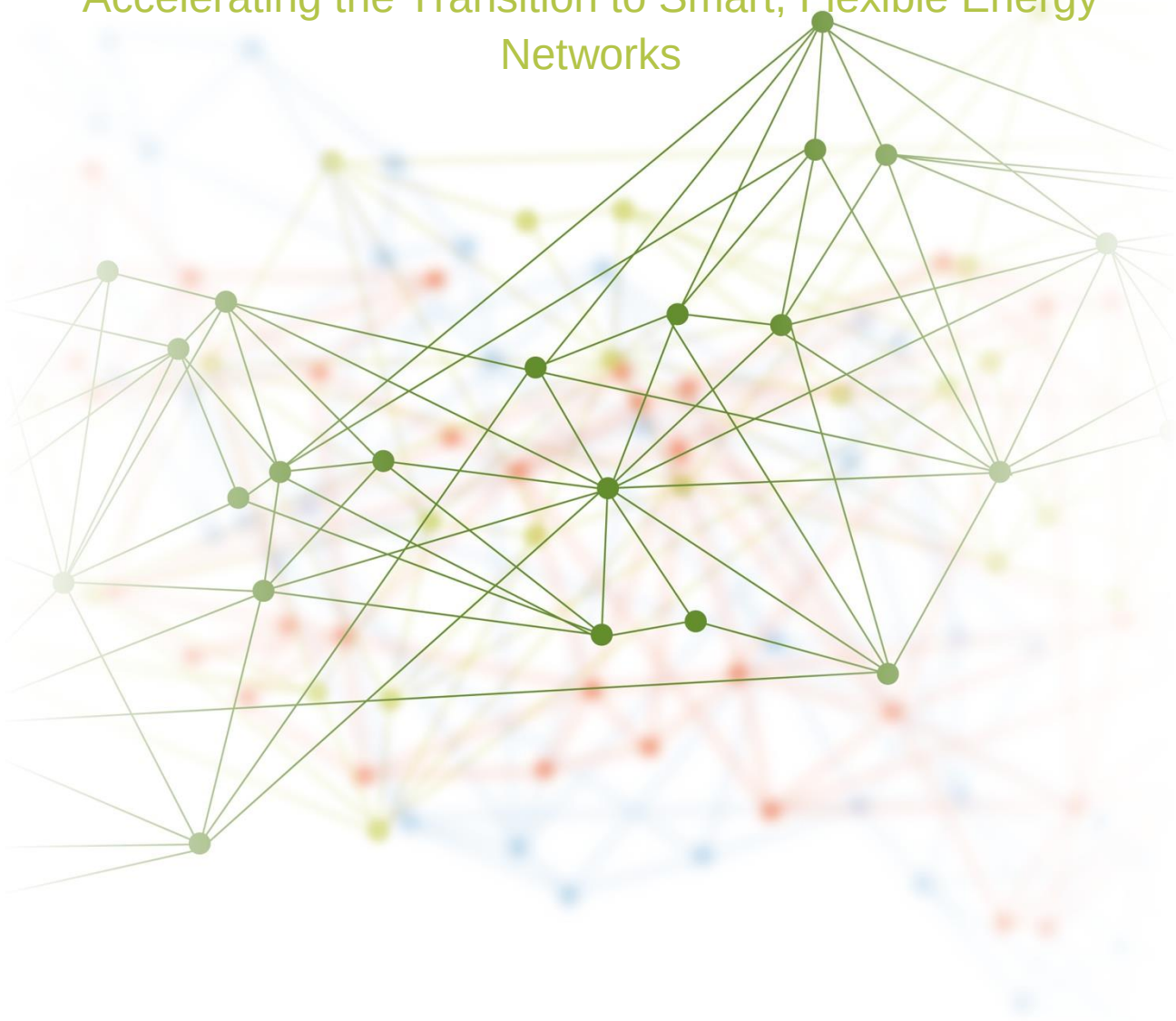
SP ENERGY NETWORKS

RIIO NIC NETWORK INNOVATION COMPETITION

FUSION

USEF Consultation Document

Accelerating the Transition to Smart, Flexible Energy Networks



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- This document must be read in its entirety. This document may contain detailed technical data which is intended for use only by persons possessing requisite expertise in its subject matter.

- This document has been produced from information relating to dates and periods referred to in this document. This document does not imply that any information is not subject to change.

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1 INTRODUCTION TO PROJECT FUSION

Project FUSION is funded under Ofgem's 2017 Network Innovation Competition (NIC), to be delivered by SP Energy Networks in partnership with seven project partners: DNV GL, Origami Energy, PassivSystems, Imperial College London (academic partner), SAC Consulting, The University of St. Andrews, and Fife Council.

Project FUSION represents a key element of SP Energy Network's transition to becoming a Distribution System Operator, taking a step towards a **clean, smart and efficient energy system**. As the electricity system changes from a centralised to decentralised model, it enables a smarter and more flexible network to function. Project FUSION is trialling the use of commoditised local demand-side flexibility through a structured and competitive market, based on a **universal, standardised market-based framework: the Universal Smart Energy Framework (USEF)**. USEF provides a standardised framework that defines products, market roles, processes and agreements, as well as specifying data exchange, interfaces and control features. The purpose of USEF is to accelerate the transition to a smart, flexible energy system to maximise benefits for current and future customers.

FUSION will also inform wider policy development around flexibility markets and the DNO-DSO transition through the development and testing of standardised industry specifications, processes, and requirements for transparent information exchange between market participants accessing market-based flexibility services. Ultimately, FUSION will contribute to Distribution Network Operators and all market actors unlocking potential and value of local network flexibility in a competitive and transparent manner. In doing so, FUSION aims to contribute to addressing the energy trilemma by making the energy system more secure, more affordable and more sustainable.

1.1 Objectives

FUSION aims to achieve the following specific objectives:

- Explore the potential for localised demand-side flexibility utilisation to accelerate new connections to the network that otherwise would require traditional reinforcement;
- Investigate a range of commercial mechanisms to encourage flexibility from energy consumers' use of electrical applications in satisfying overall energy use; and
- Evaluate the feasibility, costs and benefits of implementing a common flexibility market framework based on the open USEF model to manage local distribution network constraints and support wider national network balancing requirements.

In addition, through a live trial in East Fife, FUSION will:

- Gain an understanding of the potential use and value of flexibility within geographically local regions to further enhance efficient DNO network management; and
- Demonstrate the proof of concept, and evidence the business case, of commoditised flexibility (locally and for GB) through a USEF-based flexibility market.

1.2 Project Structure

Figure 1 shows the high-level structure and timeline for project FUSION.

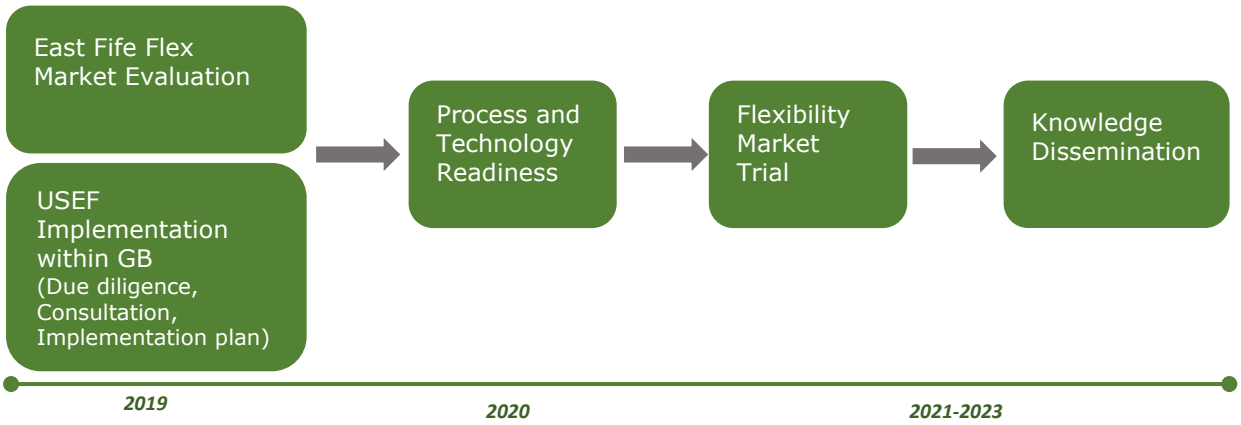

Figure 1: FUSION project structure

The first two project stages are being carried out in parallel during 2019:

- The **flexibility market evaluation** involves a comprehensive assessment of the available flexibility in East Fife, including customers connected at all voltage levels, to map the potential flexibility and determine the specific trial locations.
- The **USEF Implementation within GB** stage involves a due diligence of USEF against current and (likely) future GB energy market arrangements, a public consultation process and culminates in the development of a reference implementation plan for USEF in the GB energy market.

These initial two stages will inform stage 3, **Process and Technology Readiness**, to be delivered during 2020. This stage will implement the requisite processes and network flexibility planning tools that integrate with SP Distribution's existing network management tools to identify short-term and long-term flexibility requirements. This also includes implementation of USEF processes with market participants looking to participate in the trials. Moreover, FUSION will develop and implement a cloud-based procurement platform through which SP Distribution engages with participating aggregators and flexibility providers.

The **Flexibility Market Trial** in stage 4 will involve an open tender for the procurement of flexibility contracts with aggregators and other providers of flexibility in East Fife. Operational interaction with aggregators will be implemented using the cloud-based platform, which will facilitate the procurement, dispatch and remuneration of demand response and local generation. At the end of the trial, the trial results will be fully evaluated, and learnings will be made available to stakeholders through a range of appropriate dissemination methods.

1.3 Stakeholder Engagement

Project FUSION is a customer-centric project which requires well-informed project decisions and the wider participation of different types of stakeholders in the energy industry. This is firstly reflected in the consortium of project partners and its steering board, which includes network operators, aggregators, consultants, academic partners and local government.

In addition, project FUSION is working directly with two other 2017 NIC projects, TRANSITION (SSEN in partnership with ENWL) and EFFS (WPD), to maximise the collective learning across these projects for the benefit of the GB energy sector. The progress and outputs of these projects feed directly into, as well as complement, the work undertaken by the ENA Open Networks (ON) project.

Stakeholder engagement is central to the success of Project FUSION and a stakeholder forum has therefore been established for the project. The Stakeholder Forum connects and communicates with multiple groups across the industry. There is continual feedback and information exchange as the project progresses across local, national and international levels, all of which continuously informs the delivery of the project itself.

The project will also generate learning opportunities for SPEN, the wider DNO community, the ESO, aggregators, renewable energy developers, national and international energy market stakeholders, academia, local authorities and other industry stakeholders. Throughout FUSION, tangible and valuable learning will be generated, captured and disseminated, to ensure that stakeholders understand the impact and opportunities from FUSION outcomes. Knowledge dissemination will contribute to the foundation for the future DNO-DSO transition and the successful commercialisation of demand side flexibility for the British energy sector.

2 CONSULTATION ROADMAP

This consultation forms part of the third Work Package (WP3) of Project FUSION which explores the implementation of the USEF framework in the GB context and seeks to inform policy development around flexibility markets and the DNO-DSO transition.

