



FUSION

Project Progress Report (PPR_04)



Version History

Author	Revision	Date	Status	Comments
Michael Green	V0.1	05/10/2022	First Draft	

Approval


Name	Position	Date	Signature
James Yu	Future Networks Manger	11/10/22	

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1 Introduction

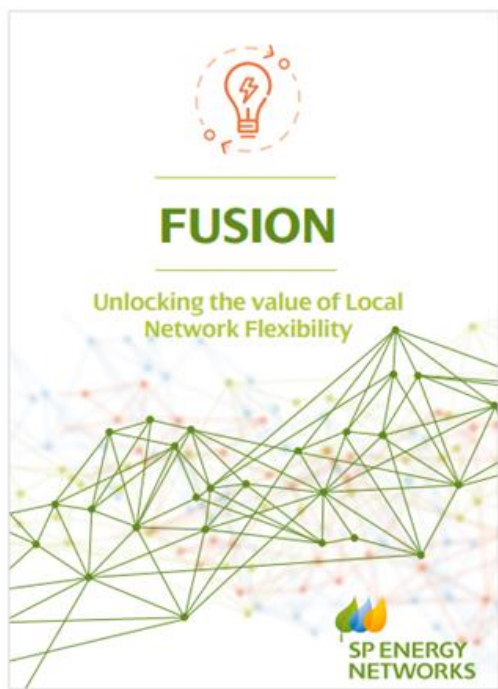
This is the fourth in what comprises a series of annual Project Progress Reports (PPR) for Project FUSION. This fourth edition (PPR_004) reports on the period spanning from 28th September 2021 to 28th September 2022, henceforth referred to in this report as the “reporting period”.

Project FUSION seeks to demonstrate the effectiveness of harnessing commoditised local-network flexibility as an asset management tool to allow the DSO to:

- Alleviate distribution network congestion issues, and
- Complement national balancing requirements within the existing regulatory framework.

SP Energy Networks submitted the proposal for Project FUSION in 2017 under the Network Innovation Competition (NIC) funding mechanism. Ofgem approved the proposal and issued the Project Direction on the 28th of September 2018.

The project officially commenced in October 2018 and is due to conclude in November 2023.



2 Executive Summary

2.1 Progress Update

Project progress to date has been in-line with or better than the expectations set-out in the Project Direction. No project delay or overspend is noted or anticipated.

2.1.1 Project Deliverables

There were no Project Deliverables due during this reporting period. However, *Table 1* below summarises the progress made during this period towards those deliverables due in the future.

All Project Deliverables due to date have been successfully completed according to schedule and budget. Progress to date on pending deliverables indicates that the project is trending toward the successful and timely completion of all remaining deliverables.

Remaining Project Deliverables			
Deliverable	Evidence required	Due date	Status (@ 28/09/21)
1 Implement a minimum of two physical and live trials of commoditised flexibility based on the USEF framework.	<ul style="list-style-type: none"> ▪ Identify two trial locations. ▪ Identify the required flexibility services available from flexibility providers. ▪ Contract for flexibility services. ▪ Undertake live trials. ▪ Report on the implementation and analysis of USEF trials. 	03/04/23	Good progress. <ul style="list-style-type: none"> ▪ Physical trials fully live and operational at two trial locations since 09/09/21 ▪ 2 x interim trial learning reports available to date on the FUSION website. ▪ Next interim learning report (#3) available Nov 2022.
2 Modelling report on commoditised flexibility benefits for the UK (Imperial College London).	<ul style="list-style-type: none"> ▪ Academic modelling report on GB flexibility. 	28/02/23	Good progress. <ul style="list-style-type: none"> ▪ Empirical data from live trials being collated & analysed since 09/09/21 ▪ Final draft of modelling report anticipated Q4 2022 for internal review and approval.
3 Open Networks report in coordination with the ENA Open Networks Programme.	<ul style="list-style-type: none"> ▪ Report on coordination and hierarchies of control for flexibility, in collaboration with the ENA Open Networks Programme. 	28/02/23	Good progress. <ul style="list-style-type: none"> ▪ FUSION & NGESO to commence trials of primacy rule implementation in October 2022, with an associated learnings report planned for submission to Ofgem in February 2023.

Table 1: Project Deliverables during the PPR_02 reporting period

Further detail on the progress made in relation to these (and all other) Project Deliverables is provided in *Section 8 - Project Deliverables*.

