SP Energy Networks

Update

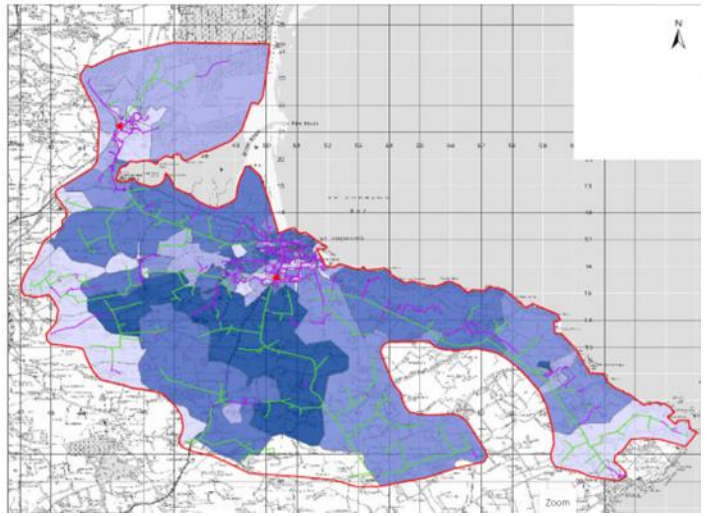
Project FUSION

Future Networks

25/09/2023

Content

1. Aims & Objectives



Project Objectives
1.1 Evaluate **Feasibility, Costs & Benefits** of USEF-based flexibility market
1.2 Investigate **Commercial mechanisms** to encourage **multi-vector** flexibility
1.3 Explore Demand Side Flexibility (DSF) potential to **accelerate new demand connections**

18month trial:

Sep 2021 – April 2023

2. What is USEF?

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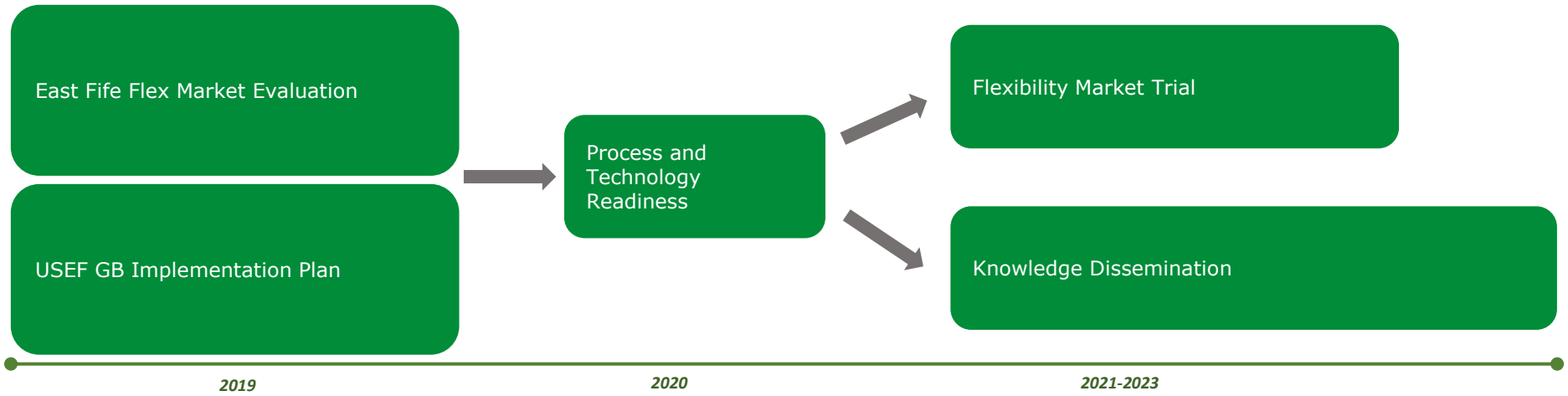
Key Features

Feature	Summary	Benefit
Market Coordination Mechanism (MCM)	Roles, responsibilities, sequencing	Scope & clarity
USEF Flexibility Trading Protocol (UFTP)	Messaging, encryption, APIs	Highly automated
D-Programmes	Day-ahead forecasts & trading	Reliability & agility
Discretionary bids	Discretion to bid without any prior commitment	Removes barriers
Baseline design	Nomination (daily D-1 forecast)	Non-prescriptive
Common Reference Operator (CRO)	Common data repository	Secure data visibility