2.1 Background to the Consultation

The starting point for WP3 and the basis for this consultation was a due diligence of the USEF framework against legal, regulatory and market arrangements governing the GB energy sector. The due diligence was carried out by DNV GL and assessed the fit of USEF with the direction of reform of GB energy policy and regulation, as well as forward-looking industry initiatives like the Energy Networks Association's Open Networks (ENA ON) project, to inform the transition to a smart, flexible energy system.

The fit analysis has considered key topics and areas that are essential for implementing a common flexibility market framework based on the open USEF model and, more generally, for maximising the value of flexibility for network operators and end-users:

- Flexibility Value Chain and routes to market for flexibility resources;
- Flexibility market organisation, covering new and changing market roles and interactions;
- Design of a flexibility market;
- Detailed requirements to facilitate DSO flexibility transactions;
- Detailed requirements to access specific flexibility markets; and
- Detailed requirements for privacy, cybersecurity and communications between market participants.

The due diligence results show that there is a close fit between USEF and both the current market design and the likely direction of future market design in GB. The results also show that there are several relevant and valuable innovative elements within USEF that could enrich current discussions and views on future energy market design, both broadening and deepening these views. This consultation seeks the views of GB energy market stakeholders on those innovative elements.

The due diligence report is available as a reference document on the Project FUSION website, providing a detailed description of the USEF framework mapped against GB arrangements: Due Diligence Report.

DNV GL used the findings of the due diligence to develop the structure of this consultation document and the consultation questions on behalf of SP Energy Networks. DNV GL has also held workshops and bilateral meetings with key industry stakeholders to obtain feedback on the consultation questions as well as the wider content of the consultation document to ensure it is relevant and fit for purpose.

2.2 Objective of the Consultation

Informed by the due diligence, this consultation document sets out recommendations for implementing USEF in the GB energy system. The public consultation explains the basis for USEF's recommendations and invites energy industry stakeholders to provide their feedback, to ensure USEF's proposals are valid and relevant, as well as enhancing them where possible. The consultation will inform the FUSION flexibility market trial, where key USEF concepts will be implemented in practice to assess their feasibility and effectiveness.

Therefore, this consultation seeks to:

- obtain stakeholder views on the potential application of USEF concepts in the GB energy system;
- acquire stakeholder feedback on recommendations that will inform future arrangements for local flexibility markets and facilitate the DNO to DSO transition;
- inform the future work undertaken in Project FUSION to develop a USEF GB implementation plan; and
- further develop thinking in the area of local flexibility markets.

2.3 How we will use your feedback

Once this consultation closes, all responses will be reviewed and summarised in a separate consultation report, alongside any conclusions that can be drawn. This report will be published on the Project FUSION website. The feedback we receive will inform the development of a reference implementation plan for USEF in the GB market, as well as the flexibility market trial in Project FUSION.

2.4 How to engage and respond

This consultation will be open for 8 weeks until 30th August online. Please provide your response either by email to fusion@spenergynetworks.com.

The consultation questions cover several aspects of the design, organisation, arrangements and requirements of flexibility markets. Some questions may not be relevant to all organisations and therefore respondents are welcome to respond only to the questions which are relevant to them and/or their organisations.

While the consultation is open, stakeholders are invited to join two public events, the first to be held in London on 18th July 2019 and the second in Glasgow on 20th August 2019. Further details on these events will be provided on the FUSION webpage and communicated to stakeholders on the project's mailing list.

All consultation responses are intended to be shared amongst project partners and stakeholders, therefore if your response is confidential and not for publication, please clearly notify us. Or, if elements of your organisation's response are confidential then please provide us with a full version for consideration and a non-confidential version for publication.

Alongside your response, please provide us with the following mandatory information:

- Full Name
- Organisation
- Role
- Contact details (i.e. contact number and/or email)
- Confidentiality option

3 INTRODUCTION TO USEF

The Universal Smart Energy Framework (USEF) provides guidelines to build an integrated smart energy future. Its purpose is to accelerate the establishment of an integrated smart energy system which benefits all stakeholders, from energy companies to consumers. Through its work, USEF aspires to contribute to the harmonisation of these flexibility mechanisms throughout Europe. USEF's ongoing development is managed by the USEF Foundation, a dedicated core team tasked with coordinating expertise, projects and partners while safeguarding the integrity and objectives of USEF.

A brief video introduction to the USEF framework is available online via this link.

3.1 Overview

The USEF framework aims to facilitate effective coordination across all the different actors involved in the electricity market by providing a common standardised roles model and market design while describing communication requirements and interactions between market roles. USEF turns flexible energy use into a tradeable commodity available for all energy market participants, separated from (but in coordination with) the traditional electricity supply chain, to optimise the use of resources. USEF focuses on explicit demand-side flexibility, in which prosumers are contracted by the aggregator to provide specific flexibility services using Active Demand and Supply (ADS) assets. USEF acknowledges, but does not provide detailed considerations for implicit demand-side flexibility or peer-to-peer energy trading.

To facilitate the transition towards a cost-effective and scalable model, the framework provides the essential tools and mechanisms which redefine existing energy market roles, add new roles and specify interactions and communications between them. In addition, the USEF standard ensures that all technologies and projects will be compatible and connectable to the energy system, facilitating project interconnection, hence fostering innovation and accelerating the smart energy transition. By delivering a common standard to build on, USEF connects people, technologies, projects and energy markets in a cost-effective manner. Its market-based mechanism defines the rules required to optimise the whole system, ensuring that energy is produced, delivered and managed at lowest cost for the whole system and effectively for the end-user.

The USEF framework provides:

- A **standardised common framework** designed to be implemented on top of current energy markets such as wholesale, retail and capacity markets.
- A description of the **flexibility value chain (FVC)** involving new and existing market players and giving a central role to the aggregator in facilitating flexibility transactions.
- A **roles model** and an **interaction model** to enable the implementation of different business models and interactions between actors.
- A market design described by the **Market Coordination Mechanism (MCM)** which sets out the phases and interaction requirements for flexibility transactions. The MCM provides all stakeholders with equal access to a smart energy system. To this end, it facilitates the delivery of value propositions (i.e. marketable services) to various market parties without imposing limitations on the diversity and customisation of those propositions.
- Detailed **communication and market access requirements** taking into consideration privacy and cybersecurity issues.

USEF's basic principles underpin its arrangements, roles and interactions and are summarised below:

- USEF facilitates one overall energy system instead of one single flexibility customer;
- USEF enables a market-based approach to unlock the value of flexibility;
- Freedom of choice to participate in flexibility products must be guaranteed; and
- USEF describes a model of interoperable roles, centred around the Aggregator role.

In USEF, aggregators have a central role in maximising the value and use of demand-side flexibility. Aggregators are responsible for acquiring and accumulating flexibility from prosumers and offering that flexibility to market participants (e.g. DSO, TSO, Balance Responsible Parties - BRPs) via trading counter parties (e.g. Balancing Service Provider – BSP) in commercial transactions as illustrated in Figure 2. The reward that aggregators receive in return for providing flexibility to market participants is shared with the prosumers.

USEF, as a roles model (see section 3.3), positions the Aggregator role on the retail side. For example, where an aggregator business provides balancing services, it combines the USEF roles of Aggregator and Balancing Service Provider (BSP). According to USEF, all market parties (or actors) that aggregate flexibility undertake the role of the Aggregator.

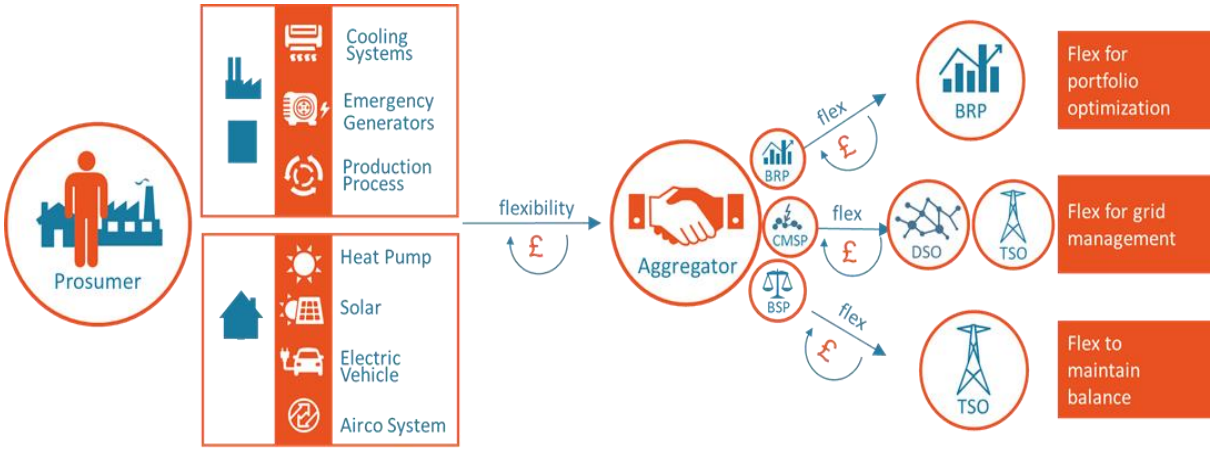

Figure 2: USEF Flexibility Value Chain

3.2 USEF Market Design

The USEF market design aims to create well-functioning electricity markets, where flexibility is dispatched based on market signals to where it is most essential and valuable. The flexibility market, as proposed by USEF, runs from the day before the delivery of the electricity to the moment of consumption, enabling full access to flexible technologies. The USEF market design provides USEF operating regimes and a common Market Coordination Mechanism (MCM).

The USEF MCM allows optimisation of the value of flexibility across all roles in the system and provides all stakeholders with equal access to the system, whilst ensuring that all physical constraints (frequency and thermal limits of network components) are met. The USEF MCM respects the freedom of connection, transaction and dispatch of flexibility, to the extent possible and builds on top of existing European market arrangements. It consists of five phases, as illustrated in Figure 3. These phases are iterative in nature and occur concurrently for different time periods under consideration (i.e. while network operation is underway for the current time period, settlement is being undertaken for a past period, and planning is underway for the future).

When examining the market process for a single time period, the five market phases can be categorised as occurring sequentially from years and months ahead of time, through real-time network operation, to post-settlement.

Figure 3: USEF MCM Phases

3.3 USEF as a Roles Model

Rather than being based on business models, USEF is a roles model. This approach results in a uniform description of roles and corresponding tasks and responsibilities, which can be implemented in various ways based on the local market and business needs. Several business models can be defined using USEF's roles model, while the interactions between market roles remain unchanged. This approach provides a generally applicable model in which the definition of each business is independent on other market participants. It also enables the standardisation of the flexibility market while still allowing the flexibility market to adjust to regional differences in market regulations.

A typical example of a USEF-enabled business model is an industrial prosumer that also takes on the role of aggregator, by providing flexibility to the network. In this case, the prosumer undertakes all the tasks and responsibilities assigned to the USEF aggregator role.

Insofar as possible, USEF has chosen to align the names of the roles used in its model with the existing business roles commonly accepted throughout Europe and defined by the European Network of Transmission System Operators for Electricity (ENTSO-E). The due diligence conducted in FUSION WP3 mapped USEF roles against existing GB roles as well as, where possible, against "actors" defined in the ENA ON Future Worlds Workstream. This exercise was not straightforward since the ENA ON Future Worlds is based on actors, rather than roles. The ENA has yet to map the future roles onto its Future Worlds actors. Trials, like FUSION's upcoming trial of the USEF roles model, will be important instruments to further inform this mapping.

The fit analysis in the due diligence report has identified three categories, when mapping USEF roles against GB roles and Future Worlds actors:

1. Roles that exist in all the arrangements but with slightly different responsibilities or names
2. Roles with exact match
3. Roles that are exclusive to USEF and/or GB and/or Future Worlds.

The outcomes of the fit analysis are outlined in Table 1. Further information on the roles' mapping is provided in Appendix B of this document and analysed in detail in the due diligence (sections 3.2. and 3.3).

It should be noted that USEF describes roles, while the Future Worlds describe actors that can perform multiple roles. For instance, USEF defines the role of the Balance Service Provider (BSP), as per European Guidelines. The BSP role is not explicitly defined in the Future Worlds and could be undertaken by several ENA ON actors, such as the aggregator and the Local Energy Systems (LES). (see Appendix B for reference)

Table 1: Mapping of USEF, GB roles and Future Worlds actors

USEF	GB	ENA Open Networks Future Worlds
Aggregator	Aggregator / Virtual Lead Party	Aggregator
Allocation Responsible Party (ARP)	ELEXON	Settlement Agent
Balance Responsible Party (BRP)	Balance Responsible Party (BRP)	Not explicitly defined
Balancing Services Provider (BSP)	Balancing Services Provider (BSP)	Not explicitly defined
Capacity Services Provider (CSP)	Capacity Services Provider (CSP)	Not explicitly defined
Common Reference Operator (CRO)		
Contraint Management Services Provider (CMSP)		
Distribution System Operator (DSO)	Distribution System Operator (DSO)	Distribution System Operator (DSO)
Energy Services Company (ESCo)	Energy Services Company (ESCo)	Not explicitly defined
Meter Data Company (MDC)	Data Communications Company	Data Communications Company
Producer	Generator	Generator
Prosumer	Prosumer & Consumer	Prosumer & Consumer
Supplier	Supplier	Supplier
Trader	Trader	Not explicitly defined
Transmission System Operator	Electricity System Operator	Electricity System Operator
	Transmission Owner (TO)	Transmission Owner (TO)
Active Demand & Supply (ADS)		Flexibility Resources
		Local Energy Systems
		Local Market Operator

Legend:

Role exists in all the arrangements but with slightly different responsibilities or names
Exact match
Exclusive only to these arrangements

For further information on USEF, please visit the USEF website which provides detailed publications on various key aspects of the USEF framework.

4 CONSULTATION QUESTIONS

We have categorised the questions into six areas that are cross-referenced to the key sections of the due diligence report:

- Flexibility Value Chain (Q1) is about facilitating commercial flexibility services by aggregators;
- Market Organisation (Q2-4) proposes new functions, roles and interactions to maximise the potential benefits of flexibility for the energy system;
- Market Design (Q5-7) focuses on the design of market mechanisms to facilitate effective operation and coordination among market participants;
- DSO Flexibility Transactions (Q8-9) proposes arrangements to facilitate cost-effective flexibility transactions for future DSOs;
- Market Access Requirements (Q10-13) considers arrangements for aggregators or aggregated flexibility resources to access specific flexibility markets; and
- Privacy and Cybersecurity (Q14) considers potential GDPR requirements in making information available to market participants.

For each question, we provide the relevant context ("Situation") and then set out USEF's recommendation ("USEF recommends"), which forms the basis of the question. Within each question, we also reference the section(s) of the Due Diligence Report providing the full details of USEF's proposals, and link with GB context relevant to the question.

Please consider and respond to all questions that are of interest to you or your organisation.

Q1 Flexibility value chain - Independent aggregation in wholesale markets

Please refer to due diligence report sections 2.1.2.4, 2.2.1.5 and 2.3.

Situation: In current GB market arrangements, only suppliers are able to utilise **demand-side flexibility in wholesale markets**. It is not currently possible for a customer to contract with a third-party aggregator who will use its flexibility on wholesale markets. To do so, the aggregator will need to meet detailed requirements to obtain a supply licence or establish contractual relationship with a supplier (effectively making the aggregator a service provider to the supplier). However, via both these routes, we are moving away from independent aggregation towards a joint aggregator-supplier model.

USEF defines “Independent aggregation” as the situation where a customer has an agreement with an aggregator to dispatch and market (all or parts of) its flexibility, while this aggregator operates without the consent from, or a contract with, the customer’s electricity supplier. Facilitating independent aggregation enables market parties to trade flexibility more easily. This can support start-up businesses and new business models, **facilitate liquid flexibility markets** and maximise the benefits of flexibility.

In order to enable independent aggregation in wholesale markets, it is necessary to organize a *transfer of energy (ToE)* between the energy supplier (of the customer where the flexibility is activated) and the aggregator. USEF defines the ToE as a wholesale electricity transaction between the supplier and the aggregator, triggered by a demand response activation by the aggregator, and used to restore the energy balance for both the aggregator and the supplier. The ToE arrangement is an extension of current wholesale settlement processes; the main challenge for ToE arrangements is to use an accurate baseline methodology to quantify the activated flexibility volume that needs to be transferred.

USEF recommends: Direct access for independent aggregation to wholesale energy markets should be facilitated to enhance the value of flexibility. Under USEF arrangements, independent aggregators provide wholesale services that help Balance Responsible Parties (BRPs) to minimise energy sourcing costs, including imbalance costs on day-ahead and intraday markets. USEF wholesale services include day-ahead optimisation, intraday optimisation, self-balancing and passive balancing services, as well as generation optimisation.

USEF proposes several ways of facilitating independent aggregation, setting out additional models for aggregators to directly access wholesale energy markets, without a supply licence or contractual arrangements with a licensed supplier. USEF’s models enable the wholesale energy settlement of flexibility transactions, as well as the settlement of imbalances imposed upon suppliers due to activation of demand response by aggregators.

In wholesale markets, there is a need to quantify the ToE, although there is no need to quantify the delivered flexibility, which is implicit in the portfolio of the BRPs. A baseline methodology to quantify the ToE is therefore required. USEF also recommends that the regulatory authority (Ofgem in GB) is responsible for approving the baseline methodology for ToE in wholesale markets.

Q1a: Provided appropriate arrangements for wholesale energy and imbalance settlement for affected suppliers are in place, do you agree that aggregators should be able to provide their services in the wholesale energy markets without a supply licence or an agreement with the supplier of the customer? *(Yes, No, Don't know)*

Q1b: If yes, a baseline methodology needs to be defined for the ToE in the wholesale markets. Which organisation(s) should take the initiative to design and propose this methodology?

Please provide the basis for your answers.

Q2 Market Organisation - Congestion point repository

Please refer to due diligence sections 3.1.1, 3.2.1 and 3.3.

Situation: Congestion in the distribution network occurs locally. Therefore, it is essential to identify congested areas where demand side flexibility is required. GB DNOs publish their constrained areas on their websites and/or the Piclo Flex platform, their flexibility requirements and the flexibility products which they plan to procure in each area of the network. Flexibility providers, who are interested in participating in the flexibility services, obtain access to the above platforms and information, which allows them to explore local opportunities for flexibility provision and participate in the procurement processes.

A **single central congestion point repository** has not yet been developed in GB, although similar functionalities are being considered in GB.

For example, the ENA Open Networks project explores the creation of a System Wide Resource Register offered by DNOs, IDNOs, TOs and the ESO to customers and industry stakeholders. The scope of the register is to improve the visibility for distributed energy resources to network and system operators and to customers for visibility of reinforcement quotes. The RecorDER project has been proposed as a potential solution for the System Wide Resource Register, which is a collaborative Network Innovation Allocation project between National Grid, SP Energy, Electron and UK Power Networks

The Energy Data Taskforce (EDT) is another industry initiative focused on the use and management of data in the energy sector. The report “A Strategy for a Modern Digitalised Energy System”, published on 13 June 2019, recommends the coordination of asset registration which will simplify the registration process for consumers, businesses and intermediaries and eliminate duplication of data. In addition, the EDT report recommends the development of a Digital System Map that will help unlock the opportunities of a decentralised, digitalised energy system and facilitate access to network data to support projects or test new business models effectively.

USEF recommends: USEF proposes the development of a **Common Reference**, a repository containing detailed information on congestion points, their associated connections and active aggregators in the electricity network. The Common Reference can enhance informed decision making for flexibility buyers and sellers, as well as create a level playing field for all market participants by ensuring the availability of transparent and consistent information. The Common Reference could enhance GB initiatives currently being considered, as it focuses on visibility of congestion points and connected (potential) flexibility.

USEF proposes the Common Reference can only be accessed by appropriately registered market participants to optimise their services and exchange information. Aggregators can access the Common Reference to assess whether they have sufficient flexibility from their customers in a given congestion point to provide to the DSO, as well as to explore possibilities of adding new flexible resources to their portfolio, by contracting new customers within a congested area. Ultimately, the Common Reference can be used for matchmaking between DSOs seeking to procure flexibility in an area and aggregators offering flexibility in the same area.

USEF recommends that the Common Reference repository is operated by the **Common Reference Operator (CRO)**. The CRO’s role is to ensure the publication of both the DSO flexibility requirements and the associated flexibility assets in each congested point as well as the standardisation of this publication for all distribution areas. USEF does not provide any

recommendation on the regulatory arrangements required for the CRO to operate in the market and to provide its services to the stakeholders. In GB, the role of the CRO could be performed by a new or existing entity or by one of the ENA ON actors.

Note that question 14 below explores the potential impact of the UK Data Protection Act (DPA) 2018 and EU General Data Protection Regulation (GDPR) on the provision of information in the Common Reference.

Q2a: Should there be a standardised publication of congestion points and associated connections, flexible assets and active aggregators, which market participants have access to? *(Yes, No, Don't know)*

Q2b: If yes, do you think this should be a regulated entity (e.g. operating under licence, and regulated by Ofgem)? *(Yes, No, Don't know, N/A)*

Please provide the basis for your answers.

Q3 Market Organisation - Central data hub

Please refer to due diligence sections 5.2.1 and 5.3.2.

Situation: In GB, flexibility transactions and wholesale processes are facilitated by various parties. Wholesale energy transactions are settled either bilaterally or through power exchanges. ELEXON is responsible for allocating electricity volumes for imbalance settlement processes, including the validation and settlement of Balancing Mechanism (BM) transactions. National Grid ESO is responsible for the settlement of non-BM balancing services and the payment of these services. DSOs are responsible for the validation and remuneration of flexibility related to DSOs' flexibility transactions, for which they capture and access all data locally.

The Energy Data Taskforce recommends that a Data Catalogue should be established to provide visibility of the data that exists across the energy sector through common metadata standards. The Data Catalogue is designed to address the problem of data visibility by requiring organisations to contribute metadata about their datasets. The Taskforce recommends that the Data Catalogue should be developed and managed by an independent, trusted party with a strong track record in data management, proposing the Office for National Statistics (ONS) to undertake this role.

USEF recommends: In the same context as the Energy Data Taskforce, USEF has highlighted that the increase in both the number of flexibility transactions and the number of parties involved in flexibility services creates a need for a registry for demand-side flexibility transactions. Such a registry will support the commercial energy market through gathering, validating, storing and distributing market data.

Therefore, USEF recommends the establishment of a regulated **central data hub**, where data for flexibility processes, such as the coordination of flexibility deployment, measurement, validation and settlement of flexibility services, is recorded. Demand-side flexibility processes can be executed within or outside the central data hub. This data hub will provide a more transparent market, facilitating the standardisation of flexibility settlement processes as well as the participation of flexibility service providers in various flexibility services. USEF foresees that the central data hub will provide flexibility buyers and sellers with better visibility of flexibility transactions across all markets, which in turn will facilitate flexibility value stacking.

Q3a: Do you agree that there should be a central data hub to record flexibility volumes and transactions to allow consistent settlement of flexibility and create transparency? *(Yes, No, Don't know)*

Q3b: If yes, do you think this should be a regulated entity (e.g. operating under licence and regulated by Ofgem)? *(Yes, No, Don't know, N/A)*

Please provide the basis for your answers.

Q4 Market Organisation - Constraint management service provider

Please refer to due diligence sections 3.1 and 3.3.

Situation: A Balancing Service Provider (BSP) is defined as a market participant that provides energy volumes to National Grid ESO for the purposes of balancing the total system. The role of the BSP was introduced by the Electricity Balancing Guideline from the European Commission and all terms and conditions developed for the BSP are clearly defined in the Commission Regulation (EU) 2017/2195. The Article 16 of this European Regulation defines responsibilities for the BSP with regard to prequalification requirements, balancing energy submissions and updates of energy balancing submissions before the gate closure time. The BSP is a role which exists in GB with defined responsibilities and interactions which aligns with the EU guideline.

In the energy markets, we also see market parties that provide constraint management services to the ESO and DSOs and help grid operators to optimise grid operation for physical and market constraints, such as DSO congestion management services. However, the parties that provide constraint management services do not hold a designated role in the GB market, as such their responsibilities are not clearly defined. To date, these parties are often referred to as “aggregators”, although they may combine several roles, such as the role of a BSP, supplier, Energy Services Company (ESCo), or any subset of these roles.

USEF recommends: USEF recommends the responsibilities of the party that provides constraint management services to the DSOs should be formally recognised and standardised, as with the BSP. To facilitate the standardisation of these responsibilities, USEF defines the role of the Constraint Management Service Provider (CMSP).

The CMSP’s function is to provide constraint management services to electricity networks. This role takes on specific responsibilities in communicating and coordinating flexibility transactions with the ESO and DSOs, to ensure effective deployment of flexibility as well as effective management of network constraints. Responsibilities also involve ensuring efficient dispatch of flexibility to maintain the safety and reliability of the networks. Apart from defining the CMSP responsibilities related to prequalification, flexibility trading, dispatch, settlement, USEF’s recommendation also clarifies the contractual relations of the CMSP with the aggregator, the DSOs and/or the ESO, and the Balance Responsible Parties.

USEF is a roles model, rather than a business model. This implies that the role of the CMSP could be undertaken by several existing entities or ENA ON actors, such as aggregators and Distributed Energy Resources (DER).

Q4a: Would it be beneficial to formalise the responsibilities and the role of the constraint management service provider (CMSP) similarly to the BSP role? *(Yes, No, Don’t know)*

Q4b: If yes, what kind of responsibilities should be defined for the CMSP role?

Please provide the basis for your answer.

Q5 Market Design - Operating regimes

Please refer to due diligence sections 4.1.1, 4.2.1 and 4.3.

Situation: The deployment of flexibility generates questions on how and when to activate flexibility in order to maximise the value of flexibility and safeguard the reliability of the networks. In GB, the National Emergency Plan introduces crisis levels to ensure there is a consistent approach to the assessment of an emergency and to confirm that an appropriate level of response is implemented locally, nationally, and across the European Union, as required. Detailed emergency interface procedures and protocols are set out in the Grid Code and Distribution Code.

The Codes cover a range of potential emergency scenarios, such as load shedding, whether by voltage reduction or disconnection, and Black Start, specifying technical details, notification protocols and implementation requirements. The commercial treatment and associated market details are set out in the Balancing and Settlement Code.

The ENA ON project is currently considering future arrangements for the GB energy market regarding how to define flexibility market boundaries and market thresholds at a locational level and where the threshold between market-led and control-led flexibility should be set.

USEF recommends: USEF proposes the concept of operating regimes, functioning as a traffic light mechanism to inform the (un)restricted trade and dispatch of flexibility. The USEF market design of operating regimes aims to ensure well-functioning short-term electricity markets, where flexibility is dispatched based on market signals to where it is most essential and valuable. USEF introduces four operating regimes which reflect the status of constraints and congestion in the energy system (Figure 1).

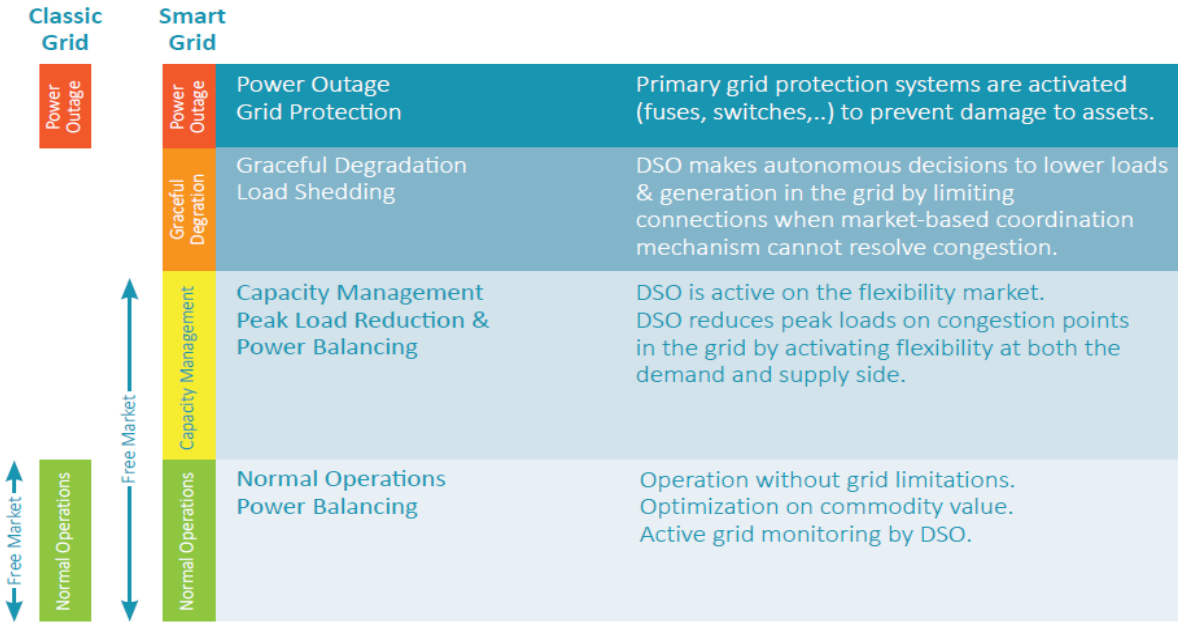

Figure 1: USEF Operating Regimes

The following describes the operations in each USEF regime:

- **The Green regime – "Normal Operations":** no grid limitations in the operation of the network and the commodity value of flexibility is optimised. Flexibility is used for portfolio optimisation and energy balancing.

- **The Yellow regime - "Congestion Management without market restrictions":** flexibility is required not only for energy balancing but also for grid capacity management. In areas where system operators have identified a possible grid overload, they procure capacity management products to keep the power flows and voltage level within acceptable limits. System operators procure flexibility without market restrictions and respecting the three freedoms of "connect, trade and dispatch". In this regime grid capacity management services are used as an alternative to grid reinforcement without trade or dispatch restrictions and always offered on voluntary basis.

- **The Orange regime - "Congestion Management with market restrictions to Graceful Degradation:** ESO or DSOs can overrule the market when the market mechanisms of the yellow regime can no longer resolve the congestion. Flexibility may still be activated through a market-based mechanism, yet certain freedoms are affected: flexibility bids may be compulsory, or dispatch restrictions may apply. Also, non-market-based mechanisms may be used (e.g. direct load control or generation curtailment). As USEF focuses on market- based solutions, it recommends that the non-market option of Orange regime should only be considered as a last resort in case the market did not function. In this regime, congestion management services are utilised as a regulated mechanism imposing trade and/or dispatch restrictions possibly non-voluntarily.

- **The Red regime - "Power Outage":** is activated when all other solutions for managing constraints and congestions have failed.

Q5a: Do you think that there is need to create transparency on network limitations that restrict the free trade of flexibility services by market participants? *(Yes, No, Don't know)*

Q5b: If yes, do you think that USEF's Operating Regimes are a feasible solution for this issue? *(Yes, No, Don't know, N/A)*

Q5c: Do you think that clear rules should be defined to regulate when DSOs move from one state to the other? *(Yes, No, Don't know)*

Please provide the basis for your answers.

Q6 Market Design - Information exchange

Please refer to due diligence sections 4.1.3, 5.1.2.1 and 5.3.1.

Situation: According to the Future World B which is described in the ENA ON Workstream 2, the ESO and the DSOs will separately procure flexibility to meet their flexibility requirements. World B suggests that the need for **information exchange** will increase in the future. As such, closer coordination between the ESO and the DSOs and other market participants will be required, including aggregators and flexibility service providers. Current and future arrangements envisage that aggregators are only required to inform the DSOs about their availability and utilisation of flexibility during the procurement and contractual arrangements.

USEF recommends: Aggregators should be an integral part of the information exchange and planning processes in providing flexibility to DSOs. Therefore, USEF introduces the concept of **D-programs**, through which aggregators active in congested DSO areas are obliged to inform the DSO on planned activations of flexibility (day-ahead and intraday). Aggregators also need to inform DSOs about any contracted flexibility capacity. Note that this obligation applies to all aggregators, including aggregators that do not participate in DSO congestion management services. The DSO combines the D-programs with profiles of its customers that are not served by an aggregator, validates the combined plan and accepts it or rejects it, based on grid safety analysis outcomes. USEF also proposes extending this obligation to suppliers for flexibility activated through implicit mechanisms.

Finally, USEF recommends that the same information exchange will take place in case of congestion points on ESO level, since USEF constraint management processes are based on the same principles. D-programs are fundamental to USEF and facilitate better planning for DSOs to optimise the procurement and dispatch of flexibility.

Q6a: Do you think that further coordination of flexibility deployment between suppliers/aggregators and the ESO/DSOs is needed to facilitate efficient and reliable flexibility markets? *(Yes, No, Don't know)*

Q6b: If yes, do you agree that information exchange (i.e. D-programs) between suppliers/aggregators and ESO/DSOs, concerning flexibility contracts and flexibility activations, limited to congested areas, should be mandatory? *(Yes, No, Don't know, N/A)*

Please provide the basis for your answers.

Q7 Market Design - Flexibility Platforms

Please refer to due diligence sections 5.2.1 and 5.3.2.

Situation: Currently, most markets and products within the flexibility value chain are operated on separate platforms with different functionalities. For example, power exchanges operate platforms for wholesale markets and National Grid ESO uses its own portal to procure and transact flexibility services. When DNOs wish to procure flexibility for congestion management purposes, they can either go through **proprietary operational platforms** (e.g. WPD's Flexible Power platform) or consider **third-party commercial platforms** (e.g. Piclo Flex) as a facilitator for interactions with flexibility providers.

USEF recommends: USEF proposes the **standardisation of interactions between flexibility service providers and flexibility platforms**. For instance, measurement, validation and settlement of flexibility must be designed in a way that supports both viable business cases for aggregators and effective products for the TSO/DSOs. Even if validation and settlement of product delivery take place on TSO/DSO proprietary operational platforms, consistency is a necessity when the aggregator is active in different products and markets simultaneously.

It is possible that in a future flexibility market, TSO/DSO proprietary operational platforms will continue to coexist alongside third-party commercial platforms. In this case, USEF also recommends the **standardisation of the interface between TSO/DSO platforms and third-party commercial platforms**. This facilitates that TSOs and DSOs can more readily interact with multiple market operators, allowing them access to a more liquid and competitive market. An open, standardised interface would also make it easier and more cost-efficient for commercial platform operators to facilitate grid management services, which in turn facilitate market access for flexibility service providers.

Q7a: Would you consider that it is beneficial to have a standard interface between (1) flexibility service providers and flexibility platforms; and (2) TSO/DSO platforms and third-party commercial platforms? *(Yes, No, Don't know)*

Q7b: What could be the possible scope of this standardisation?

Please provide the basis for your answer.

Q8 DSO Flexibility Transactions - DSO flexibility procurement

Please refer to due diligence sections 5.1.2 and 5.3.1.

Situation: In current and future GB DSO products, as they have been designed to date by the ENA ON or by individual DNOs, the DSO procures the flexibility service ahead of dispatch time and establishes bilateral contracts with flexibility service providers. This approach guarantees a certain availability of flexibility for the DSO and is in line with USEF long-term availability contracts where the activation of flexibility is prearranged in bilateral contracts.

USEF recommends: USEF arrangements include both long-term availability contracts and **short-term flexibility procurement via "free bids"**. Aggregators with long-term availability contracts have the obligation to offer a fixed amount of flexibility to the DSO and they are paid for both offering availability of flexibility and activating flexibility. The availability price is pre-arranged, while the activation price is determined by the merit order of the bids. Long-term flexibility contracts are not automatically activated (fully or pro-rata) when flexibility is required, and activation of flexibility is organised through a merit-order mechanism. Aggregators are then obliged to place bids in accordance with the service window and contracted amount stated in their contracts, which will then populate the merit order.

Short-term contracts refer to the contracts that are signed between the aggregator and the DSO closer to real-time. Flexibility trading for congestion management, which typically occurs Day-Ahead, Intra-Day and sometimes in Real-time, is classified as short-term.

In the case of "free bids", an aggregator places a bid on the market on a day-to-day basis, without a contractual obligation to do so. The aggregator, therefore, is free to offer flexibility, and can bid at the marginal cost of this flexibility. The availability is not guaranteed for the DSO, until the bid is made. USEF recommends that "free bids" can compete with contracted flexibility in a merit-order mechanism, in which besides price, the DSO can also assess other qualitative characteristics such as connectivity aspects, reliability, and the period to which the load is shifted. The DSO must provide transparency about this selection process.

The merit order itself ensures that the DSO can buy the economically optimal flexibility service, while the availability contracts guarantee availability of flexibility (i.e. sufficient depth of the merit order). The "free bids" mechanism provides flexible resources that cannot be committed in advance to a certain service window the opportunity to participate in congestion management services through a short-term contract. This mechanism also provides a smooth transition to future, more liquid, flexibility markets, where availability contracts may become obsolete.

Q8: Do you agree with USEF's recommendation to allow free bids in a DSO congestion management product, even when DSOs requirements are met by the existing availability contracts? *(Yes, No, Don't know)*

Please provide the basis for your answer.

Q9 DSO Flexibility Transactions - DSO flexibility products & processes

Please refer to due diligence sections 4.1, 5.1.2.1, 5.1.3.1 and 5.1.4.1.

Situation: Flexibility products and services can deliver various business benefits to the DSOs. The due diligence has highlighted the potential to put in place further arrangements that ensure effective flexibility procurement and dispatch by DSOs to accommodate the commercial outcome for flexibility providers.

Exploring the direction of GB future market arrangements in ENA ON Future World B, we see that the DSOs and the ESO would work together to efficiently manage networks through coordinated procurement and dispatch of flexibility resource. Although system operators will procure flexibility separately, they are expected to interact with the flexibility market in various ways to maximise synergies between transmission and distribution networks and minimise potential conflicts associated with the delivery of concurrent flexibility services. These interactions highlight the need for standardisation of processes and communication.

Workstream 1A of the ENA ON project is exploring, amongst other deliverables, options to develop consistent processes for DSO flexibility transactions (e.g. procurement, dispatch, settlement) and standards for commercial interactions between the DSOs and the flexibility providers.

USEF recommends: USEF introduces the Market Coordination Mechanism (MCM) which includes all the steps of the flexibility trading process from contractual arrangements to the settlement of flexibility. USEF splits the flexibility trading process in five phases and describes the interactions between market participants and information exchange requirements in each phase of the MCM (Figure 2).

Figure 2: USEF MCM Phases

USEF also provides comprehensive arrangements to plan and manage the deployment of DSO flexibility services and defines **consistent processes for DSO flexibility transactions** such as contractual & regulatory arrangements, pricing, validation, settlement and remuneration of flexibility processes. These processes are under development in GB and therefore USEF's proposals could facilitate the standardisation of DSO flexibility products and transactions.

In addition, USEF has considered communication requirements between the ESO and DSOs and recommends that DSOs and the ESO use common market mechanisms, IT systems and interfaces to procure flexibility and interact with the market. Some foreseen benefits of this standardisation and use of common IT systems and interfaces include lower transaction costs, higher liquidity and high transparency among market participants which in turn will unlock demand-side flexibility participation.

USEF arrangements have been designed to sit on top of existing market arrangements and could fit to flexibility markets of different countries. To that aim, USEF could facilitate the

alignment of GB processes with other European processes. This in turn would lower entry barriers for international aggregators and IT solution providers in GB market, as well as allow easier access for GB aggregators to continental markets.

Q9a: Do you agree that a common mechanism for all DSOs and the ESO to procure flexibility and interact with the market would be beneficial? *(Yes, No, Don't know)*

If yes, would you consider the USEF approach to be suitable for providing this mechanism? *(Yes, No, Don't know, N/A)*

Q9b: If you agree with that consistent processes and standardisation would be beneficial, which elements of the flexibility transactions processes and interactions should be standardised?

Q9c: Do you consider it beneficial for GB processes to align with European processes for DSO flexibility mechanisms? *(Yes, No, Don't know)*

Please provide the basis for your answer.

Q10 Market access requirements - Aggregator implementation models

Please refer to due diligence sections 6.2 and 6.3 and Appendix C of this document.

Situation: Ofgem's and BEIS' plans identify the **wider market participation of aggregators and demand-side response** (DSR) as a key priority. However, key elements in flexibility transactions, such as balancing responsibility and delivery risk, still need to be defined or designed. Under current arrangements, suppliers can be exposed to **delivery/imbalance risk** as a result of an independent aggregator's activity. For example, when the aggregator activates flexibility from a prosumer, then the supplier of this prosumer is faced with an open supply position for energy that the supplier sourced but never used. In addition, the supplier or the Balance Responsible Party (BRP) of the supplier has an imbalance position compared to the contracted volume (i.e. the BRP has under-consumed compared to its contracted volume).

Ofgem and BEIS have raised these issues in an Open Letter and in the Smart Systems and Flexibility Plan, proposing that balancing costs and delivery risks must be borne by the party that creates them. In the case of flexibility transactions, this would be the aggregator. For the Balancing Mechanism and TERRE settlement, arrangements will include a mechanism whereby energy related to an instruction for a Virtual Lead Party's (VLP) asset, will be discounted from the supplier's position and there will be no energy transaction between the VLP and the supplier. ELEXON will make the adjustments in the energy volumes and will correct the supplier's position for a given consumer at the boundary meter level.

USEF recommends: USEF agrees with Ofgem's views that wider participation of aggregators in GB energy markets requires arrangements that set out aggregator's relation to the supplier or other parties with balancing responsibility. These arrangements define how balance responsibility, transfer of energy and information exchange are organised. USEF has developed seven models that are called **Aggregator Implementation Models (AIMs)** and describe existing or potential future arrangements between the aggregator and other market participants. USEF has developed the AIMs in an effort to answer the following questions:

- Are the roles of the supplier and aggregator combined in a single market party?
- Does the aggregator need to assign its own Balance Responsible Party for its portfolio?
- Does the aggregator need a contract with the supplier?
- Do we need a Transfer of Energy to correct the open position of the supplier? If so, how is energy transferred?

Appendix C explains USEF's AIMs in further detail.

In the development of the AIMs, USEF separates flexibility from supply; the aggregator takes the responsibility for the flexibility, while the energy supply remains the responsibility of the supplier. Therefore, the responsibilities of the aggregator are limited to the flexibility activation period, to assets that are activated by the aggregator and to the deviation of these assets from their baseline during the activation period. Clear arrangements should be in place through which the aggregator compensates the supplier for DSR activation effects. Finally, USEF recommends that the controllable asset that is used to provide flexibility should be isolated from other assets of the prosumer, so that the aggregator is only responsible for the controllable load (or generation).

For reference: USEF defines "Independent aggregation" as the situation where a customer has an agreement with an aggregator to dispatch and market (parts of) its flexibility, while this

aggregator operates without the consent from or a contract with the electricity supplier of the customer. Independent aggregation enables market parties to trade flexibility more easily.

Q10a: Do you consider that aggregators should have balance responsibility for the flexibility they operate in all flexibility markets and products? *(Yes, No, Don't know)*

If not, which products may deviate from this principle?

Q10b: Do you agree that the open supply position of the supplier should be corrected through defined mechanisms? *(Yes, No, Don't know)*

Please provide the basis for your answer.

Q11 Market access requirements - Re-dispatch responsibility

Please refer to due diligence section 5.1.2.1 and 5.3.

Situation: When a DSO or the ESO requests a flexibility activation in the form of a congestion management product, that activation affects overall system balance. This impact can be neutralised by activating the same amount of flexibility in the opposite "direction" outside the congested area. This mechanism is often referred to as a **"re-dispatch**".