2.1.2 Notable Milestones

Table 2 below lists some of the most¹ notable milestones achieved during this reporting period.

Ref	Achievement / Milestone accomplished
1.	Commenced Phase 2 of the live trial, having successfully procured standby flexibility at various voltages (33kV & 11kV) for the 12-month period April 2022 – March 2023.
2.	Provided 500kW of standby flexible capacity to support the DNO in managing local network needs to accommodate the following real network events: <ul style="list-style-type: none"> i. A planned outage of a transformer at St. Andrews Primary substation (Apr 2022) ii. A major sporting event; the St. Andrews Golf Open (July 2022)
3.	The DNO has issued 332 flex orders resulting in the successful dispatch of 48.1 MWh of flexible capacity onto the local network in response to simulated events, generating a wealth of empirical data which has formed the basis for detailed analysis into the efficacy of the FUSION flexibility day-ahead and intraday market and other learning objectives.
4.	Trialed various market features unique to USEF , including the use of: <ul style="list-style-type: none"> • Free-bids (intraday and day-ahead trading outside of contracted availability hours) • D-prognoses (nomination baselining)
5.	Published 2 x Interim Trial Learning Reports (ITLR) to report on the trial findings to date. <ul style="list-style-type: none"> • ITLR#1 - October 2021 • ITLR#2 - May 2022
6.	Project FUSION has collaborated with NGESO to agree on the plan for a joint trial , commencing October 2022, to trial the implementation of primacy rules to provide learning relevant to Open Networks Project (WS1a P5 – primacy rules).
7.	Over the reporting period, Project FUSION has delivered material benefit to both our network and to participating customers . Case studies to illustrate some of these benefits are provided in <i>Appendix 3 – Network benefit & Appendix 4 – Customer benefit</i> .

Table 2: Notable milestones during reporting period

2.1.3 Challenges encountered

No significant problems have been encountered during this reporting period.

Several minor issues were identified early and successfully navigated, the most notable of which are listed below. An expanded summary of each of the issues listed below is provided in *Section 3.3 Project Issues – Concise Summary*.

FUSION Flexibility Platform (FFP): minor glitches

- Very rarely there appears to have been instances in which, when the DNO places a FlexOrder in the FFP, the FFP fails to communicate that instruction to the associated aggregator.
- SPEN is working closely with OpusOne Solutions to diagnose the cause of this phenomenon. Current indications suggest that the issue resides within the FFP, in which case it will need to be rectified accordingly.
- Thankfully the issue is very rare (occurring in less than 5% of FlexOrders) and so it has not impeded the trial. Any resulting anomalies generated in the trial data have also been isolated in the ensuing results analysis to prevent them from skewing any observations.

¹ Section 3.2 'Project Highlights – Concise Summary' provides an expanded list of additional notable milestones achieved during this reporting period.

Distributed Energy Resources (DER) – unplanned maintenance

- Occasionally some of the DER were temporarily unable to participate in the flexibility market due to unplanned outages.
- Thankfully there was sufficient DER participating in the FUSION market to allow trading to continue unhindered and the Flexibility Service Agreements (FSA) in place provided clear procedures for how to navigate such instances smoothly and without issue.

2.1.4 Interim Learnings & Dissemination

Key interim outputs generated during the reporting period are listed in *Table 3* below;


WP:	Output:	Method of Dissemination
WP1	<u>Flex Tender 2022</u> FUSION hosted a public webinar in October 2021 to share learnings to date and attract aggregators to respond to the phase 2 Flexibility Tender	<ul style="list-style-type: none"> Teams presentation with Q&A. Slides shared with attendees
WP5	<u>IT development: Short-cut</u> A plug-in was developed to allow non-USEF-compliant aggregators to participate in the FUSION flexibility market without having to implement USEF within their own platforms.	<ul style="list-style-type: none"> This will be reported upon in the 3rd interim trial learnings report (ITLR#3) which is due for publication in Q4 2022.
	<u>Test scripts</u> Scripts were developed for testing of the entire end-end system prior to phase 2 go-live	<ul style="list-style-type: none"> Details of these test scripts were made available in the ITLR#1 report.
	<u>Trial Learning objectives</u> SMART learning objectives defined at the outset of Phase 1 of the live trials.	<ul style="list-style-type: none"> Articulated in the ITLR#1 report.
	<u>Quantitative insights</u> Observations with respect to each of the trial learning objectives have been published in the 2x successive interim learning reports, both of which are available on the FUSION website.	<ul style="list-style-type: none"> Articulated in the following published reports: <ul style="list-style-type: none"> - ITLR#1 - ITLR#2
WP6	<u>ENIC 2021</u> FUSION presented at the ENIC event, Sep' 2021.	<ul style="list-style-type: none"> Pre-recorded video with accompanying slides.
	<u>Ofgem Show & Tell</u> Presented to Ofgem delegates, October 2021	<ul style="list-style-type: none"> Teams presentation with Q&A. Slides shared with attendees
	<u>Fife Council</u> Continual professional Development (CPD)	<ul style="list-style-type: none"> Training event focussing on experiences and relevant learnings from FUSION
	<u>FUSION Update Video</u> FUSION published an interim learnings update video, May 2022	<ul style="list-style-type: none"> LinkedIn video 
	<u>EIS 2022</u> FUSION presented at the EIS event, September 2022.	<ul style="list-style-type: none"> In-person presentation in the 'flexibility' break-out session. Project represented at SP Energy Networks stand to answer questions.

Table 3: Interim outputs generated during reporting period

2.2 Project Risks

No risks have been identified that are likely to impede the achievement of any of the Project Deliverables outlined in the Project Direction or cause any deviation from the agreed aims, objectives or delivery programme. Risks are reviewed regularly and updated periodically in the Risk Register.

A comprehensive list of persisting project risks and their corresponding mitigation measures is provided in *Section 12 - Risk Management*.

3 Project Manager’s Report

3.1 Project Overview

3.1.1 Project Plan

In order to ensure the successful completion of the FUSION Project, a project delivery plan was developed by SPD, which grouped activities into discrete Work Packages, within which tasks and timescales were also defined.

An overview of these Work Packages and their associated timescales is provided below in *Figure 1: Project Delivery Timeline*.

For a more detailed summary of Project Progress against each Work Package, please refer to *Section 5: Progress against Plan*.

3.1.2 Project Deliverables

The latest² Project Direction issued for FUSION articulated a set of ‘Project Deliverables’ and associated timescales, against which the success of the project would be evaluated.

Figure 1 below provides a timeline showing the due-dates established by the Regulator for each of these seven ‘Project Deliverables’ (shown in **green** for completed or **red** for pending).

Progress to date has been very good with all ‘Project Deliverables’ having been submitted either on or before their contractual due-dates.

For a detailed ‘RAG’ status report of the progress made against each of the ‘Project Deliverables’ please refer to *Section 8: Project Deliverables*.

² [https://www.ofgem.gov.uk/system/files/docs/2018/10/fusion - direction amended 09 2018.pdf](https://www.ofgem.gov.uk/system/files/docs/2018/10/fusion_-_direction_amended_09_2018.pdf)