Source:

3. Method

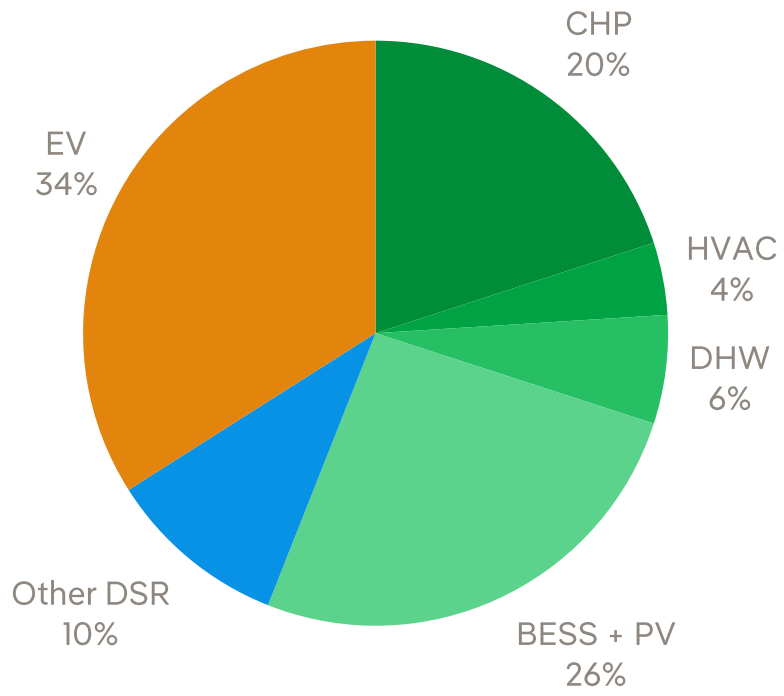


- **Flexibility market evaluation**: comprehensive assessment of the available flexibility in East Fife, including customers connected at all voltage levels, to map the potential flexibility and determine the specific trial locations.
- **USEF Implementation within GB:** involved a due diligence of USEF 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.
- **Process and Technology readiness:** 1. Tendered for long-term flexibility availability; 2. Developed the FUSION Flexibility Platform; 3. Implemented USEF processes with successful aggregators; 4. End-end testing and commissioning.
- **Flex Market Trial:** Live operation of the local flexibility market. 18-months. Daily dispatches. St Andrews golf-event
- **Knowledge Dissemination:** 6-monthly learning reports, annual webinars/presentations, annual progress report.

4. Results

Key Trial Stat's	
Congestion points	2 x Primary substations 5 x 11kV feeders
Constraint type	Thermal, load-driven.
Flexibility products traded	Sustain, Secure, Dynamic
2 x Participating aggregators	Orange Power & Gridimp (Engie)
Contracted capacity	1.5MW (80% residential)
Dispatches	+500
Reliability of delivery	80% (Residential only: 86%)
Reliability of receiving offer	94%
Delivered flexibility	49MWh
Average availability cost (£/kWh)	14.3
Average utilisation cost (£/kWh)	0.6

Flexible Assets by capacity



Key:
Combined Heat &Power (CHP), Heating Ventilation & Cooling (HVAC), Domestic Hot Water (DHW), Battery Energy Storage System (BESS), Photovoltaics (PV), Demand Side Reduction (DSR), Electric Vehicles (EV).

Reliability of delivery: 80%
Contribution of residential flexibility to our total contracted capacity (MW): 80%

5. Benefits

*"FUSION has allowed us to **save money** from trading our flexibility; **reduce our carbon footprint**; and serve our **local community** by supporting the network during the recent St Andrews Golf Open."*

*"The FUSION trial, through consistently demonstrating **reliability of delivery** of circa 70%, provides evidence that flexibility can reliably help us to manage constraint and facilitate new connections in the east fife area prior to the planned reinforcement in 2025."*

*"FUSION helped to bring us **forward as a company**"*

Source:

6. Conclusions

Learning objective	Trial Observations	Inferred learnings
1.1 Evaluate **Feasibility, Costs & Benefits** of USEF-based flexibility market	•**GB's first** USEF-adherent flexibility market. •**+500** dispatches realised •USEF-enablement uplift: **£150k*** •CBA savings relative to BaU flex: ➢ Trial: **negligible.** ➢ GB roll-out: **significant but treat with caution†.**	• (†**CBA** is premised upon USEF mechanisms being causal to the high residential participation observed in FUSION.) • **Insufficient evidence** to prove causal link at this stage. • **If** a **causal link** were to be established, **then** a **positive business case would** exist for adopting those market mechanisms across GB.
1.2 Investigate **Commercial mechanisms** to encourage **multi-vector** flexibility	• **High uptake (80%) of residential** flexibility participants (2022). •USEF **commercial mechanisms** and **automation** were **reported** by a residential aggregator as having been **influentia**l in securing participation from residential flexibility providers.	• Insufficient evidence to indisputably claim that **USEF encourages residential participation**. • Some evidence to suggest USEF mechanisms were **attractive to** residential participants. • But alternative factors might **include targeted campaign** to recruit residential customers.
1.3 Explore Demand Side Flexibility (DSF) potential to **accelerate new demand connections**	• **High reliability of delivery** observed (80%) • This will be a factor in managing new connections **applications in constraint zones** • **Poor baselining quality** observed across all methods (e.g. nomination, MBMA, historical) – puts reliability at risk.	• It is hypothesised that the relatively high reliability observed might be attributable to **day-ahead trading**. • There's evidence to support a **correlation** but insufficient to prove a causal link. • What's clear is the urgent need for **improved baselining.**

*Uplift costs for the unique USEF elements only: £87k for the DNO and £30k by each of the two aggregators

Source:

7. Next steps

Observation	Recommendation
Baselining accuracy requires attention	We suggest: • Regular **monitoring and reporting** of aggregator baselining accuracy • **Standardised approach** to monitoring and reporting on that accuracy and steps taken to improve. • Consideration of whether this requirement should be **specified in the FSA contracts.**
USEF **might** promote **residential participation** & **reliability** of delivery	We suggest DNO's & aggregators consider the potential benefits of USEF features: - **Commercial mechanisms** (day-ahead trading / discretionary bids) - Single platform with comprehensive **scope** (trading > dispatch > settlement) - API's that **automate** the steps in scope (conducive for managing large portfolios of small assets)
Participating aggregators want a **UK standard**	**USEF's MCM and UFTP could help to inform a UK's journey toward a flexibility trading standard.** 1. Comprehensive **scope** (trading, dispatch & settlement) 2. A high degree of **automation** of each step
Participating aggregators want an **automated, end-end platform**	**USEFs MCM and UFTP could help to inform the development of a highly automated end-end platform.** USEF provides a framework for delivering the following functions in a highly-automated platform: • Trading, • Dispatch. • Settlement. Participating aggregators reported that USEF could help inform the development of an automated end-end platform, noting that the preceding 'match-making' function is not covered by USEF.

Source:

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Appendix 1

Table 13 Flexibility reliability in DSO services obtained in GB innovation projects

Project	Key partners	Calculation method	Final value	Main References
TRANSITION & LEO project (2022)	Origami (now Baringa), SSEN, Electricity North West	**Reliability index** = supply delivered/ supply purchased	Weighted average is **72%.**	Transition & project LEO – Market Trials Report (Period 1)
Cornwall LEM (2019) Phase 1 = The Visibility Plugs and Socket (VPaS) project (May-Aug 2019) Phase 1 and 2 (May-Dec 2019)	Imperial College London, WPD, Centrica	**Delivery proportion** = service delivered (MWh)/service procured (MWh)	Phase 1 – on average, **60%** of the expected MWh were delivered. Phases 1 and 2 average = **58.3%**	Cornwall LEM Flexibility Market Platform LEM Flexibility Market Platform Design and Trials Report Cornwall LEM report repository
ENTIRE (2019)	WPD	Service reliability is acceptable if dips in requested output are not below 95%.	22% of events were continuously above 95%, 41% were above 63%.	Visibility Plugs and Socket – Phase 1 interim learning report ENTIRE – operational trials report

Source: