with an agreement to increase its import in coordination with another site which restricts its MIC.
	A site gets an earlier export connection at a reduced MEC with an agreement to increase its export in coordination with a site that restricts its MEC.
Offsetting	<b>Increase demand at one site (within its MIC) prior to an equal level of increase in generation at another site (above its MEC) within a constrained network*</b>
	Increase generation at one site (within its MEC) prior to an equal level of increase in demand at another site (above its MIC) within a constrained network*
	Increase demand at one site (within its MIC) prior to an equal level of increase in generation at another site (above its MEC) within an unconstrained network*
	Increase generation at one site (within its MEC) prior to an equal level of increase in demand at another site (above its MIC) within an unconstrained network*
	Charging of EVs at a site to allow increase in generation without causing network constraint.
	Discharging of EVs to allow increase in demand above MIC of a site without causing network constraint.
Use Cases from TRANSITION final NIC submission	
Wholesale Portfolio Optimisation 1	<b>Reduce demand, increase generation or discharge energy storage by a trader to balance portfolio position prior to and during Gate Closure*</b>
Wholesale Portfolio Optimisation 2	<b>Increase demand, reduce generation or charge energy storage by a trader to balance portfolio position prior to and during Gate Closure*</b>

\* Indicates those services for which a Use Case has been developed and detailed in Appendix 2.

## Appendix 1 – Use Cases

### Use Case 1 - DSO Constraint Management

Service Description		
<p>There is a need to reduce the demand on a distribution network asset immediately under certain system conditions and at certain times of day for a maximum duration to keep that asset within its operational envelope. This could be to support the network during fault conditions, during maintenance work or where a constraint is forecast, using a DSO triggered service.</p> <p>The flexibility required can come from one of three actions that help to reduce demand at the MPAN; a reduction in demand, an increase in generation or discharging a battery.</p>		
Pre-Condition		
<p>Unplanned outage of a critical asset that has the potential to overload the other critical assets which requires demand reduction within [minutes] to avoid such a situation.</p>		
Trigger(s)		
Network	DNO network monitoring of the critical assets.	
Data	<p><b>Inputs:</b></p> <p>Metering data on critical assets; and</p> <p>Offers to use flexibility from flexibility providers.</p>	<p><b>Outputs:</b></p> <p>Status of critical assets; and</p> <p>Acceptance of flexibility offers; and</p> <p>Delivery of contracted flexibility.</p>
Market Actor Position		
Aggregator	<ul style="list-style-type: none"> <li>Buyer of flexibility from flexible demand, generation or storage;</li> <li>Seller of flexibility to the DNO/DSO; and</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	
Balance Responsible Person	<p>May be a buyer of flexibility from flexible demand, generation or storage.</p> <p>The use of flexibility has;</p> <ul style="list-style-type: none"> <li>no effect on this Market Actor if they can compensate in geographically different area from their flexibility portfolio; or</li> <li>creates an imbalance against the Gate Closure position if unaware of the use of the flexibility and exposed to Imbalance Price for that volume.</li> </ul>	
Community Energy Schemes	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	
Consumers (Domestic)	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> </ul>	

	<ul style="list-style-type: none"> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Consumers (Non-Domestic)	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Data Communications Company	Seller of data services (meter data) and communications service (activation trigger and despatch instructions) to the providers and buyers of flexibility for this service.
Directly-Connected Generation	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Directly-Connected Storage	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
DNO	Owner of the network infrastructure, operational management of network and identifier of the need for the service.,
DSO	Buyer of flexibility to manage the services requirements.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the use of flexibility.
Electricity System Operator	Monitor of activity; potential loss of flexibility for ancillary services, although has greater understanding of flexibility available on the system.
Energy Traders	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the use of flexibility.
Neutral Market Facilitator	For DNO/DSO services, it is believed this role facilitates the marketplace, manages transactions, communicates to parties affected by flexibility use and collector of data on flexibility delivery. Interested in reliability and performance of flexibility, but no contractual interest.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>9</sup>	

<sup>9</sup> See the Basic Market Rules from "Market Rules Development Initial Variant", 3 February 2020, <https://ssen-transition.com/wp-content/uploads/2020/02/Market-Rules-Development-Phase-1-v1.0.pdf>

Potential Conflicts and Management
<ul style="list-style-type: none"> <li>▪ The asset delivering this service needs to receive notice that the service is required some time ahead of delivery (Arming Period); the flexibility may not be Armed after that time.</li> <li>▪ The service will be activated during Gate Closure and this could affect pricing of the service due to the impact of imbalance charges to the Balance Responsible Party, particularly during periods of either high prices.</li> <li>▪ Near real-time metering will be required of the flexibility delivered either at the critical asset and / or at the asset delivering the flexibility.</li> <li>▪ The service delivery could be overruled by the ESO if using the flexibility would cause issues.</li> <li>▪ The service specification should enable the stacking of services in one of two situations;               <ul style="list-style-type: none"> <li>– at any time outside the delivery window for the service; and</li> <li>– after the Arming Period has passed for a Settlement Period.</li> </ul> </li> <li>▪ Asset unplanned availability shortly before the trigger is issued or during the delivery period would affect the level of flexibility delivered or the delivery rate. The service specification should provide an obligation for prompt notification of unplanned unavailability.</li> </ul>
Post-Conditions
<ul style="list-style-type: none"> <li>▪ The delivery of flexibility in accordance with the service specification means the substation continues to deliver customer demand within operational limits and there is no loss of service as verified by (near) real-time monitoring and metering.</li> <li>▪ Need the ability to unwind transactions if there are significant changes to service need and such transactions should consider the lost opportunity to flexibility providers.</li> </ul>
Other
<ul style="list-style-type: none"> <li>▪ The service should be trialled initially to ensure the data flows are appropriate and that flexibility providers are aware of what is required of them to ensure they respond as expected during service delivery.</li> <li>▪ The following processes need to be defined; data provision, delivery verification, settlement and invoicing and performance metrics.</li> <li>▪ The delivery of this service provides the opportunity to;               <ul style="list-style-type: none"> <li>– consider the impacts of different forms of contracting and associated value;</li> <li>– understand the effect of differing levels of visibility on service delivery;</li> <li>– consider the effect of flexibly location on flexibility delivered at the substation and to provide feedback on whether the different approach compared to the use of Line Loss Factors for demand is appropriate or material.</li> </ul> </li> </ul>

## Use Case 2 - Peak Management

Service Description		
<p>There is a need to reduce the demand on a distribution network asset to keep that asset within its normal operational envelope. This could be as a result of a forecast capacity constraint on the asset at a particular time, e.g. to reduce the demand on a critical asset during winter tea-time peak, using a DSO planned service. This service supports the deferral or avoidance of conventional approaches to network reinforcement.</p> <p>The flexibility required can come from one of three actions that help to reduce demand at the MPAN; a reduction in demand, an increase in generation or discharging a battery.</p>		
Pre-Condition		
<p>Forecast increase in demand of a distribution network asset which requires a planned demand reduction within [hours] to avoid operating outside normal operational limits.</p>		
Trigger(s)		
Network	DNO network monitoring of the critical assets.	
Data	<p><b>Inputs;</b></p> <p>Metering data on critical assets; and</p> <p>Offers to use flexibility from flexibility providers.</p>	<p><b>Outputs:</b></p> <p>Status of critical assets; and</p> <p>Acceptance of flexibility offers; and</p> <p>Delivery of contracted flexibility.</p>
Market Actor Position		
Aggregator	<ul style="list-style-type: none"> <li>Buyer of flexibility from flexible demand, generation or storage;</li> <li>Seller of flexibility to the DNO/DSO; and</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	
Balance Responsible Person	<p>May be a buyer of flexibility from flexible demand, generation or storage.</p> <p>The use of flexibility has;</p> <ul style="list-style-type: none"> <li>no effect on this Market Actor if they can compensate in geographically different area from their flexibility portfolio; or</li> <li>creates an imbalance against the Gate Closure position if unaware of the use of the flexibility and exposed to Imbalance Price for that volume.</li> </ul>	
Community Energy Schemes	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	
Consumers (Domestic)	<ul style="list-style-type: none"> <li>Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	



Consumers (Non-Domestic)	<ul style="list-style-type: none"> <li>▪ Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>▪ Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Data Communications Company	Seller of data services (meter data) and communications service (activation trigger) to the provider and buyers of flexibility for this service.
Directly-Connected Generation	<ul style="list-style-type: none"> <li>▪ Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>▪ Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Directly-Connected Storage	<ul style="list-style-type: none"> <li>▪ Seller of flexibility to the DNO/DSO directly or indirectly via a third party.</li> <li>▪ Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
DNO	Owner of the network infrastructure, operational management of network and identifies the need for the service.,
DSO	Buyer of flexibility to manage the services requirements.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the use of flexibility.
Electricity System Operator	Monitor activity: potential loss of flexibility for ancillary services, although has greater understanding of flexibility available on the system.
Energy Traders	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the use of flexibility.
Neutral Market Facilitator	For DNO/DSO services, it is believed this role facilitates the marketplace, manages transactions, communicates to parties affected by flexibility use and collector of data on flexibility delivery. Interested in reliability and performance of flexibility, but no contractual interest.

### Business Rules

The business rules that apply to this Use Case are the Basic Market Rules.<sup>15</sup>

### Potential Conflicts and Management

- The asset delivering this service needs to receive notice that the service is required some time ahead of delivery (Arming Period); the flexibility may not be used after that time.
- The service will be activated during Gate Closure and this could affect pricing of the service due to the impact of imbalance charges to the Balance Responsible Party, particularly during periods of either high prices.
- Near real-time metering will be required of the flexibility delivered either at the critical asset and / or at the asset delivering the flexibility.

- The service delivery could be overruled by the ESO is using the flexibility would cause issues or additional for the ESO.
- The service specification should enable the stacking of services in one of two situations;
  - at any time outside the delivery window for the service; and
  - after the Arming Period has passed for a Settlement Period.
- Asset unplanned availability shortly before the trigger is issued or during the delivery period would affect the level of flexibility delivered or the delivery rate. The service specification should provide an obligation for prompt notification of unplanned unavailability.

### Post-Conditions

- The delivery of flexibility in accordance with the service specification means the substation continues to deliver customer demand within operational limits and there is no loss of service as verified by (near) real-time monitoring and metering.
- Need the ability to unwind transactions if there are significant changes to service need and such transactions should consider the lost opportunity to flexibility providers.

### Other

- The service should be trialled initially to ensure the data flows are appropriate and that flexibility providers are aware of what is required of them to ensure they respond as expected during service delivery.
- The following processes need to be defined; data provision, delivery verification, settlement and invoicing and performance metrics.
- The delivery of this service provides the opportunity to;
  - consider the impacts of different forms of contracting and associated value;
  - understand the effect of differing levels of visibility on service delivery;
  - consider the effect of flexibly location on flexibility delivered at the substation and to provide feedback on whether the different approach compared to the use of Line Loss Factors for demand is appropriate or material.

### Use Case 3 - Short-Term Operating Reserve

Service Description		
<p>A service to provide the ESO with a planned reduction in demand or increase in generation in advance of a forecast system imbalance, e.g. to increase the margin of generation over demand following unplanned outages of generation at winter tea-time peak. The delivery of this service could cause conflict with the DNO/DSO and requires coordination of activation. The flexibility required can come from one of three actions that help to reduce demand at the MPAN; a reduction in demand, an increase in generation or discharging a battery.</p>		
Pre-Condition		
<p>There is a forecast system imbalance due to a shortfall of generation which requires a planned reduction in demand at certain MPANs within a defined period to avoid a risk of significant system imbalance, potential DNO actions (including voltage reduction and demand disconnections). If not addressed quickly enough, this could lead to a blackout.</p>		
Trigger(s)		
Network	ESO forecast of system imbalance.	
Data	<p><b>Inputs;</b></p> <p>Metering data on critical assets; and</p> <p>Offers to use flexibility from flexibility providers.</p>	<p><b>Outputs:</b></p> <p>Status of critical assets; and</p> <p>Acceptance of flexibility offers; and</p> <p>Delivery of contracted flexibility.</p>
Market Actor Position		
Aggregator	<ul style="list-style-type: none"> <li>Buyer of flexibility from flexible demand, generation or storage;</li> <li>Seller of flexibility to the ESO; and</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	
Balance Responsible Person	<p>May be a buyer of flexibility from flexible demand, generation or storage.</p> <p>The use of flexibility has;</p> <ul style="list-style-type: none"> <li>no effect on this Market Actor if they can compensate in geographically different area from their embedded flexibility portfolio; or</li> <li>creates an imbalance against the Gate Closure position if unaware of the use of the flexibility and exposed to Imbalance Price for that volume.</li> </ul>	
Community Energy Schemes	<ul style="list-style-type: none"> <li>Seller of flexibility to the ESO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	
Consumers (Domestic)	<ul style="list-style-type: none"> <li>Seller of flexibility to the ESO directly or indirectly via a third party.</li> <li>Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>	

Consumers (Non-Domestic)	<ul style="list-style-type: none"> <li>▪ Seller of flexibility to the ESO directly or indirectly via a third party.</li> <li>▪ Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Data Communications Company	Seller of data services (meter data) and communications service (despatch instructions) to the provider and buyers of flexibility for this service.
Directly-Connected Generation	<ul style="list-style-type: none"> <li>▪ Seller of flexibility to the ESO directly or indirectly via a third party.</li> <li>▪ Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
Directly-Connected Storage	<ul style="list-style-type: none"> <li>▪ Seller of flexibility to the ESO directly or indirectly via a third party.</li> <li>▪ Has exposure to contractual penalties if the contracted level of flexibility is not delivered.</li> </ul>
DNO	As the owner of the network infrastructure, operational management of network and party that may be affected by the delivery of the service if the delivery of the service causes an unplanned load of the network.
DSO	As the buyer of flexibility to manage the delivery of services, it may be affected by the delivery of the service if it is a buyer of flexibility from the same flexible demand, generation or storage assets providing flexibility to deliver the service.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the use of flexibility.
Electricity System Operator	Benefits from the delivery of the service, provided there is no interruption to the delivery or any unintended consequences.
Energy Traders	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the use of flexibility.
Neutral Market Facilitator	For DNO/DSO services, it is believed this role facilitates the marketplace, manages transactions, communicates to parties affected by flexibility use and collector of data on flexibility delivery. Interested in reliability and performance of flexibility, but no contractual interest.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>15</sup>	
<b>Potential Conflicts and Management</b>	
<ul style="list-style-type: none"> <li>▪ There is a potential issue if the flexibility is offered for both this service and another DNO/DSO service with the potential for one party to experience a shortfall in service delivery if the one service is interrupted or declared unavailable so the other can be delivered;</li> </ul>	

<ul style="list-style-type: none"> <li>▪ There may be unintended consequences if the delivery of the service creates headroom in an ANM scheme which then despatches additional generation, negating the effect of the service instruction.</li> <li>▪ The asset delivering this service needs to receive notice that the service is required some time ahead of delivery (Arming Period); the flexibility may not be used after that time.</li> <li>▪ The service will be activated during Gate Closure and this could affect pricing of the service due to the impact of imbalance charges to the Balance Responsible Party, particularly during periods of either high prices.</li> <li>▪ The service delivery could be overruled by the DNO/DSO if using the flexibility would cause issues or additional for the DNO/DSO.</li> <li>▪ Asset unplanned availability shortly before the trigger is issued or during the delivery period would affect the level of flexibility delivered or the delivery rate. The service specification should provide an obligation for prompt notification of unplanned unavailability.</li> </ul>
<p><b>Post-Conditions</b></p>
<ul style="list-style-type: none"> <li>▪ The delivery of flexibility in accordance with the service specification means the forecast system imbalance does not materialise and no further action is required by the ESO to operate the system normally.</li> <li>▪ Need the ability to unwind transactions if there are significant changes to service need and such transactions should consider the lost opportunity to flexibility providers.</li> </ul>
<p><b>Other</b></p>
<ul style="list-style-type: none"> <li>▪ As an established ESO service, the main purpose for the inclusion of this service is to develop the latest thinking from ON-P on conflict management through workshops between a combination of ESO, SPEN, SSEN and WPD and to then provide feedback to ON-P.</li> </ul>

**Use Case 4 - Maximum Import Capacity Trading**

Service Description		
<p>There is a need for some customers to increase their import capacity above their authorised Maximum Import Capacity (MIC) for short periods that would not justify a long-term increase in the level of their authorised MIC. This service enables one Market Actor within a constrained area who has an excess of MIC to sell the excess (or a portion of it) to another Market Actor so they can increase their level of import at an MPAN. This service supports the deferral or avoidance of conventional approaches to network reinforcement.</p>		
Pre-Condition		
<p>A Market Actor needs additional import capacity above their authorised MIC for a defined period and there is another Market Actor with a similar excess level of MIC in the same constrained area who is prepared to sell for an agreed period.</p>		
Trigger(s)		
Network	DNO network monitoring of the critical assets.	
Data	<p><b>Inputs;</b></p> <p>Metering data on critical assets; and</p> <p>Approval by the DNO that the buyer can increase its MIC for a period of time; and</p> <p>Bilateral agreement to trade MIC for a period of time.</p>	<p><b>Outputs:</b></p> <p>Status of critical assets; and</p> <p>Ability to use of contracted MIC.</p>
Market Actor Position		
Aggregator	Not expected to be involved to such transactions during TRANSITION.	
Balance Responsible Person	<p>The use of flexibility has;</p> <ul style="list-style-type: none"> <li>▪ no effect on this Market Actor if they are aware of the transaction and can compensate in geographically different area from their flexibility portfolio; or</li> <li>▪ creates an imbalance against the Gate Closure position if unaware of the transaction and are then exposed to Imbalance Price for that additional imported volume.</li> </ul>	
Community Energy Schemes	<ul style="list-style-type: none"> <li>▪ If a buyer of the service (and have prior approval from the DNO), can increase import but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>▪ If a seller of the service can increase revenue (provided they do not use the transacted MIC).</li> </ul>	
Consumers (Domestic)	Not expected to be involved to such transactions during TRANSITION.	

Consumers (Non-Domestic)	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase import but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue (provided they do not use the transacted MIC).</li> </ul>
Data Communications Company	Not expected to be involved to such transactions during TRANSITION.
Directly-Connected Generation	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase import but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue (provided they do not use the transacted MIC).</li> </ul>
Directly-Connected Storage	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase import but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue (provided they do not use the transacted MIC).</li> </ul>
DNO	Approval to the transaction with appropriate conditions.
DSO	Not expected to be involved to such transactions during TRANSITION.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service.
Electricity System Operator	Not expected to be involved to such transactions during TRANSITION.
Energy Traders	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service.
Neutral Market Facilitator	It is believed that this role requires to be aware of the transactions to inform affected parties and collect data on service post-event.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>15</sup>	
<b>Potential Conflicts and Management</b>	
<ul style="list-style-type: none"> <li>Transactions are conditional until approved by the DNO (if required) which could mean they need to be agreed between buyer and seller some time ahead of delivery. This uncertainty could increase the imbalance of some Market Actors.</li> <li>There needs to be an obligation on the seller of MIC not to use the MIC that has been transacted.</li> </ul>	

<ul style="list-style-type: none"> <li>▪ It is possible that the party selling MIC was not using the MIC it sells which could cause an overload on the network.</li> <li>▪ The service could increase provision of other flexibility services if it is then used to stack services or if a battery was involved.</li> </ul>
<p><b>Post-Conditions</b></p>
<ul style="list-style-type: none"> <li>▪ The exchange of MIC in accordance with the service specification means the buyer has increased its import.</li> <li>▪ Need the ability to unwind transactions if there are significant changes to the system that affect the exchange.</li> </ul>
<p><b>Other</b></p>
<ul style="list-style-type: none"> <li>▪ The service should be trialled initially to ensure the data flows are appropriate and that Market Actors are aware of what is required of them to ensure they respond as expected during service delivery, particularly any conditionality around transactions.</li> <li>▪ The delivery of this service provides the opportunity to consider;             <ul style="list-style-type: none"> <li>- the timescales to address the conditional approval of transactions;</li> <li>- the effect of transactions of MIC that was rarely or never used by a Market Actor on network demand and loadings;</li> <li>- the effect of differing levels of visibility on service delivery; and</li> <li>- different charging mechanism to compensate the DNO for increasing network utilisation.</li> </ul> </li> </ul>



**Use Case 5 - Maximum Export Capacity Trading**

Service Description		
<p>There is a need for some customers to increase their export capacity above their authorised Maximum Export Capacity (MEC) for short periods that would not justify a long-term increase in the level of their authorised MEC. This service enables one Market Actor within a constrained area who has an excess of MEC to sell the excess (or a portion of it) to another Market Actor so they can increase their level of export at an MPAN. This service supports the deferral or avoidance of conventional approaches to network reinforcement.</p>		
Pre-Condition		
<p>A Market Actor needs additional export capacity above their authorised MEC for a defined period and there is another Market Actor with a similar excess level of MEC in the same constrained area who is prepared to sell for an agreed period.</p>		
Trigger(s)		
Network	DNO network monitoring of the critical assets.	
Data	<p><b>Inputs;</b></p> <p>Metering data on critical assets; and</p> <p>Approval by the DNO that the buyer can increase its MEC for a period of time; and</p> <p>Bilateral agreement to trade MEC for a period of time.</p>	<p><b>Outputs:</b></p> <p>Status of critical assets; and</p> <p>Ability to use of contracted MEC.</p>
Market Actor Position		
Aggregator	Not expected to be involved to such transactions during TRANSITION.	
Balance Responsible Person	<p>The use of flexibility has;</p> <ul style="list-style-type: none"> <li>▪ no effect on this Market Actor if they are aware of the transaction and can compensate in geographically different area from their flexibility portfolio; or</li> <li>▪ creates an imbalance against the Gate Closure position if unaware of the transaction and are then exposed to Imbalance Price for that additional exported volume.</li> </ul>	
Community Energy Schemes	<ul style="list-style-type: none"> <li>▪ If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>▪ If a seller of the service can increase revenue (provided they do not use the transacted MEC).</li> </ul>	
Consumers (Domestic)	Not expected to be involved to such transactions during TRANSITION.	

Consumers (Non-Domestic)	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue (provided they do not use the transacted MEC).</li> </ul>
Data Communications Company	Not expected to be involved to such transactions during TRANSITION.
Directly-Connected Generation	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue (provided they do not use the transacted MEC).</li> </ul>
Directly-Connected Storage	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue (provided they do not use the transacted MEC).</li> </ul>
DNO	Approval to the transaction with appropriate conditions.
DSO	Not expected to be involved to such transactions during TRANSITION.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service.
Electricity System Operator	Not expected to be involved to such transactions during TRANSITION.
Energy Traders	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service.
Neutral Market Facilitator	It is believed that this role requires to be aware of the transactions to inform affected parties and collect data on service post-event.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>15</sup>	
<b>Potential Conflicts and Management</b>	
<ul style="list-style-type: none"> <li>Transactions are conditional until approved by the DNO (if required) which could mean they need to be agreed between buyer and seller some time ahead of delivery. This uncertainty could increase the imbalance of some Market Actors.</li> <li>There needs to be an obligation on the seller of MEC not to use the MEC that has been transacted.</li> </ul>	

<ul style="list-style-type: none"> <li>▪ It is possible that the party selling MEC was not using the MEC it sells which could cause an overload on the network.</li> <li>▪ The service could increase provision of other flexibility services if it is then used to stack services.</li> </ul>
<p><b>Post-Conditions</b></p>
<ul style="list-style-type: none"> <li>▪ The exchange of MEC in accordance with the service specification means the buyer has increased its export.</li> <li>▪ Need the ability to unwind transactions if there are significant changes to the system that affect the exchange.</li> <li>▪ Need a specific process to allow this service to be delivered.</li> </ul>
<p><b>Other</b></p>
<ul style="list-style-type: none"> <li>▪ The service should be trialled initially to ensure the data flows are appropriate and that Market Actors are aware of what is required of them to ensure they respond as expected during service delivery, particularly any conditionality around transactions.</li> <li>▪ The delivery of this service provides the opportunity to consider;             <ul style="list-style-type: none"> <li>- the timescales to address the conditional approval of transactions;</li> <li>- the effect of transactions of MEC that was rarely or never used by a Market Actor on network demand and loadings;</li> <li>- the effect of differing levels of visibility on service delivery; and</li> <li>- different charging mechanism to compensate the DNO for facilitating an increase in (renewable) distributed generation.</li> </ul> </li> </ul>

**Use Case 6 - Offsetting**

Service Description		
<p>There is a need for some Market Actors within a constrained area to transact for an increase demand prior to an equal level of increase in generation such that there is a net zero effect on the constraint but an overall increase in generation. This would involve exceeding the MEC for the generator and, in limited circumstances, an increase in MIC for the demand. This service supports the deferral or avoidance of conventional approaches to network reinforcement.</p>		
Pre-Condition		
<ul style="list-style-type: none"> <li>▪ The Market Actor in a constrained area wants to exceed its MEC for a defined period when there it can contract for there to be an equal increase in demand from another named Market Actor should have (conditional) approval from the DNO prior to any transactions occurring.</li> <li>▪ Transactions should be approved by the DNO prior to them taking effect and any generation above the MEC being exported.</li> </ul>		
Trigger(s)		
Network	DNO network monitoring of the critical assets.	
Data	<p><b>Inputs;</b></p> <p>Metering data on critical assets;</p> <p>An agreed scheme to address fail safes;</p> <p>Outline approval by the DNO that the buyer can enter into conditional transactions;</p> <p>Bilateral agreement to trade MEC for a period of time; and</p> <p>Approval from DNO prior to start time of transaction.</p>	<p><b>Outputs:</b></p> <p>Status of critical assets;</p> <p>An equal level of increased demand and generation; and</p> <p>Fail safes monitored and working as expected.</p>
Market Actor Position		
Aggregator	Not expected to be involved to such transactions during TRANSITION.	
Balance Responsible Person	<p>The use of flexibility has;</p> <ul style="list-style-type: none"> <li>▪ no effect on this Market Actor if they are aware of the transaction and can compensate in geographically different area from their flexibility portfolio; or</li> <li>▪ creates an imbalance against the Gate Closure position if unaware of the transaction and are then exposed to Imbalance Price for that additional exported volume.</li> </ul>	
Community Energy Schemes	<ul style="list-style-type: none"> <li>▪ If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> </ul>	

	<ul style="list-style-type: none"> <li>If a seller of the service can increase revenue.</li> </ul>
Consumers (Domestic)	Not expected to be involved to such transactions during TRANSITION.
Consumers (Non-Domestic)	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue.</li> </ul>
Data Communications Company	Required to provide communications and data for the fail safes to ensure a safe and secure network is provided.
Directly-Connected Generation	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> </ul>
Directly-Connected Storage	<ul style="list-style-type: none"> <li>If a buyer of the service (and have prior approval from the DNO), can increase export but has to meet any data and notification obligations of the agreement with the DNO.</li> <li>If a seller of the service can increase revenue.</li> </ul>
DNO	Provides outline approval by the DNO that the buyer can enter into conditional transactions and approval from DNO prior to start time of transaction.
DSO	Not expected to be involved to such transactions during TRANSITION.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service.
Electricity System Operator	Not expected to be involved to such transactions during TRANSITION.
Energy Traders	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service.
Neutral Market Facilitator	It is believed that this role requires to be aware of the transactions to inform affected parties and collect data on service post-event.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>15</sup>	
<b>Potential Conflicts and Management</b>	
<ul style="list-style-type: none"> <li>The scheme for fail safes needs to be approved at the outset and needs to be verified at regular intervals.</li> <li>The timing is critical in relation to;             <ul style="list-style-type: none"> <li>Outline approval to undertake transactions; and</li> </ul> </li> </ul>	

- Approval of individual transactions.
- Transactions are conditional until approved by the DNO (if required) which could mean they need to be agreed between buyer and seller some time ahead of delivery. This uncertainty could increase the imbalance of some Market Actors.
- The service could increase provision of other flexibility services if it is then used to stack services.
- Need a specific process to allow this service to be delivered.

**Post-Conditions**

- The increase of demand prior to increase of a similar level of generation (and vice versa when the transaction ends or the fail safes operate).
- Need the ability to unwind transactions if there are significant changes to the system that affect the exchange.

**Other**

- The service should be trialled initially to ensure the data flows are appropriate and that Market Actors are aware of what is required of them to ensure they respond as expected during service delivery, particularly any conditionality around transactions.
- The delivery of this service provides the opportunity to consider;
  - the timescales to address the conditional approval of transactions;
  - the effect of transactions of network demand and loadings;
  - the effect of differing levels of visibility on service delivery; and
  - different charging mechanism to compensate the DNO for facilitating an increase in (renewable) distributed generation.

**Use Case 7 - Wholesale Portfolio Optimisation 1 (reduce demand)**

Service Description					
<p>An Energy Trader in a vertically-integrated Market Actor can use the flexibility in a portfolio of demand, generation and storage to support trading and portfolio balancing prior from Day Ahead to Gate Closure and portfolio balancing within Gate Closure. This is a peer-to-peer service involves demand reduction but that does not involve the DNO/DSO at any point, provided MIC and MEC are not exceeded.</p>					
Pre-Condition					
<p>An Energy Trader has a portfolio of flexible assets that can be used to support day ahead and intraday trading and portfolio balancing prior to Gate Closure and portfolio balancing within Gate Closure. The Energy Trader can utilise the flexibility to support one or both activities within a pre-agreed set of risk parameters. In this Use Case, value is created by reducing demand or increasing generation under three particular pre-conditions;</p> <ul style="list-style-type: none"> <li>▪ to reduce exposure to high wholesale market prices when the portfolio is long;</li> <li>▪ to lengthen the portfolio when the wholesale price is high; or</li> <li>▪ position the portfolio to take advantage of forecast imbalance prices.</li> </ul>					
Trigger(s)					
Network	The network is not involved in this service.				
Data	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: left;">Inputs;</th> <th style="width: 50%; text-align: left;">Outputs:</th> </tr> </thead> <tbody> <tr> <td>                     Availability and meter data on flexible assets;                       Market price (wholesale and forecast imbalance price); and                       Risk parameters for trading pre- and post-Gate Closure.                 </td> <td>                     Flexibility is traded to support portfolio needs prior to Gate Closure; and                       Flexibility is used to balance the portfolio position within Gate Closure.                 </td> </tr> </tbody> </table>	Inputs;	Outputs:	Availability and meter data on flexible assets;  Market price (wholesale and forecast imbalance price); and  Risk parameters for trading pre- and post-Gate Closure.	Flexibility is traded to support portfolio needs prior to Gate Closure; and  Flexibility is used to balance the portfolio position within Gate Closure.
Inputs;	Outputs:				
Availability and meter data on flexible assets;  Market price (wholesale and forecast imbalance price); and  Risk parameters for trading pre- and post-Gate Closure.	Flexibility is traded to support portfolio needs prior to Gate Closure; and  Flexibility is used to balance the portfolio position within Gate Closure.				
Market Actor Position					
Aggregator	Not expected to be involved to such transactions during TRANSITION.				
Balance Responsible Person	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service. Devolved responsibility for balancing the portfolio position to the Energy Trader in a vertically-integrated entity.				
Community Energy Schemes	Not expected to be involved to such transactions during TRANSITION.				
Consumers (Domestic)	Not expected to be involved to such transactions during TRANSITION.				

Consumers (Non-Domestic)	Seller of flexibility that is scheduled as required by the Energy Trader to meet trading requirements and / or portfolio balancing requirements in return for payment.
Data Communications Company	Required to provide communications on flexibility availability and data on flexibility delivery.
Directly-Connected Generation	Seller of flexibility that is scheduled as required by the Energy Trader to meet trading requirements and / or portfolio balancing requirements in return for payment.
Directly-Connected Storage	Seller of flexibility that is scheduled as required by the Energy Trader to meet trading requirements and / or portfolio balancing requirements in return for payment.
DNO	Not expected to be involved to such transactions during TRANSITION.
DSO	Not expected to be involved to such transactions during TRANSITION.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service. Devolved responsibility for balancing the portfolio position to the Energy Trader in a vertically-integrated entity.
Electricity System Operator	Not expected to be involved to such transactions during TRANSITION.
Energy Traders	Responsibility for optimising the net position between demand, trades and flexibility both pre- and post-Gate Closure within agreed risk parameters. This includes the opportunity to use flexibility to provide DNO services.
Neutral Market Facilitator	It is believed that this role requires to be aware of the transactions to inform affected parties and collect data on service post-event.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>15</sup>	
<b>Potential Conflicts and Management</b>	
<ul style="list-style-type: none"> <li>▪ Visibility of transactions by the NMF and DNO/DSO is an issue, particularly if the flexibility is not used within the agreed MIC and MEC.</li> <li>▪ Flexibility is used to meet the optimise the portfolio position and some of this will be in near real-time with little opportunity to inform NMF or DNO/DSO.</li> <li>▪ Modelling and simulation to establish impacts of different forms of contracting and associated value</li> <li>▪ Trial to establish participant behaviour and information requirements</li> <li>▪ Understand outcomes of different levels of visibility for market frameworks and quantify impacts of conflicts</li> <li>▪ Need a specific process to allow this service to be delivered.</li> </ul>	



<b>Post-Conditions</b>
<ul style="list-style-type: none"><li>▪ The portfolio has been optimised pre- and post-Gate Closure and the Energy Trader can take advantage of wholesale market prices and imbalance prices.</li></ul>
<b>Other</b>
<ul style="list-style-type: none"><li>▪ The delivery of this service provides the opportunity to consider the appropriate level of visibility appropriate for the DNO/DSO to manage network flows.</li></ul>

**Use Case 8 – Wholesale Portfolio Optimisation 2 (increase demand)**

Service Description					
<p>An Energy Trader in a vertically-integrated Market Actor can use the flexibility in a portfolio of demand, generation and storage to support trading and portfolio balancing prior from Day Ahead to Gate Closure and portfolio balancing within Gate Closure. This is a peer-to-peer service involves demand increase but that does not involve the DNO/DSO at any point, provided MIC and MEC are not exceeded.</p>					
Pre-Condition					
<p>An Energy Trader has a portfolio of flexible assets that can be used to support day ahead and intraday trading and portfolio balancing prior to Gate Closure and portfolio balancing within Gate Closure. The Energy Trader can utilise the flexibility to support one or both activities within a pre-agreed set of risk parameters. In this Use Case, value is created by increasing demand or reducing generation under three particular pre-conditions;</p> <ul style="list-style-type: none"> <li>▪ to take advantage of low wholesale market prices when the portfolio is long;</li> <li>▪ to shorten the portfolio when the wholesale price is low; or</li> <li>▪ position the portfolio to take advantage of forecast imbalance prices.</li> </ul>					
Trigger(s)					
Network	The network is not involved in this service.				
Data	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: left;">Inputs;</th> <th style="width: 50%; text-align: left;">Outputs:</th> </tr> </thead> <tbody> <tr> <td>                     Availability and meter data on flexible assets;                       Market price (wholesale and forecast imbalance price); and                       Risk parameters for trading pre- and post-Gate Closure.                 </td> <td>                     Flexibility is traded to support portfolio needs prior to Gate Closure; and                       Flexibility is used to balance the portfolio position within Gate Closure.                 </td> </tr> </tbody> </table>	Inputs;	Outputs:	Availability and meter data on flexible assets;  Market price (wholesale and forecast imbalance price); and  Risk parameters for trading pre- and post-Gate Closure.	Flexibility is traded to support portfolio needs prior to Gate Closure; and  Flexibility is used to balance the portfolio position within Gate Closure.
Inputs;	Outputs:				
Availability and meter data on flexible assets;  Market price (wholesale and forecast imbalance price); and  Risk parameters for trading pre- and post-Gate Closure.	Flexibility is traded to support portfolio needs prior to Gate Closure; and  Flexibility is used to balance the portfolio position within Gate Closure.				
Market Actor Position					
Aggregator	Not expected to be involved to such transactions during TRANSITION.				
Balance Responsible Person	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service. Devolved responsibility for balancing the portfolio position to the Energy Trader in a vertically-integrated entity.				
Community Energy Schemes	Not expected to be involved to such transactions during TRANSITION.				
Consumers (Domestic)	Not expected to be involved to such transactions during TRANSITION.				

Consumers (Non-Domestic)	Seller of flexibility that is scheduled as required by the Energy Trader to meet trading requirements and / or portfolio balancing requirements in return for payment.
Data Communications Company	Required to provide communications on flexibility availability and data on flexibility delivery.
Directly-Connected Generation	Seller of flexibility that is scheduled as required by the Energy Trader to meet trading requirements and / or portfolio balancing requirements in return for payment.
Directly-Connected Storage	Seller of flexibility that is scheduled as required by the Energy Trader to meet trading requirements and / or portfolio balancing requirements in return for payment.
DNO	Not expected to be involved to such transactions during TRANSITION.
DSO	Not expected to be involved to such transactions during TRANSITION.
Electricity Suppliers	Exposed to a financial and physical imbalance between purchases and sales of electricity if there is a change in the level of purchases or sales as a result of the service. Devolved responsibility for balancing the portfolio position to the Energy Trader in a vertically-integrated entity.
Electricity System Operator	Not expected to be involved to such transactions during TRANSITION.
Energy Traders	Responsibility for optimising the net position between demand, trades and flexibility both pre- and post-Gate Closure within agreed risk parameters. This includes the opportunity to use flexibility to provide DNO services.
Neutral Market Facilitator	It is believed that this role requires to be aware of the transactions to inform affected parties and collect data on service post-event.
<b>Business Rules</b>	
The business rules that apply to this Use Case are the Basic Market Rules. <sup>15</sup>	
<b>Potential Conflicts and Management</b>	
<ul style="list-style-type: none"> <li>▪ Visibility of transactions by the NMF and DNO/DSO is an issue, particularly if the flexibility is not used within the agreed MIC and MEC.</li> <li>▪ Flexibility is used to meet the optimise the portfolio position and some of this will be in near real-time with little opportunity to inform NMF or DNO/DSO.</li> <li>▪ Modelling and simulation to establish impacts of different forms of contracting and associated value</li> <li>▪ Trial to establish participant behaviour and information requirements</li> <li>▪ Understand outcomes of different levels of visibility for market frameworks and quantify impacts of conflicts</li> <li>▪ Need a specific process to allow this service to be delivered.</li> </ul>	

Post-Conditions
<ul style="list-style-type: none"><li>▪ The portfolio has been optimised pre- and post-Gate Closure and the Energy Trader can take advantage of wholesale market prices and imbalance prices.</li></ul>
Other
<ul style="list-style-type: none"><li>▪ The delivery of this service provides the opportunity to consider the appropriate level of visibility appropriate for the DNO/DSO to manage network flows.</li></ul>

## Appendix 2 – Market Actor (sources)

In the following tables, the Market Actor definition in the Use Case Report v0.14 row are; (i) uncoloured when defined in this report, (ii) orange when the definition in one of the rows below has been amended; and (iii) green when the definition in one of the rows below has been used unamended.

Source	Aggregator	Balance Responsible Person	Community Energy Scheme	Consumer (Domestic)	Consumer (Non-Domestic)	Data Communications Company	Directly-Connected Generation
Use Case Report v0.14	Bring together on or more small assets to allow them to transact collectively with other market actors or in larger markets than they would otherwise have been able to. There is potential for community and third sector involvement in delivering aggregation through local services or flexibility tariffs and shared DER equipment	A market actor with responsibility for balancing energy volumes used, or paying for imbalances, compared to declared forecasts	A community energy scheme emphasis on local engagement, local leadership and control and the local community benefiting collectively from the outcomes and covers aspects of collective action to reduce, purchase, manage and generate energy.	This role refers to end-users with MPAN Profile Class 01 or 02 who either (i) only consume energy, (ii) both consume and produce energy, or (iii) only produce energy.	This role refers to end-users with MPAN Profile Class 00 or 03-08 who either (i) only consume energy, (ii) both consume and produce energy, or (iii) only produce energy.	Responsible for establishing and managing the data and communications network that connects smart meters to the business systems of energy suppliers, network operators and other authorised service users of the network.	Generation connected to the distribution network on a site that normally exports electricity and whose only demand is for the ancillary load of the facility.
ENA Open Network Project - Opening Markets for Network Flexibility 2017 Achievements and Future Direction <sup>10</sup>	An entity who acts as intermediary between electricity generators and users with Distributed Energy Resources and those power system participants who wish to use these services	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	A Generator including a Customer with own generation whose generation sets are directly connected to the DNO's Distribution Network or to another authorised distributor connected to the DNO's Distribution Network. <b>This is the definition for Distributed Generation</b>

<sup>10</sup> [http://www.energynetworks.org/assets/files/electricity/futures/Open\\_Networks/14574\\_ENA\\_Open%20Networks%20Report\\_AW\\_v9\\_Web.pdf](http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/14574_ENA_Open%20Networks%20Report_AW_v9_Web.pdf)

Source	Aggregator	Balance Responsible Person	Community Energy Scheme	Consumer (Domestic)	Consumer (Non-Domestic)	Data Communications Company	Directly-Connected Generation
EATL Report - Modelling the DSO transition using the Smart Grid Architecture Model <sup>11</sup>	An aggregator is a company who acts as an intermediary between electricity end-users, DER owners and the power system participants who wish to serve these end-users or exploit the services provided by these DER. The aggregator groups distinct agents in the electric power systems (i.e. consumers, producers, prosumers, or any mix thereof) to act a single entity when engaging in power system markets (both wholesale and retail) or selling services to system operators (e.g. ESO, DSO, etc.)	No definition provided	Community Energy Schemes aim to match energy supply and demand within a defined geographical area via peer-to-peer trading / local energy market to the benefit of its participants (e.g. communities, companies, individuals). CES participants to provide each other with energy and trade out the aggregate "balance" in the wholesale electricity market. CES can provide flexibility services to electricity system operators (e.g. ESO, DSO) for electricity system balancing and T- and D-network constraint management. CES generally include distributed generation customers, demand side management, end-use prosumers and end-use consumers. CES incorporate innovative distribution, management and metering, novel business models and can include clean transport systems as well. <b>This is the definition for Local Energy Systems (with CES replacing LES)</b>	Active customers represent domestic or smaller non-domestic end-use electricity customers that are energy conscious and therefore have invested in off-the-shelf low carbon technologies to derive revenue from renewable energy schemes, to reduce their overall costs or for social responsibility reasons. Generation or demand is unlikely to be actively managed and is installed on a passive "fit and forget" basis. Low carbon technology equipment includes solar panels, heat pumps, electric vehicles, electric battery storage. These customers are likely to be exporting to and importing from the D-network and would seek to benefit from supplier's time of use tariffs. <b>This is the definition for Active Customer (could use the definition for Passive Customer which has little or no interest in low carbon technology based products and flexible energy market services).</b>	System Service Providers are small-scale power generation technologies (typically in the range 11kW to 10MW and including electric energy storage facilities) and larger end use electricity consumers (e.g. industrial and commercial) with the ability of flexing their demand as part of their business (i.e. demand side response) that are directly connected to the electricity distribution network. SSP provide flexibility services to system operators (e.g. ESO, DSO, etc) for electricity system balancing and network constraint management. SSP may enter into bilateral contracts with system operators for system support services. <b>This is the definition of Small Scale Providers (could use the definition for Active Participant which has bilateral contract with energy suppliers only, not system operators).</b>	The Data Communications Company (DCC) is responsible for establishing and managing the data and communications network that connects smart meters to the business systems of energy suppliers, network operators and other authorised service users of the network. The DCC is a monopoly company regulated by the energy regulator.	System Service Providers are small-scale power generation technologies (typically in the range 11kW to 10MW and including electric energy storage facilities) and larger end use electricity consumers (e.g. industrial and commercial) with the ability of flexing their demand as part of their business (i.e. demand side response) that are directly connected to the electricity distribution network. SSP provide flexibility services to system operators (e.g. ESO, DSO, etc) for electricity system balancing and network constraint management. SSP may enter into bilateral contracts with system operators for system support services. <b>This is the definition for Small Scale Providers (could use the definition for Active Participant which has bilateral contract with energy suppliers only, not system operators).</b>

<sup>11</sup> [http://www.energynetworks.org/assets/files/Modelling-DSO-Transition-Using-SGAM\\_Issue2.1\\_PublicDomain.pdf](http://www.energynetworks.org/assets/files/Modelling-DSO-Transition-Using-SGAM_Issue2.1_PublicDomain.pdf)

Source	Aggregator	Balance Responsible Person	Community Energy Scheme	Consumer (Domestic)	Consumer (Non-Domestic)	Data Communications Company	Directly-Connected Generation
Ofgem - Future Insights Paper <sup>12</sup>	Aggregators - can bring together numerous small assets to allow them to transact collectively in larger markets than they would otherwise have been able to. Aggregation also provides a route into flexibility markets for end users who may not have dedicated DER assets and wish to benefit from providing flexibility through demand-side response. There is potential for community and third sector involvement in delivering aggregation through localised flexibility tariffs and shared DER equipment	No definition provided	No definition provided	Prosumers - domestic or commercial consumers who have energy generation or storage facilities - such as rooftop solar panels. They engage in 'explicit' demand response, trading flexibility for financial remuneration. Consumers - contribute to flexible energy systems by responding to price or tariff signals (e.g. time-of-use tariffs). Their interaction with flexibility markets may be directly, through an aggregator or through their supplier. <b>As a Consumer (Domestic) could be a Prosumer or Consumer, both definitions have been included</b>	No definition provided	No definition provided	No definition provided
USEF - Universal Smart Energy Framework <sup>13</sup>	A service provider that contracts, monitors, aggregates, dispatches and remunerates flexible assets at the customer side	A market participant or its chosen representative who is responsible for balancing electricity supply and demand of its portfolio in each settlement period. <b>Although Balance Responsible Party is not a USEF term, the report quoted provides a definition of Balance Responsible Party.</b>	No definition provided	This role refers to end-users who only consume energy, end-users who both consume and produce energy, as well as end-users that only generate (including on-site storage). <b>This is the definition for Prosumer.</b>	This role refers to end-users who only consume energy, end-users who both consume and produce energy, as well as end-users that only generate (including on-site storage). <b>This is the definition for Prosumer.</b>	No definition provided	This role refers to end-users who only consume energy, end-users who both consume and produce energy, as well as end-users that only generate (including on-site storage). <b>This is the definition for Prosumer.</b>
Ofgem's views on the design of arrangements to accommodate independent aggregators in energy markets <sup>14</sup>	Independent aggregators are defined here as parties who bundle changes in consumer's loads or distributed generation output for sale in organised markets and who do not simultaneously supply the customer with energy	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided

<sup>12</sup> [https://www.ofgem.gov.uk/system/files/docs/2019/09/ofgem\\_fi\\_flexibility\\_platforms\\_in\\_electricity\\_markets.pdf](https://www.ofgem.gov.uk/system/files/docs/2019/09/ofgem_fi_flexibility_platforms_in_electricity_markets.pdf)

<sup>13</sup> [https://www.spenergynetworks.co.uk/userfiles/file/Project\\_Fusion\\_USEF\\_Due\\_Diligence\\_Report.pdf](https://www.spenergynetworks.co.uk/userfiles/file/Project_Fusion_USEF_Due_Diligence_Report.pdf)

<sup>14</sup> [https://www.ofgem.gov.uk/system/files/docs/2017/07/ofgem\\_s\\_views\\_on\\_the\\_design\\_of\\_arrangements\\_to\\_accomodate\\_independent\\_aggregators\\_in\\_energy\\_markets.pdf](https://www.ofgem.gov.uk/system/files/docs/2017/07/ofgem_s_views_on_the_design_of_arrangements_to_accomodate_independent_aggregators_in_energy_markets.pdf)

Source	Aggregator	Balance Responsible Person	Community Energy Scheme	Consumer (Domestic)	Consumer (Non-Domestic)	Data Communications Company	Directly-Connected Generation
Ofgem Aggregators - Barriers and External Impacts <sup>15</sup>	Aggregators are defined as third party intermediaries specialising in coordinating or aggregating demand response from individual consumers to better meet industry parties' technical requirements for specific routes to market. Aggregators send signals to their consumers to modify their demand as a response to the System Operator requirements and/or market price signal	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
Flexasure - Demand Side Response Code of Conduct <sup>16</sup>	"Aggregator" means a company that contracts with individual demand sites to provide a single DSR service. Within the scope of the Code this includes a third-party company assisting a single demand site to provide DSR services as well as companies contracting with multiple demand sites	No definition provided	No definition provided	"Domestic Customers" shall have the meaning given to it in Condition 1 of the Standard Conditions of Electricity Supply Licence.	"Non-Domestic" shall have the meaning given in and is to be interpreted in accordance with standard condition 6 (Classification of premises) of the Standard Conditions of Electricity Supply Licence	No definition provided	No definition provided
Clarifying the regulatory framework for electricity storage: licensing <sup>17</sup>	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
ESO Website <sup>18</sup>	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided

<sup>15</sup> [https://www.ofgem.gov.uk/system/files/docs/2016/07/aggregators\\_barriers\\_and\\_external\\_impacts\\_a\\_report\\_by\\_pa\\_consulting\\_0.pdf](https://www.ofgem.gov.uk/system/files/docs/2016/07/aggregators_barriers_and_external_impacts_a_report_by_pa_consulting_0.pdf)

<sup>16</sup> Flexasure - Demand Side Response Code of Conduct

<sup>17</sup> [https://www.ofgem.gov.uk/system/files/docs/2017/10/electricity\\_storage\\_licence\\_consultation\\_final.pdf](https://www.ofgem.gov.uk/system/files/docs/2017/10/electricity_storage_licence_consultation_final.pdf)

<sup>18</sup> <https://www.nationalgrid.com/who-is-my-distribution-network-operator>



Source	Aggregator	Balance Responsible Person	Community Energy Scheme	Consumer (Domestic)	Consumer (Non-Domestic)	Data Communications Company	Directly-Connected Generation
ENTSO-E <sup>19</sup>	No definition provided	A market participant or its chosen representative responsible for its imbalances	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
Guidance on Community Energy (Department for Business, Energy & Industrial Strategy) <sup>20</sup>	No definition provided	No definition provided	Community energy covers aspects of collective action to reduce, purchase, manage and generate energy. Community energy projects have an emphasis on local engagement, local leadership and control and the local community benefiting collectively from the outcomes. <b>This is the definition for Community Energy and Community Energy Projects.</b>	No definition provided	No definition provided	No definition provided	No definition provided
Neutral Market Facilitator Data Exchange and Governance <sup>21</sup>	No definition provided	An industry actor such as an electricity supplier with responsibility for balancing energy volumes used, or paying for imbalances, compared to declared forecasts	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided

<sup>19</sup> Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (Text with EEA relevance. )

<sup>20</sup> <https://www.gov.uk/guidance/community-energy#what-is-community-energy>

<sup>21</sup> [https://ssen-transition.com/wp-content/uploads/2019/05/SSEN\\_NMF-Neutral-Market-Facilitator-Data-Exchange-and-Governance\\_007.pdf](https://ssen-transition.com/wp-content/uploads/2019/05/SSEN_NMF-Neutral-Market-Facilitator-Data-Exchange-and-Governance_007.pdf)

Source	Directly-Connected Storage	DNO	DSO	Electricity Suppliers	Electricity System Operator	Energy Traders	Neutral Market Facilitator
Use Case Report v0.14	Electricity storage connected to the distribution network on a site whose import is for charging the storage units and / or the ancillary load of the facility and export for discharging the storage units.	The company that owns and operates the power lines and infrastructure in a defined area that connects to the electricity transmission network and distributes electricity to and from end users	A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising B19 networks, demand, generation and other flexible DERs. As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DERs on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers, enabling customer access to networks and markets, customer choice and great customer service	The role of the Supplier is to source and supply energy to end-users, to manage (hedge) delivery and imbalance risks, and to invoice its customers for energy.	The ESO is responsible for the operation of the electricity transmission system by balancing electricity supply and demand, ensuring the stability and security of the electric power system, maintaining satisfactory voltage and frequency profiles and managing transmission network constraints.	A market actor that buys and sells energy with other market actors on the wholesale market, either directly on a bilateral basis (over the counter) or via an energy exchange (years ahead to day-ahead and intraday).	The party that facilitates the market whilst demonstrating neutrality to ensure benefits are realised for all consumers through effective competition that ensures a level playing field for all.
ENA Open Network Project - Opening Markets for Network Flexibility 2017 Achievements and Future Direction	No definition provided	The person or legal entity named in Part 1 of the Distribution Licence and any permitted legal assigns or successors in title of the named party	A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DERs). As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DERs on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers, enabling customer access to networks and markets, customer choice and great customer service	Grid Code definition: (a) A person supplying electricity under an Electricity Supply Licence; or (b) A person supplying electricity under exemption under the Act; in each case acting in its capacity as a supplier of electricity to Customers in Great Britain. <b>This is the definition for Supplier</b>	National Grid Electricity Transmission (NGET) in its capacity as operator of the National Transmission System. <b>This is the definition for National Electricity Transmission System Operator (this report pre-dates the establishment of the ESO)</b>	No definition provided	No definition provided

Source	Directly-Connected Storage	DNO	DSO	Electricity Suppliers	Electricity System Operator	Energy Traders	Neutral Market Facilitator
EATL Report - Modelling the DSO transition using the Smart Grid Architecture Model	<p>System Service Providers are small-scale power generation technologies (typically in the range 11kW to 10MW and including electric energy storage facilities) and larger end use electricity consumers (e.g. industrial and commercial) with the ability of flexing their demand as part of their business (i.e. demand side response) that are directly connected to the electricity distribution network. SSP provide flexibility services to system operators (e.g. ESO, DSO, etc) for electricity system balancing and network constraint management. SSP may enter into bilateral contracts with system operators for system support services.</p> <p><b>This is the definition for Small Scale Providers (could use the definition for Active Participant which has bilateral contract with energy suppliers only, not system operators).</b></p>	No definition provided	<p>A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DERs). As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DERs on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers, enabling customer access to networks and markets, customer choice and great customer service</p>	<p>An electricity supplier is a company that buys electricity in the wholesale market or directly from generators and sells it on to end use electricity consumers. The suppliers sets the prices that consumers pay for the electricity that they use. Suppliers work in a competitive market and customers can choose any supplier to provide them with electricity.</p> <p><b>This definition is for Energy Supplier</b></p>	<p>The ESO is responsible for the operation of the electricity transmission system by balancing electricity supply and demand, ensuring the stability and security of the electric power system, maintaining satisfactory voltage and frequency profiles and managing transmission network constraints.</p>	No definition provided	No definition provided
Ofgem - Future Insights Paper	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided

Source	Directly-Connected Storage	DNO	DSO	Electricity Suppliers	Electricity System Operator	Energy Traders	Neutral Market Facilitator
USEF - Universal Smart Energy Framework	This role refers to end-users who only consume energy, end-users who both consume and produce energy, as well as end-users that only generate (including on-site storage). <b>This is the definition for Prosumer.</b>	Company licensed to distribute electricity in GB. <b>Although DNO is not a USEF term, the report quoted provides a definition of DNO.</b>	As defined in DIRECTIVE 2009/72/EC: A natural or legal entity responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems and for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity.	The role of the Supplier is to source and supply energy to end-users, to manage (hedge) delivery and imbalance risks, and to invoice its customers for energy. <b>This is the definition of Supplier.</b>	No definition provided	A market party that buys energy from market parties and re-sells to other market parties on the wholesale market, either directly on a bilateral basis (over the counter) or via an energy exchange (day-ahead, intraday). <b>This is the definition of Trader.</b>	No definition provided
Ofgem's views on the design of arrangements to accommodate independent aggregators in energy markets	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
OFGEM Aggregators - Barriers and External Impacts	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
Flexassure - Demand Side Response Code of Conduct	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided

Source	Directly-Connected Storage	DNO	DSO	Electricity Suppliers	Electricity System Operator	Energy Traders	Neutral Market Facilitator
Clarifying the regulatory framework for electricity storage: licensing	"Electricity Storage" in the electricity system is the conversion of electrical energy into a form of energy which can be stored, the storing of that energy, and the subsequent reconversion of that energy back into electrical energy and "Electricity Storage Facility" in the electricity system means a facility where Electricity Storage occurs	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
ESO Website	No definition provided	The company that owns and operates the power lines and infrastructure that connects homes and commercial properties in your area to the electricity transmission network	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
ENTSO-E	No definition provided	The company that owns and operates the power lines and infrastructure that connects homes and commercial properties in your area to the electricity transmission network	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
Guidance on Community Energy (Department for Business, Energy & Industrial Strategy)	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided	No definition provided
Neutral Market Facilitator Data Exchange and Governance	No definition provided	No definition provided	The system operator role of an electricity distribution region	No definition provided	The system operator role of the National Grid	No definition provided	No definition provided