DNV·GL

Project Fusion – USEF Due Diligence

SP Energy Networks

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for
DNV GL Limited

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EXECUTIVE SUMMARY

Introduction to Project FUSION

The energy landscape is changing as new possibilities to produce, use, and store energy continue to emerge and evolve. The ongoing uptake of low carbon technologies and rise of distributed generation lead to high growth and variability of load on electricity networks, requiring new solutions and technologies as alternatives to conventional methods of network management. Demand-side flexibility (DSF) is widely recognised as one such alternative method, and although DSF has been tested and deployed by some network operators, the industry is still investigating how to maximise its economic potential.

Project FUSION will demonstrate the feasibility of using local flexible resources to address distribution network congestion issues by making such resources accessible through a universal, standardised market-based framework: the Universal Smart Energy Framework (USEF). FUSION will implement a local, competitive flexibility market based on the USEF framework in East Fife, Scotland. FUSION will inform wider policy development around flexibility markets and the DNO-DSO transition through the development of standardised industry specifications, processes and requirements for transparent information exchange between market participants accessing market-based DSF.

Introduction to the USEF Framework

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 harmonization of these flexibility mechanisms throughout Europe. USEF's ongoing development is managed by the USEF Foundation,[1] a dedicated core team tasked with coordinating expertise, projects and partners while safeguarding the integrity and objectives of USEF.

USEF aims to facilitate effective coordination across all the different actors involved in the electricity market by providing a common, standardised role 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, separate from (but in coordination with) the traditional electricity supply chain, to optimise the use of resources. To facilitate the transition towards a cost-effective and scalable model, the framework provides the essential tools and mechanisms to redefine existing energy market roles, add specific roles and to specify interactions and communications between them. In addition, the USEF standard facilitates project interconnection, thereby fostering innovation and accelerating the smart energy transition.

Due Diligence Methodology

This report documents the findings of a due diligence process of the Universal Smart Energy Framework (USEF) against legal, regulatory and market arrangements governing the GB energy sector.[2] In addition, this report assesses the direction of reform of GB energy policy and regulation, as well as forward-looking industry initiatives like the ENA Open Networks project and assesses the fit of the USEF framework with this direction. The information date for this due diligence is 20 May 2019.

The main purpose of the due diligence is twofold

- To identify whether USEF is fit-for-use in the GB market; and

1 https://www.usef.energy/usef-foundation/

2 www.usef.energy

- To identify innovative elements in the USEF framework that could add value to the current thinking about future market design, and that can be trialled and proven within the FUSION project.

Additionally, the due diligence will point out

- the potential need for adaptations of USEF to make it compliant with relevant GB legal, regulatory and market arrangements; and/or
- the potential need for modifications to the current GB legal, regulatory and market arrangements to facilitate effective flexibility markets.

The USEF framework is developed as an add-on to existing energy market models, principally those based on ENTSO-E principles (European Network of Transmission System Operators for Electricity), to create a level playing field for demand side participation. However, while based on common principles, the interpretation and implementation of market processes and regulations can differ between markets. Moreover, markets differ in the extent to which they are discussing, have discussed, or perhaps even have implemented, aspects of future market design to facilitate demand side participation.

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;
- Details requirements to access specific flexibility markets; and
- Detailed requirements for privacy, cybersecurity and communications between market participants.

Key Due Diligence Outcomes

The USEF framework proposes arrangements for a smart, flexible energy system of the future in which the trade of flexibility and energy is integrated and coordinated. USEF has been developed in continental Europe and has been tested and validated in many field trials. The content that has been developed, along with the insight gained and hands-on experience, are potentially valuable in the GB market as well.

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. Most importantly, the due diligence has not found areas that could prevent USEF from being implemented in GB. Few modifications will be needed on the USEF side, and a limited set of recommendations to adjust current or (proposed) future arrangements in the GB energy system appear necessary. The results also show that there are several relevant and valuable innovative elements within USEF that could enrich current discussions and views on future market design, both broadening and deepening these views.

Specifically, USEF could add value to GB flexibility market arrangements in the following areas:

- Although there is alignment on key routes in the **flexibility value chain**, USEF describes a greater range of services than those that currently exist in the GB energy system. USEF also proposes ways of facilitating independent aggregation, setting out additional models for Aggregators to access wholesale energy markets, even if they do not have a supply licence or contractual requirements 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.

- USEF proposes a **market organisation** based on clear roles and responsibilities, some of which do not yet exist in the GB energy system. Some of these USEF roles can be said to be in early development in GB, and there are no barriers to such roles being developed in full in the future.
    - 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, facilitating informed decision making for flexibility sellers and buyers. A CRO role does not currently exist in GB, but a similar functionality is being considered in the ENA ON project, which explores the creation of a System Wide Resource Register.
    - In USEF, the Meter Data Company (MDC) acquires and validates meter data required for flexibility and balancing settlement processes. The MDC role as a single entity facilitates transparency and consistency in the flexibility settlement processes, providing accurate and valid data to market parties. In GB, these activities are split between several entities, including the Data and Communications Company (DCC), which manages smart meter data and communication infrastructure, and other parties covering data validation, information exchange and settlement processes.
    - The GB energy system does not currently recognise USEF's Constraint Management Services Provider (CMSP) as a unique role with specific responsibilities (e.g. towards prequalification, flexibility trading, dispatch, settlement), although there are currently market participants that provide constraint management services to NG ESO and even to DSOs.
- In terms of **market design**, current GB arrangements do not cover the structure and the mechanisms for a functioning flexibility market as defined in USEF. USEF defines operating regimes, functioning as a traffic light mechanism reflecting the status of constraints and congestion in the energy system to inform the (un)restricted trade and dispatch of flexibility. USEF also defines a flexibility Market Coordination Mechanism (MCM) covering interactions between market participants to facilitate effective flexibility transactions. These are areas where USEF could add specific elements and enhance the GB market design to commercialise flexibility and lower overall energy system costs.

  The ENA ON project is working on last-resort mechanisms which will describe the shift from a market-led to a control-led state. Also, the ENA ON has planned to undertake detailed work on operation, measurement, validation and settlement of flexibility. USEF's Operating Regimes and MCM can be used to inform and enhance these deliverables.

  USEF provides a fully-developed market mechanism and detailed roles model, including a central role for the Aggregator in a future energy system. The framework sets out appropriate standards, principles, interactions, and requirements for information exchange between all market participants. In these areas USEF could enhance the work undertaken to date in the ENA ON, by considering the (economic) perspective and potential roles for actors such as Balance Responsible Parties (BRPs), Generators, Suppliers, Aggregators and Customers in coordinating the deployment of flexibility in the energy system.
- USEF defines requirements for **DSO flexibility transactions** such as contractual & regulatory arrangements, pricing, remuneration, settlement and validation processes. All these processes are under development in GB and therefore USEF's proposals could enable effective DSO flexibility transactions. USEF proposes:
    - that Aggregators active in congested DSO areas inform the DSO on planned activations of flexibility (day-ahead and intra-day), as well as on any contracted flexibility capacity. USEF also proposes to extend this obligation to Suppliers for flexibility activated through implicit mechanisms. This

information flow facilitates better planning for DSOs and the optimal procurement and dispatch of flexibility.

- to allow "free bids" under short-term procurement, where there is no contractual obligation to offer the flexibility to the market and flexibility is provided on a day-to-day basis. Free bids allow flexibility providers a last-minute route to market, at a competitive price to DSOs, maximising the value to both flexibility providers and DSOs.
- to introduce the concept of re-dispatch to compensate the effect of the local demand response activation on system level, which is essential for managing imbalances that are caused due to flexibility dispatch.
- a reference architecture for explicit demand-side flexibility from the Prosumer to the Flexibility Requesting Party, which will facilitate the standardisation of interactions between the market platforms and grid management services. A key feature in the USEF architecture is the regulated central data hub, where measurement and validation of flexibility transactions are performed and recorded.

- USEF's proposals for **market access requirements** facilitate Aggregators' ability to maximise the services they can provide:
  - Although stacking of flexibility services is generally possible both in GB and USEF, USEF proposes dynamic pooling of assets, which is currently limited in GB because of complex processes to re-allocate assets/units.
  - USEF proposes that Prosumers can contract with, and be operated by, multiple Aggregators at the same time, although each Aggregator should operate a mutually exclusive set of resources. There are currently no GB arrangements to cover the coordination of multiple aggregators working with a single prosumer, although such arrangements are in development, and could be informed by USEF.
  - USEF considers sub-metering essential for independent aggregation and proposes that Aggregators should be allowed to apply sub-metering for all flexibility services to enable the settlement process. The upcoming BSC modification P375 may allow aggregators/Virtual Lead Parties (VLPs) to install their own settlement sub-metering for flexible assets in the future.
  - In USEF, the Flexibility Requesting Party (e.g. ESO, DSO) defines the baselining methodology for all flexibility services except for wholesale market services. For these services, the regulatory authority (Ofgem in GB) is responsible for defining the baseline methodology for the Transfer of Energy (ToE). In GB, the concept of ToE is not yet in place and therefore a baselining methodology has not yet been defined.

  USEF's seven Aggregator Implementation Models (AIMs) could also add to GB arrangements for the aggregator role, balancing responsibility and settlement of imbalances between market participants. The fit analysis does not recommend AIMs that should be used in GB, but highlights which USEF models are already applied or could be applied in the future:
  - Under current GB arrangements, the equivalent of the USEF Uncorrected Model is applied to aggregators offering ancillary services to the ESO and the USEF Integrated Model is in place where a supplier and an aggregator are combined in a single market party.
  - Under future arrangements in GB, with the introduction of VLPs in the BM and Project TERRE, aggregators acting as VLPs will not be responsible for their balance position. ELEXON will perform perimeter corrections to protect suppliers from the imbalance caused by aggregators/Virtual Lead

Parties (VLPs). Elements of these arrangements are similar to USEF's Central Settlement Model and Broker Model, respectively.

- Ofgem is considering the equivalent of the Corrected Model to solve the energy sourcing issue. This option however, according to USEF, could complicate arrangements in case of residential customers since the remuneration of the supplier would be done through residential customers (the Prosumers).

In addition to identifying areas of added value, it is important to observe that the fit analysis confirms alignment between GB and USEF arrangements for the fundamentals of energy and flexibility markets, such as existing roles and interactions as well as flexibility services and routes to market. The analysis also finds that USEF's guidelines on privacy and cybersecurity mostly align with applicable GB rules, indicating that a USEF implementation in GB would not encounter fundamental barriers in this area. Finally, there are also key elements of alignment in future flexibility market design and the ENA ON project, for instance both USEF and the ENA ON World B propose that the ESO and the DSOs procure flexibility independently from each other and a level of information exchange and coordination will be required. This level of alignment is an expected key finding since both USEF and GB aim to align with ENTSO-E principles as the basis for future flexibility services and market organisation.

Next Steps

The findings from this due diligence are the basis for the next phase in Project FUSION, which involves a public consultation on the USEF framework that will seek GB energy market stakeholders' opinion on a set of proposals to overcome gaps and conflicts between GB arrangements and the USEF framework, as well as to consider innovative elements of the USEF framework to inform future GB market design.

We will analyse the results and recommendations from the public consultation to inform a reference implementation plan for USEF in the GB energy market. This plan will both inform the trial within FUSION as well as the future design of the GB energy system, to be refined over the course of the project and informed by the trial outcomes.