For example, if the activation of flexibility leads to a decrease in demand at a congestion point of a DSO, then the system needs an increase in demand or a decrease in generation to be facilitated outside the DSO's congested area. This raises the question of which market party should be responsible for the re-dispatch.

USEF recommends: In theory, five models are possible with regard to re-dispatch responsibility in a DSO congestion management product:

a) The DSO performs the re-dispatch and the DSO should buy re-dispatch simultaneously with the flexibility activation ("congestion spread")

b) The DSO performs the re-dispatch with no restrictions on when the DSO should buy energy for re-dispatch

c) The ESO performs the re-dispatch for the cumulative DSO/ESO flexibility activations

d) The aggregator or the Constraints Management Service Provider (CMSP) performs the re-dispatch, implying that the DSO purchases a service rather than energy. This option requires a Transfer of Energy (ToE) between the aggregator and the supplier.

e) The supplier performs the re-dispatch, implying that the DSO purchases a service rather than energy. This option does not require a ToE.

The choice of model invites two additional considerations:

- Does the DSO/ESO purchase energy (kWh) from the flexibility service provider or does it buy only a service (but not kWh) when requesting flexibility for re-dispatch purposes?
- Is independent aggregation (see Q1) facilitated by the market and could an independent aggregator therefore perform re-dispatch (Option d)?

USEF recommends either option b (re-dispatch by the DSO) or option d (re-dispatch by the aggregator).

Q11: Who should be responsible for the re-dispatch in a DSO congestion management product? Please select among the options a, b, c, d, e, none of the above.

Please provide the basis for your answer.

Q12 Market access requirements - Flexibility value stacking

Please refer to due diligence section 6.1.1 and 6.3.

Situation: Stacking of flexibility services refers to the provision of multiple services from the same portfolio to one or multiple parties that require flexibility (i.e. ESO, DNOs). This is an opportunity for enhancing the value of flexibility under several pathways and providing aggregators and prosumers with additional revenue streams.

The due diligence has highlighted that stacking of flexibility services is possible in GB for balancing services and the capacity market and is being considered for DSO flexibility services. The Electricity System Operator (ESO) recently published a letter to trigger the review of exclusivity clauses within balancing services contracts, acknowledging the advantages of value stacking and the need of third parties, such as Distribution Network Operators (DNOs) and the aggregators, to profit from these services.

The majority of the ESO balancing services can be stacked across different availability windows, while some of them can be stacked within the same availability window. There are, however, some restrictions which inhibit close to real-time adjustment of assets within a portfolio.

The ENA ON project also explores flexibility services stacking, where aggregators will be able to stack revenues from different flexibility services at both distribution and transmission level and to aggregate their portfolio across DNO networks.

Ofgem encourages stacking of flexibility services to improve the business case to deploy flexibility for both consumers and aggregators.

USEF recommends: The possibilities for portfolio optimisation by the aggregator should be maximised to reap all potential benefits related to value stacking. USEF therefore agrees with the current GB arrangements and recommends an additional route for aggregators to stack flexibility services through **dynamic pooling**. Dynamic pooling allows aggregators to activate one asset of their portfolio for one service and another asset of their portfolio for different service in the same availability window, deciding which resources to use up to real time. The remaining assets in the aggregator's portfolio will not be included in settlement processes.

Dynamic pooling maximises the value of flexibility for the aggregator and facilitates portfolio risk management. For example, the aggregator can decide close to real-time to activate flexibility from assets in a specific congested area to deliver for a DSO congestion management product and flexibility from other assets (same portfolio, different location) for balancing/capacity services at a transmission level. Hence, the aggregator can choose which assets are more suitable for each service based on close-to-real time generation/consumption data of its portfolio and use its assets in the most efficient and reliable way. This option will facilitate aggregators active in domestic customers; domestic portfolios will consist of many small flexible assets. Therefore, it will be difficult for aggregators to define which assets will be used well in advance of the flexibility dispatch.

Q12a: Do you agree that dynamic pooling in flexibility services should be supported? *(Yes, No, Don't know)*

Q12b: If yes, please indicate products and services where dynamic pooling should be possible (i.e. balancing, congestion management, wholesale, capacity market).

Please provide the basis for your answer.

Q13 Market access requirements - Sub-metering arrangements

Please refer to due diligence sections 6.1.3 and 6.3.

Situation: Currently, **sub-metering** is used in various GB balancing services, due to the need for increased granularity of data at asset level. Newly available technology allows for services to be provided by a portfolio of smaller assets, with testing and performance monitoring contractually linked to the assets making up that portfolio.

To date sub-metering readings are not used for settlement in the Balancing Mechanism or wholesale market, where imbalance settlement is based on the readings from the main meter at the connection point. From December 2019, independent aggregators can participate in the Balancing Mechanism as Virtual Lead Parties (VLPs). VLPs will be able to control end-users' flexible assets, behind the meter, without prior agreement with the supplier. Given current sub-metering arrangements in GB, there is no measurement-based mechanism to quantify and validate the activation of flexibility behind the meter for imbalance settlement purposes. ELEXON is exploring how settlement processes can use appropriate sub-metering data and allow sub-sites 'behind the meter' to provide balancing services through the Balancing Mechanism (modification P375). The sub-metering data will separate the balancing-related activities from imbalance settlement.

USEF recommends: As part of the separation of flexibility from supply there is a need to isolate the controllable asset that is used for demand response from other assets at the end user's site. To this end, USEF recommends that the aggregator should be allowed to apply sub-metering for all flexibility services, including balancing services to the ESO and constraint management services to both the ESO and the DSO, and services to the wholesale energy markets. Sub-metering allows the aggregator to operate different flexibility resources at the same site, at the same time, and serves additional purposes such as:

- Better quantification of customer's performance towards the aggregator;
- Better quantification of aggregator's performance towards the flexibility customer; and
- Better quantification of the activated flexibility as a basis for the Transfer of Energy (ToE).

In addition, USEF recommends that data which is used for wholesale settlement purposes and ToE needs to be validated by a single independent party, which can be either regulated or unregulated.

For reference:

- USEF defines the ToE as a wholesale electricity transaction between the supplier and the aggregator, which is triggered by a demand response activation by the aggregator and is used to restore energy balance for both the aggregator and the supplier. This ToE arrangement is an extension to current wholesale settlement processes; the main challenge of the ToE arrangements is to use a proper baseline methodology to quantify the activated flexibility volume that need to be transferred. Organising the ToE is necessary for enabling independent aggregation in wholesale markets.
- USEF defines "Independent aggregation" as the situation where a customer has an agreement with an aggregator to dispatch and market (parts of) its flexibility, whereas this aggregator operates without the consent from or a contract with the electricity supplier of

the customer. Independent aggregation enables market parties to trade flexibility more easily.

Q13a: Should sub-metering be allowed in all markets and products, including wholesale market and DSO constraint management service? *(Yes, No, Don't know)*

If not, please indicate products and services where sub-metering should be possible and cost-effective.

Q13b: In the case of independent aggregation, should sub-metering also be used as input for the quantification of the Transfer of Energy, which, in turn, will impact wholesale settlement? *(Yes, No, Don't know, N/A)*

Q13c: Who should be responsible for the validation of sub-metering data?

Please provide the basis for your answers.

Q14 Privacy and cyber security - Congestion point publication

Please refer to due diligence section 7.

Situation: The UK data protection regime is set out in the Data Protection Act (DPA) 2018, along with the GDPR (which also forms part of UK law). It takes a flexible, risk-based approach which encourages organisations to consider and justify the use of data. Data protection is about ensuring people can trust organisations to use their data fairly and responsibly. Data protection and privacy is a key priority when considering information exchange for flexibility transactions and has been highlighted by many industry initiatives, such as by the ENA ON project in the development of the System Wide Resource Register.

USEF recommends: USEF recommends the use of a Common Reference (CR), which contains detailed information regarding congestion points, their associated connections and active aggregators in the electricity network. USEF envisages that this repository will facilitate consistency and transparency in the flexibility services processes and transactions. The CR provides a complete list of connection identifiers that can help resolve a specific congestion point. USEF considers that this information is vital for a well-functioning congestion management product; however, privacy may be a factor, especially where residential customers are involved, and it may be contingent on acquiring customer consent.

Q14a: Is the publication of congestion points using connection identifiers in line with GDPR requirements on security and privacy? *(Yes, No, Don't know)*

Q14b: If not, what alternative can be used to capture locational information of congestion points and their associated substations (postcodes, GPS coordinates, streets, etc.)?

Please provide the basis for your answer.

5 Next Steps

The consultation closes on 30 August 2019.

Please provide your response via email to fusion@spenergynetworks.com.

It is our intention to review your responses to this consultation and publish the insights of our analysis and processing of your feedback by the end of November 2019 on the FUSION webpage.

Appendix A Glossary of Terms

Abbreviation	Definition
Active Demand & Supply (ADS)[1]	Energy consuming or producing devices that can be actively controlled.
Aggregator[1]	A service provider that contracts, monitors, aggregates, dispatches and remunerates flexible assets at the customer side.
Aggregator Implementation Model (AIM)[1]	USEF term that describes the relation of the aggregator with the supplier and the Balance Responsible Party (BRP). It covers relevant aspects of aggregation implementation, such as contractual arrangements, imbalance responsibility and transfer of energy.
Allocated volume	An energy volume physically injected or withdrawn from the system and attributed to a Balance Responsible Party, for the calculation of the imbalance associated with the Balance Responsible Party.
Allocation Responsible Party (ARP)[1]	A party that establishes and communicates the actual electricity volumes which are consumed and produced per Imbalance Settlement Period (ISP) within a certain metering area. In GB, this role is performed by the Balancing and Settlement Code Company, ELEXON, for Imbalance Settlement and the Balancing Mechanism.
Balance Responsible Party (BRP)	A market participant or its chosen representative who is responsible for balancing electricity supply and demand of its portfolio in each settlement period.
Balancing Mechanism (BM)	A mechanism used by National Grid Electricity System Operator (ESO), to balance electricity supply and demand close to real time. It is used to balance supply and demand in each half hour settlement period.
Balancing Mechanism Unit (BMU)	Balancing Mechanism Units are the units used under the Balancing and Settlement Code (BSC) to account for all energy that flows on or off the Total System, which is the Transmission System and each Distribution System combined. A BM Unit is the smallest grouping of equipment that can be independently metered for Settlement.
Balancing Service Provider (BSP)	A market participant who provides energy volumes to the TSO for the purposes of balancing the total system. In GB, this role is usually undertaken by aggregators, suppliers or customers directly connected to the transmission network.
Balancing Settlement Code (BSC)	The Balancing and Settlement Code (BSC) is a legal document which defines the rules and governance for the balancing mechanism and imbalance settlement processes of electricity in Great Britain. The BSC is administered by ELEXON, the Balancing and Settlement Code Company.
Capacity Market (CM)	A mechanism designed to increase security of electricity supply by encouraging investment in reliable sources of capacity.

1 USEF terminology

Capacity Service Provider (CSP)[1]	A market participant in USEF that provides adequacy services to either the TSO or the BRP. This term is not used in GB although there are market parties that provide adequacy services in the Capacity Market.
Common Reference Operator (CRO)[1]	In USEF, the CRO is responsible for operating the Common Reference. USEF defines the Common Reference as a repository which contains information about connections and congestions points in the network.
Congestion Management[1]	The avoidance of the thermal overload of system components by reducing peak loads. The conventional solution to thermal overload is grid reinforcement (e.g. cables, transformers). Congestion management may defer or even avoid the necessity of grid investments.
Constraint Management Service Provider (CMSP)[1]	A provider of constraint management services to a DSO or the TSO. This is a USEF role and is not currently used in GB.
Data Transfer Service (DTS)	A regulated centralised communications service which uses common set of industry requirements to facilitate business-critical processes, such as settlement, change of supplier and metering. In DTS, only information about domestic customers is exchanged.
Demand Turn Up (DTU)	A National Grid ESO Restoration Reserve service which has been discontinued. This service requires large energy users and generators to either increase demand or reduce generation at times of high renewable output and low national demand.
Demand-Side Flexibility (DSF)	According to USEF, DSF is flexibility at the customer side, which includes flexible load, generation and on-site storage. DSF is provided “behind-the meter” or “behind the connection”. National Grid’s DSF definition encompasses the same elements as USEF, however, it also includes storage and generation “for export”. This report uses DSF as per USEF’s definition.
Demand-Side Response (DSR)	The change in electricity demand in response to a signal, through load shifting, on-site generation and/or use of storage.
Distributed Energy Resources (DER)	Small scale power generation technologies (typically in the range of up to 10MW and including electric energy storage facilities) and larger end-use electricity consumers (e.g. industrial and commercial) with the ability to flex their demand (i.e. demand-side response) that are directly connected to the electricity distribution network.
Distribution and Connection Use of System Agreement (DCUSA)	The multi-party contract between licensed electricity distributors, suppliers and generators in GB concerned with the use of the electricity distribution system.
Distribution Network Operator (DNO)	Company licensed to distribute electricity in GB.

Distribution System Operator (DSO)	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.
Distribution Use of System (DUoS) Charges	Charges levied by distribution network operators on users to recover the cost of operating and maintaining the distribution network.
Energy Contract Volume	A contract between two BSC Parties stating who is buying/selling the electricity and the volume of electricity being traded.
Energy Contract Volume Notification Agent (ECVNA)	A person authorised by a BSC Trading Party to submit an Energy Contract Volume Notification on behalf of the Trading Party.
Energy Networks Association (ENA)	The industry association for operators of gas and electricity transmission and distribution networks in the UK and Ireland.
Energy Service Company (ESCo)	A company that offers auxiliary energy-related services to Prosumers.
Enhanced Frequency Response (EFR)	National Grid ESO dynamic balancing service, where the active power changes proportionally in response to changes in system frequency. This service aims to improve the management of system frequency pre-fault to maintain system frequency closer to 50Hz.
European Network of Transmission System Operators for Electricity (ENTSO-E)	European network of TSOs that represents 43 electricity TSOs from 36 countries across Europe, with a shared objective of both setting up the internal energy market and ensuring its optimal functioning, as well as of supporting the European energy and climate agenda.
Explicit Demand-Side Flexibility (DSF)	Committed, dispatchable flexibility that can be traded on different energy markets (wholesale, balancing, system support and reserves markets).
Fast Reserve (FR)	National Grid ESO balancing service. This service provides rapid and reliable delivery of active power through an increased output from generation or a reduction in consumption from demand sources, following electronic dispatch instructions from National Grid.
Final Physical Notification (FPN)	The level of import or export that a BSC party expects to import or export from the Balancing Mechanism Unit in a settlement period, in the absence of any Balancing Mechanism acceptances from the system operator.
Firm Frequency Response (FFR)	National Grid ESO balancing service. FFR is the firm provision of dynamic or static response to changes in frequency. FFR providers supply a certain amount of power or demand reduction when large frequency variations occur in the system. Dynamic FFR is used to manage ongoing frequency variations. Static FFR is used to address large variations of frequency, usually loss of generation.

Flexibility Service Provider (FSP)[1]	Market participant offering services using flexible resources. In USEF this is either a BSP, BRP, CMSP or any combination of these three roles.
Flexibility Value Chain (FVC)	The potential of demand-side flexibility to create value to multiple participants through several markets and in the form of different products and services.
Flexibility	Ability of an asset or a site to purposely deviate from a planned or normal generation or consumption pattern.
Flexilibility Requesting Party (FRP)	Market participant who buys flexibility from a flexibility service provider either directly or through exchange / market platform.
Frequency Containment Reserve (FCR)	Active power reserves available to contain system frequency after the occurrence of an imbalance. FCR balancing service is the first line of defence against frequency deviations in the grid. Primary reserves respond rapidly (within seconds) and aim to maintain the grid frequency at 50 Hz in Europe.
Frequency Restoration Reserve (FRR)	According to EU Electricity Market Glossary: Active power reserves available to restore system frequency to the nominal frequency and to restore power balance to the scheduled value. There are 2 types of FRR: Automatic FRR (aFRR) and Manual FRR (mFRR).
Grid Supply Point (GSP)	A system's connection point at which the transmission system is connected to a distribution system.
Imbalance Settlement Period (ISP)	The time unit for which imbalance of the balance responsible parties is calculated. Each ISP normally lasts 15, 30 or 60 minutes. In GB, the term Settlement Period is used and lasts 30 minutes.
Implicit Demand-Side Flexibility	Situation when consumers/generators react to pricing signals by increasing or decreasing demand/generation in response to pricing signals. Customers can choose to be exposed to time varying electricity prices or time varying network grid tariffs that reflect the value and cost of electricity and/or transportation in different time periods.
Independent aggregation[1]	Situation where a customer has an agreement with an aggregator to dispatch and market (parts of) its flexibility, whereas this aggregator operates without the consent from or a contract with the electricity supplier of the customer.
Independent Aggregator	A market party who performs the role of Aggregator and is not affiliated to a supplier or any other market participant.
Initial Physical Notification (IPN)	The initial notification made by (or on behalf of) a BSC party, in respect of a Settlement Period and a BM Unit, to the ESO under the Grid Code, as to the expected level of export or import at the Transmission System Boundary, in the absence of any Bid-Offer acceptances at all times during that Settlement Period.
Meter Data Company (MDC)[1]	A USEF role designating a company responsible for the acquisition and validation of meter data, to facilitate the flexibility and balancing settlement processes by making accurate and valid data available to market agents.

Metering System Identifier (MSID)	Identifier associated with each metering point in the distribution system.
Producer[1]	Role responsible for feeding energy into the grid under certain requirements and for facilitating the security of energy supply.
Prosumer[1]	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).
Replacement Reserve (RR)	According to European Network Code, Replacement Reserve means the active power reserves available to restore or support the required level of frequency restoration reserve (FRR) to be prepared for additional system imbalances, including generation reserves.
Short Term Operating Reserve (STOR)	National Grid ESO balancing service that provides additional power to National grid when demand on the Transmission Network is greater than forecast or there is unforeseen generation unavailability
Supplier	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.
Supplier Volume Allocation (SVA)	The determination of quantities of active energy to be taken into account for the purposes of settlement in respect of supplier BM Units.
TERRE	Trans European Replacement Reserves Exchange (TERRE) is the European implementation project for exchanging replacement reserves in line with the European Guideline on Electricity Balancing. The aim of TERRE is to build the Replacement Reserves (RR) Platform and set up the European RR balancing energy market in order to create a harmonised playing field for the Market Participants.
Time-of-Use (ToU) Tariff	An implicit demand side flexibility mechanism in which electricity tariffs vary with the time of usage, reflecting the time-varying nature of electricity costs.
Trader[1]	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).
Transfer of Energy (ToE)[1]	USEF term for a wholesale electricity transaction between the Supplier and the Aggregator, triggered by a Demand Response activation by the Aggregator on the retail side, restoring the energy balance of both the Aggregator and the Supplier (and their BRPs).

Transmission System Operator (TSO)	A physical or legal entity responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission 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 transmission of electricity. In GB, the party responsible for the system balance and operability is the Electricity System Operator (ESO), National Grid ESO. Separate parties, the electricity Transmission Owners (TOs), are responsible for investing, building and maintaining their electricity transmission network. This report uses the term TSO when referring to USEF processes and the term ESO when referring to GB processes.
Virtual Lead Party (VLP)	BSC party that only participates in settlement by offering balancing energy. The VLPs are aggregators of Supplier Volume Allocation (SVA) registered units for the sole purpose of participating in the provision of balancing services and are not subject to the same charges and obligations as existing BSC Parties.
Virtual Power Plant (VPP)	The combination of various small size distributed generating units to form a "single virtual generating unit" that can act as a conventional generating unit and is capable of being visible or manageable on an individual basis.

Appendix B: Mapping of USEF, GB roles and Future Worlds actors

The fit analysis has identified three categories, when mapping USEF roles against GB roles and Future Worlds actors:

1. Roles that exist in all the arrangements but with slightly different responsibilities or names
2. Roles with exact match
3. Roles that are exclusive to USEF and/or GB and/or Future Worlds.

The outcomes of the fit analysis are outlined in **paragraph 4, section 3.3** of the Consultation Document.

We provide below a brief summary of the roles with similar, but not exactly the same, responsibilities, as well as a brief summary of the roles/actors that are exclusive to USEF, GB or ENA ON Future Worlds. Further details can be found in section 3 of the due diligence document.

Exclusive USEF Roles:

USEF identifies a specific role for providing constraint management services to networks, **the Constraint Management Service Provider (CMSP)**. The CMSP in USEF takes on specific responsibilities in communicating and coordinating flexibility to manage constraints with the TSO and DSOs, to ensure efficient dispatch and to maintain the safety and reliability of the networks. The role of the CMSP could be undertaken by several existing entities or ENA ON actors, such as aggregators and Distributed Energy Resources (DER).

USEF defines the role of the **Common Reference Operator (CRO)**, which operates a repository containing information about connections and congestion points in the electricity network. The CRO role facilitates informed decision making for flexibility sellers and buyers, as well as creating a level playing field for all market participants by ensuring the availability of transparent and consistent information. In GB, the role of the CRO could be performed by a new or existing entity, including one of the ENA ON actors.

Exclusive ENA ON Actors:

The Future Worlds use the concept of **Local Energy Systems (LES),** which utilise peer-to-peer trading and local energy markets to the benefit of their participants (e.g. communities, companies, individuals). Although peer-to-peer trading is not in the scope of USEF, USEF recognises that energy communities are becoming increasingly popular and that the scope of Flexibility Value Chain, as defined by USEF, can be further extended to define the type of energy and flexibility services that LES can offer. Also, USEF has published a paper on citizen energy communities, explaining possible services and the relation of these communities to roles such as Energy Supplier, BRP and Aggregator.

The role of **the Local Market Operator** is associated with the operation and the creation of flexibility platforms. USEF does not provide detailed guidance for operators of flexibility platforms. As such, the role of the Local Market Operator is not set out in USEF arrangements, but it could exist under the USEF framework design.

Clarification of roles that exist in all the arrangements, with slightly different responsibilities or names:

Aggregator - USEF

USEF defines the role of the Aggregator as a service provider that contracts, monitors, aggregates, dispatches and remunerates flexible assets at the customer side. USEF positions the Aggregator role on the retail side. For example, if an aggregator business provides balancing services, it combines the role of Aggregator with the role of the Balancing Service Provider (BSP). According to USEF, all market parties (or actors) can undertake the role of the Aggregator. USEF also defines some responsibilities for the Aggregator, currently not included in GB, involving information exchange requirements as well as interactions with other flexibility market parties.

Virtual Lead Party - GB Current arrangements

In a recent development, independent aggregators will be able to access the GB Balancing Mechanism as Virtual Lead Parties (VLP) which is a distinct new type of Balancing Settlement Code (BSC) party that only participates in settlement by offering balancing energy. The VLPs are aggregators of Supplier Volume Allocation (SVA) registered units for the sole purpose of participating in the provision of balancing services and are not subject to the same charges and obligations as existing BSC Parties. A VLP is a new type of market participant that combines the role of USEF's Aggregator with other roles (i.e. Balancing Service Provider).

Aggregator – ENA ON

An aggregator in the ON Future Worlds is a company who acts as an intermediary between active parties such as Distributed Energy Resources and active Customers who can offer flexibility services, and system operators who wish to obtain such services for efficient management of networks.

Clarification: Where an aggregator (as defined by the ENA ON) provides flexibility services to the ESO then the aggregator actor combines the USEF roles of Aggregator (i.e. aggregating flexibility at customer side) and Balancing Service Provider (i.e. providing a balancing service to the ESO). Additional differences between the USEF role and the ENA ON actor lie in the responsibilities of the Aggregators, in how broadly they can aggregate and sell flexibility as well as in the interactions with the prosumers and system operators.

Meter Data Company (MDC)- USEF

The MDC is responsible for the acquisition and validation of meter data. Its role is to facilitate the flexibility and balancing settlement processes by making accurate and valid data available to market agents.

Data Communication Company (DCC) - GB Current arrangements

The DCC establishes and manages the smart metering data and communications infrastructure.

Data Communication Company (DCC) - ENA ON

The DCC is a party 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.

Clarification: In GB, there are several entities that are involved in data acquisition, sharing and management. For example, the DCC manages smart meter data and communication infrastructure, focusing on the domestic users of smart meters, however it does not communicate and share data with the ESO, nor does it validate data. The Data aggregator, Data collector and DSR administrator all have a role to play in the data validation, information exchange and settlement processes, which are carried out by ELEXON.

USEF introduces a single entity that performs the meter data company role and interacts with all the market participants, which facilitates standardisation and transparency, and overall more efficient solution. This approach aligns with the Open Networks project's view on the future responsibilities of the DCC.

Allocation Responsible Party (ARP) - USEF

The ARP's role involves establishing and communicating the actual electricity volumes that are consumed and produced per Settlement Period within a certain metering area. In USEF this role is responsible for the settlement of all processes, including flexibility transactions.

ELEXON - GB Current arrangements

The GB Balancing and Settlement Code Company, ELEXON, is responsible for allocating electricity volumes during the settlement processes (ARP in USEF) for wholesale energy and for the Balancing Mechanism. National Grid ESO is responsible for the settlement and payment of non-BM balancing services. DNOs are responsible for settlement of the flexibility services they procure.

Settlement Agent - ENA ON

A Settlement Agent is responsible for managing the settlement of payments to and from flexibility service providers. The Settlement Agent collects, validates, processes and aggregates metered data from service providers (generation and demand-based services); sets up and maintains the systems that collect, securely store, and securely transmit the data necessary for settlement process; manages the settlement of payments by flexibility service providers; calculates payments and charges; and invoices and collects payments due.

Clarification: The "Future Worlds" role of the Settlement Agent is similar to the USEF ARP role. The main difference is that USEF assigns part of the responsibilities of the Settlement Agent to the Meter Data Company, such as the collection of meter data as well as the setup and maintenance of systems that securely collect, store and transmit the data required for the settlement process.

Appendix C: USEF Aggregator Implementation Models

As the GB energy system evolves, with traditional roles changing and new roles emerging, the role of commercial aggregators also evolves. USEF has developed seven possible market models for the Aggregator role, referred to as Aggregator Implementation Models (AIMs), which set out the Aggregator's relation to the Supplier and the Balance Responsible Party (BRP) in organising balance responsibility, transfer of energy and information exchange.

USEF has developed the AIMs to answer the following questions:

- Are the roles of the Supplier and Aggregator combined in a single market party?
- Does the Aggregator need to assign its own Balance Responsible Party (BRP) for its portfolio?
- Does the Aggregator need a contract with the Supplier?
- Do we need a Transfer of Energy to correct the open position of the Supplier? If so, how is energy transferred?

The figure below gives a two by two classification scheme on the 2nd and 3rd question and further differentiate by the 4th question. The only model where the roles are combined in a single party is the integrated model. In all other models the roles are performed by different market parties. The integrated model is considered to be a contractual model because when the roles are combined operational agreements between the roles are also required.

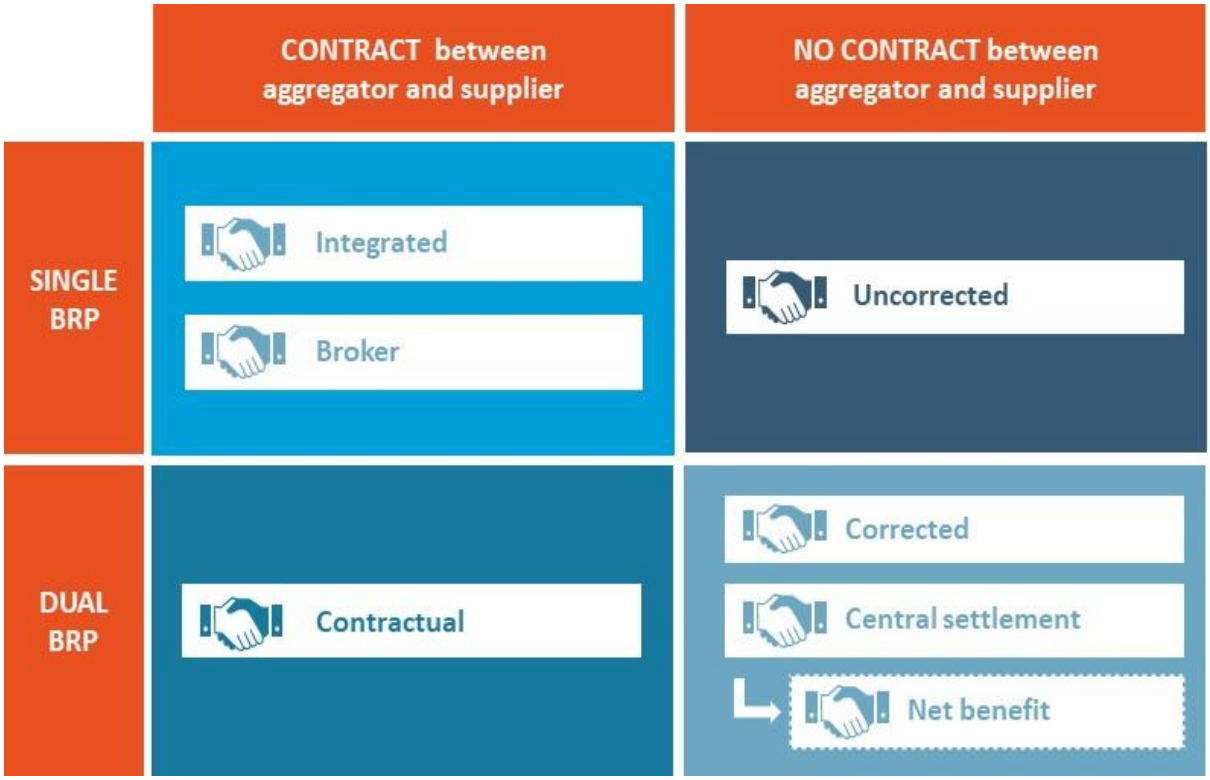

Figure 3: USEF Aggregator Model Classification scheme

USEFs 7 AIMs are described as follows:

1. **Integrated model:** The roles of Supplier and Aggregator are combined in one market party. Compensation for imbalances and the open supply position are not necessary. The Supplier/Aggregator has a contract with the Prosumer, selling energy and buying flexibility as per their contract. The Integrated Model is considered the “default” option.

2. **Broker model:** The Aggregator transfers the balance responsibility to the supplier’s BRP. Compensations for open supply position and imbalances are settled based on contractual arrangements. The Aggregator has a bilateral contract with the Supplier or the BRP of the Supplier and transfers its balancing responsibility for the flexibility to the BRP of the Supplier.

3. **Contractual model**: The Aggregator associates with his own BRP. Balances are corrected through a hub-deal (ex-post) between the BRP of the Aggregator (BRPagr) and the BRP of the Supplier (BRPsup) and Transfer of Energy (ToE) prices are based on contractual arrangements. The Aggregator has a contract with a BRP to enter energy markets and to cover imbalance and a contract with the Supplier for the Transfer of Energy. The BRPagr holds responsibility for the flexibility during activation period, as it needs to balance the sold energy with the energy sourced through the hub-deal. Aggregator will source the energy ex-post from BRPsup through a hub-deal. Sourcing volume equals the difference between measurement and baseline. A price formula needs to be agreed upon, preferably using a standardised method.

4. **Uncorrected model:** In this case the activated volume is settled through the regular balancing mechanism. There are no energy transfers between the aggregator and the supplier, nor does the aggregator need to assign balance responsibility. BRPsup is remunerated through the regular balancing mechanism for energy that sourced but not used, if passively contributing to balance restoration is incentivised by the balancing mechanism. If the Aggregator is active on balancing or adequacy services, the remuneration takes place against (in general favourable) balancing prices.

5. **Corrected model:** In this model the profile of the Prosumer is modified based on the amount of the flexibility that has been activated by the Aggregator. The remuneration takes place through the Prosumer based on retail prices. The Aggregator assigns its own BRP, the Allocation Responsible Party (ARP) corrects the perimeter of the Aggregator’s BRP based on the activated volumes.

6. **Central settlement model:** In this model, a central entity (the ARP) corrects the perimeters of both the BRP of the supplier and the BRP of the aggregator by transferring energy from one to each other. This results in no imbalance positions for the BRPs caused by the activation of flexibility and there is no direct Transfer of Energy between the Aggregator and the Supplier. In addition, the ARP settles financially the supplier for its open position based on a predefined price formula, applied to the energy that the Aggregator activated from the supplier’s portfolio.

7. **Net benefit model**: Similar to the central settlement model, in the net benefit model the ARP corrects balancing perimeters and settles the compensation for the open supply model. The cost of this compensation is socialised if certain conditions are met. For example, in the US, a net-benefit test determines the price level from which the cost gets socialised. The Aggregator compensates the Supplier for price levels below price level which was determined by the net-benefit test.

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