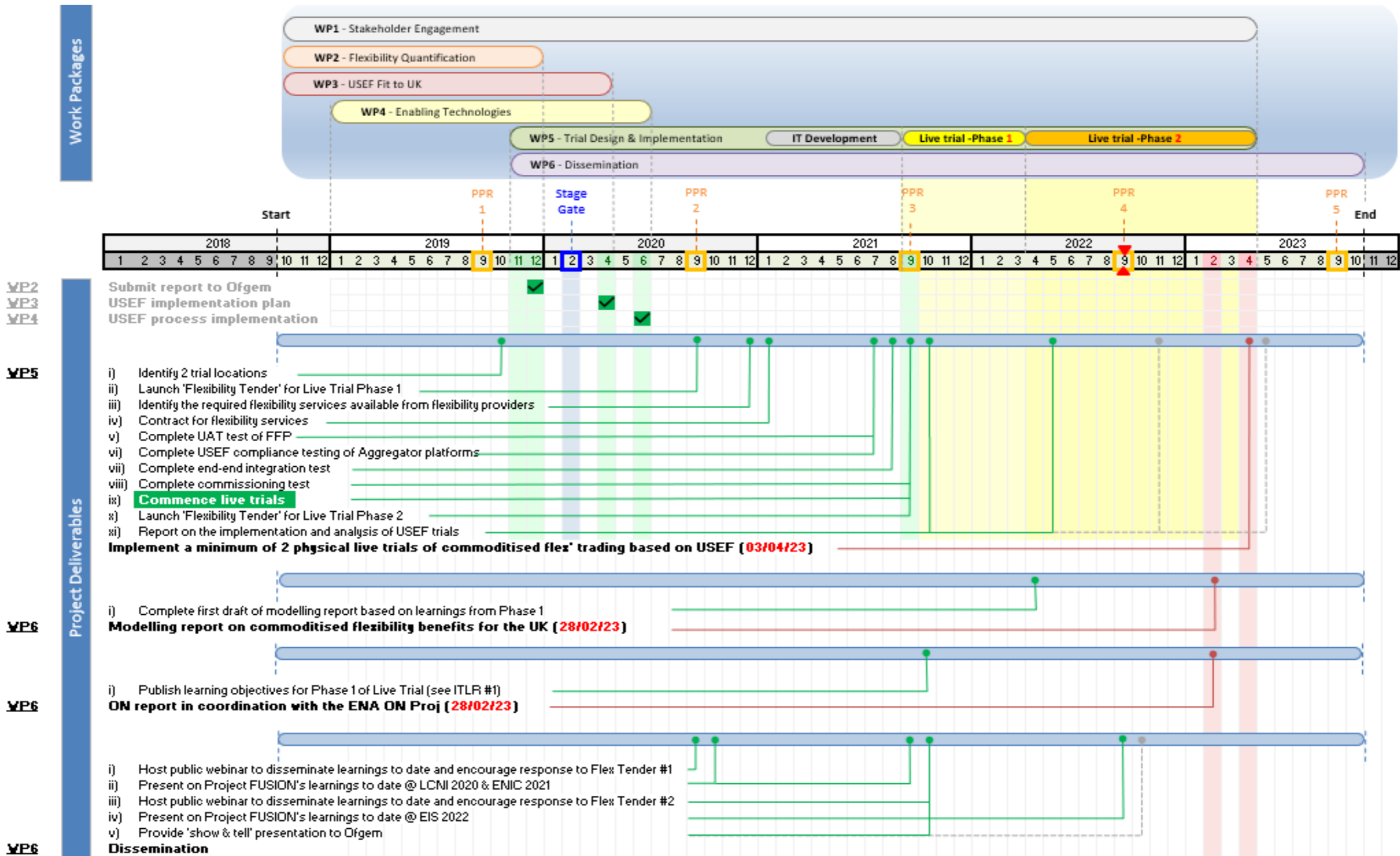


Figure 1: Project Delivery Timeline

3.2 Project Highlights - Concise Summary

Table 4 below provides a concise summary of the key successes noted during the reporting period. Detail on further highlights is provided in *Section 5.3 - Project Highlights*.

Ref	Deliverable Affected	Summary of Highlight	Brief Detail
1	WP5: Live Trial	Phase 2 'go-live' achieved	<ul style="list-style-type: none"> Flex' Tender #2 completed and Flexibility Service Agreements (FSA) signed to s flexibility secure flexibility availability for phase 2 of live trial (April 2022 – March 2023). IT development work completed to enhance the DSO and Aggregator trading platforms to, amongst other things, allow for flexibility to be traded at various voltage levels (33kV and 11kV). Testing & commissioning of all end-end systems completed Phase 2 go-live achieved April 2022.
		Alleviation of real network needs	<ul style="list-style-type: none"> Project FUSION provided 500kW of standby capacity to support the DNO in managing local network needs during the following real events: <ul style="list-style-type: none"> A planned outage of a transformer at St. Andrews Primary substation (Apr 2022) A large sporting event; the St. Andrews Open (July 2022)
		>300 of flexibility dispatches realized	<ul style="list-style-type: none"> By artificially de-rating the network assets at our congestion points, FUSION was able to simulate network events and call upon and dispatch flexibility onto our network in response to those simulated events. Over this reporting period the FUSION trial has delivered over 330 day-ahead and intra-day flexibility dispatches onto our network, corresponding to 48.1 MWh of flexibility. By responding to such a high volume of simulated events, the trial has been able to generate a significant amount of empirical data, making it suitable for statistical analysis to provide valuable insights with respect to our trial learning objectives.
2.	WP6: Dissemination	Interim learnings published	<ul style="list-style-type: none"> The following reports provide interim learnings from the trial to date: <ul style="list-style-type: none"> ITLR#1 ITLR#2

Table 4: Project Highlights – Concise Summary

3.3 Project Issues - Concise Summary

No significant problems were encountered during this reporting period.

Several minor issues were successfully navigated without incident and these are summarised in *Table 5* below.

Further detail on each of issues listed below is provided in *Section 0*

Project Issues

Ref	Deliverable Affected	Issue Summary	Brief Detail
1	WP5: Trial design	FFP issues	<ul style="list-style-type: none"> • Very rarely there appear to have been instances in which, when the DNO places a FlexOrder in the FFP, the FFP fails to communicate that instruction to the associated aggregator. • SPEN is working closely with OpusOne Solutions to diagnose the cause of this phenomenon. Current indications suggest that the issue resides within the FFP, in which case it will need to be rectified accordingly. • Thankfully the issue is very rare (occurring in less than 5% of FlexOrders) and so it has not impeded the trial. Any resulting anomalies generated in the trial data have also been isolated in the ensuing results analysis to prevent them from skewing any observations.
2	WP5: Trial design	DER un - availability	<ul style="list-style-type: none"> • Occasionally some of the DER were temporarily unable to participate in the flexibility trials due to unplanned outages. • Thankfully we had sufficient DER participating in the market to continue trading unhindered and the Flexibility Service Agreements (FSA) we have in place with aggregators provided clear procedures for how to navigate such instances smoothly and without issue.

Table 5: Project Issues – Concise Summary

3.4 Outlook to the Next Reporting Period

Table 6 below provides a summary of the progress planned under each work package during the next reporting period.

For specific detail of timings associated please refer to the RAG status report in *Section 8 - Project Deliverables*.

Anticipated activity		Associated Outputs / Value Added
WP1	ShapeShifter steering committee	- FUSION Partners to continue to engage with ShapeShifter to share learnings from the FUSION trial and suggest improvements to the framework.
WP5	Continue to run live trials:	<u>General:</u> - Continue to operate the live trials until April 2023
		<u>Primacy rules / hierarchies of Control:</u> - Subject to the finalisation of associated contracts, project FUSION is planning to collaborate with NGENSO in Q4 2022 to trial the implementation of 2 x primacy rules that were developed by the ENA under WS1a Product 5 – primacy rules. A report, written in conjunction with the ENA, will follow in February 2023. (See ‘Hierarchies of control’ elow for more detail).

WP6	Share learnings	<ul style="list-style-type: none"> - Continue to publish 6-monthly Interim Trial Learnings Reports (ITLR's). ITLR#3 due for publication in Q4 2022. - Present at EIS 2022 (FUSION scheduled to present in-person as part of a flexibility breakout session)
	CBA	<p><u>FUSION CBA</u></p> <ul style="list-style-type: none"> - FUSION to publish a CBA in February 2023 in response to deliverable 6 of the Project Direction: 'Modelling report on commoditised flexibility benefits for the UK'.
	Hierarchies of Control	<p><u>Primacy Rules</u></p> <ul style="list-style-type: none"> - FUSION to publish (in February 2023) a report in coordination with ENA ONP WS1a_P5_Primacy Rules - This publication will report on the findings of the trials that FUSION is planning to conduct with NGESO in Q4 2022.
TEF	Alignment with the ENA Open Networks Project	<ul style="list-style-type: none"> - Continue to meet monthly with TEF ONP representative to ensure alignment with the ONP and to seek to add value where possible by implementing and reporting back on various ON-P outputs.

Table 6: Anticipated activities in next reporting period

4 Business Case Update

The continued relevance of the business case was a key criterion against which projects were evaluated at the TEF³ Common Stage Gate review.

That comprehensive review concluded that, at the time of publication in February 2020, FUSION's business case was no less relevant than it was in 2018 when the project was awarded funding.

In the absence of compelling evidence to the contrary it is this author's opinion that the findings of the Stage Gate review in Feb 2020 still provide the most reliable evaluation available of the project's business case.

³ TRANSMISSION (SSEN), EFFF (WPD), FUSION (SPEN)

5 Progress against Plan

This section explains in greater detail the progress made against the Project Delivery Plan.

5.1 Overview

Figure 1 above provides a timeline showing the due-dates established by the Regulator for each of the seven 'Project Deliverables'.

During this reporting period, Project FUSION's interim outputs have been generated either in-line with or ahead of the timelines specified in the Project Directive.

5.2 Work Packages

The following sub-sections describe in more detail the progress made under each discrete Work Packages during the reporting period.

5.2.1 WP1 - Stakeholder Engagement

The key objective of Work Package 1 is to ensure that relevant stakeholders are continually engaged throughout the FUSION project.

Figure 2: Timescale for implementing WP1 below shows the timescale for implementing WP1.

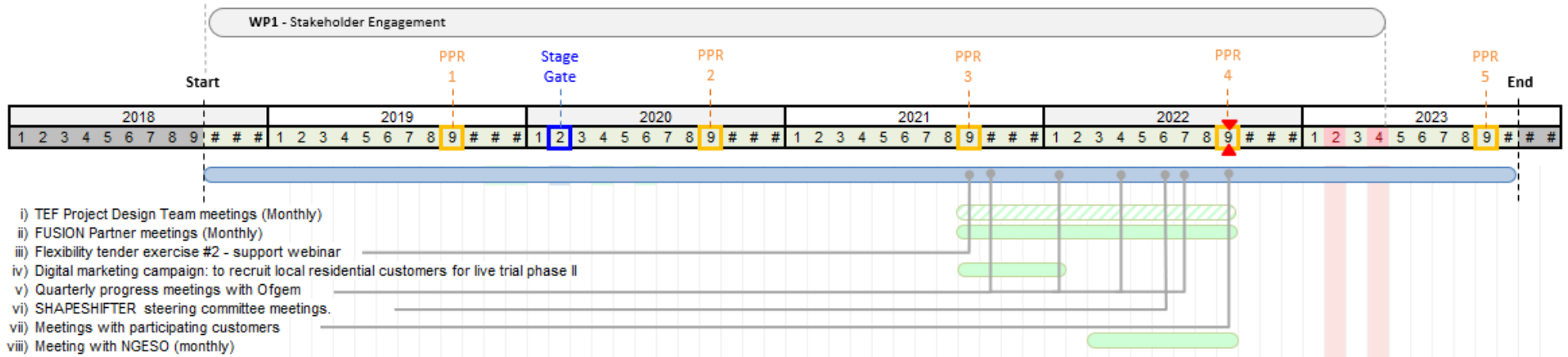


Figure 2: Timescale for implementing WP1

The original FUSION FSP defined the key activities associated with WP1 as follows:

Description
Establish and maintain an enduring and openly engaging stakeholder forum
Review and map all relevant stakeholders, their interests and alignments with FUSION
Undertake national level stakeholder events
Undertake trial location level stakeholder events

This reporting period has seen significant progress made under WP1 with effective stakeholder engagement achieved at a local, national and international level. The stakeholder forum has maintained strong momentum and participation continues to grow as more contacts are voluntarily providing their written consent for FUSION Partners to retain their details on our GDPR-compliant system. Notable stakeholders engagement activities within this reporting period include a digital marketing campaign to recruit local residential customers to participate in the trial and the establishment of a strong working dialogue with NGENSO to plan for our collaborative trial of Primacy Rules in Q4 2022.

5.2.2 WP2 - Flexibility Quantification Report

This WP was successfully completed during the previous reporting period. Figure 3Error! Reference source not found. below shows the timescale for implementing WP2 and the associated Project Deliverable due dates.

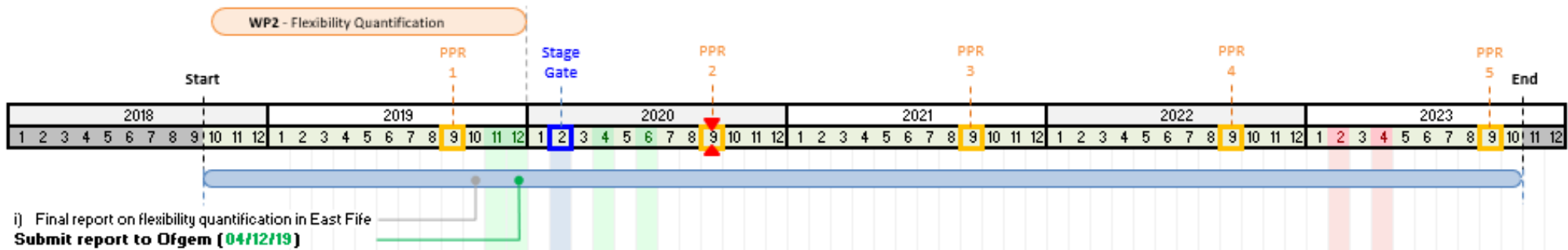


Figure 3: Timescale for implementing WP2

5.2.3 WP3 - USEF Fit for UK

This WP was successfully completed during the previous reporting period. Figure 4 below shows the timescale for implementing WP3 and the associated Project Deliverable due dates.

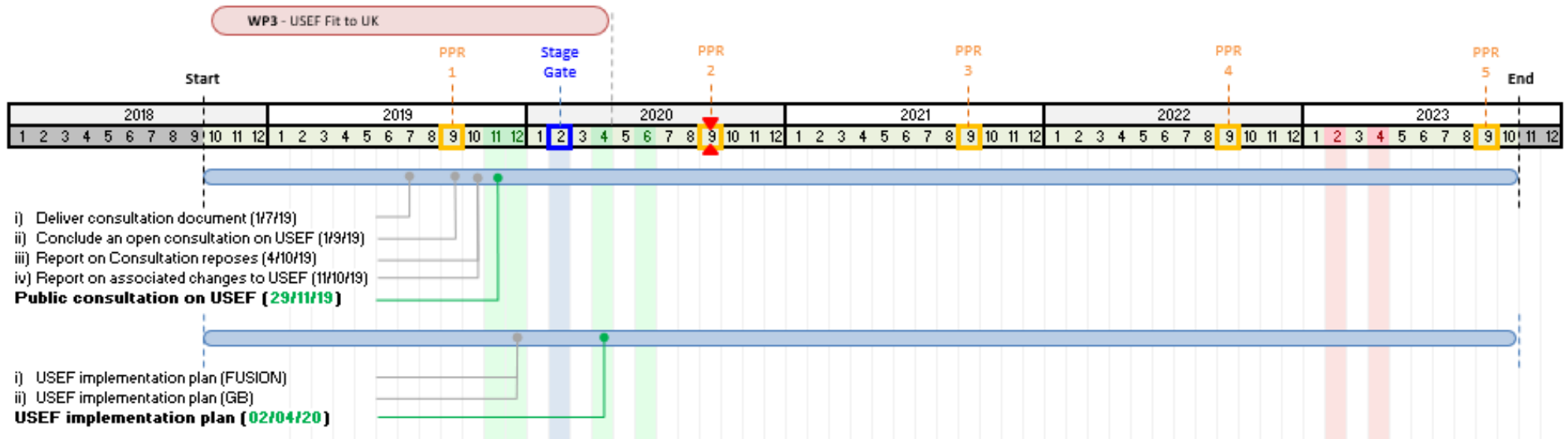


Figure 4: Timeline for implementing WP3

5.2.4 WP4 - Enabling Technologies

This WP was successfully completed during the previous reporting period. Figure 5 below shows the timescale for implementing WP4 and the associated Project Deliverables.

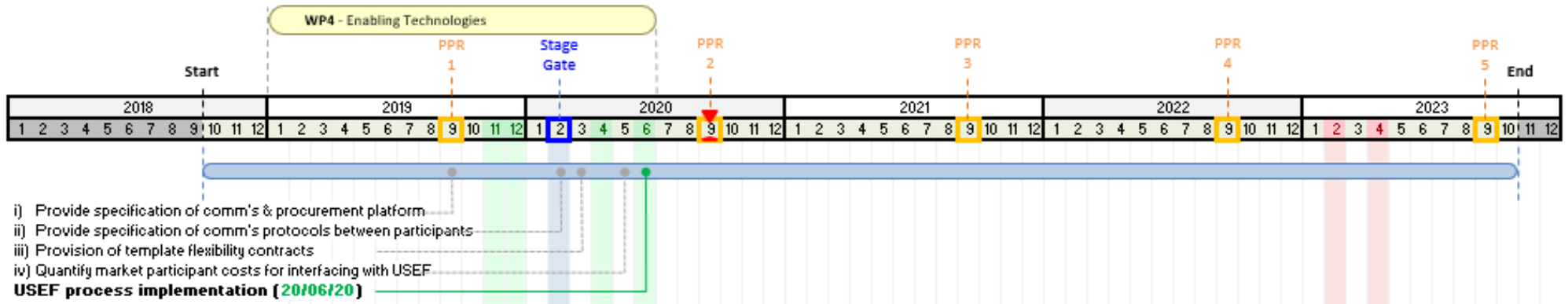


Figure 5: Timeline for implementing WP4

5.2.5 WP5 - Trials

Live trials have now successfully commenced. *Figure 6* below shows the timescale for implementing WP5 and the associated Project Deliverables.

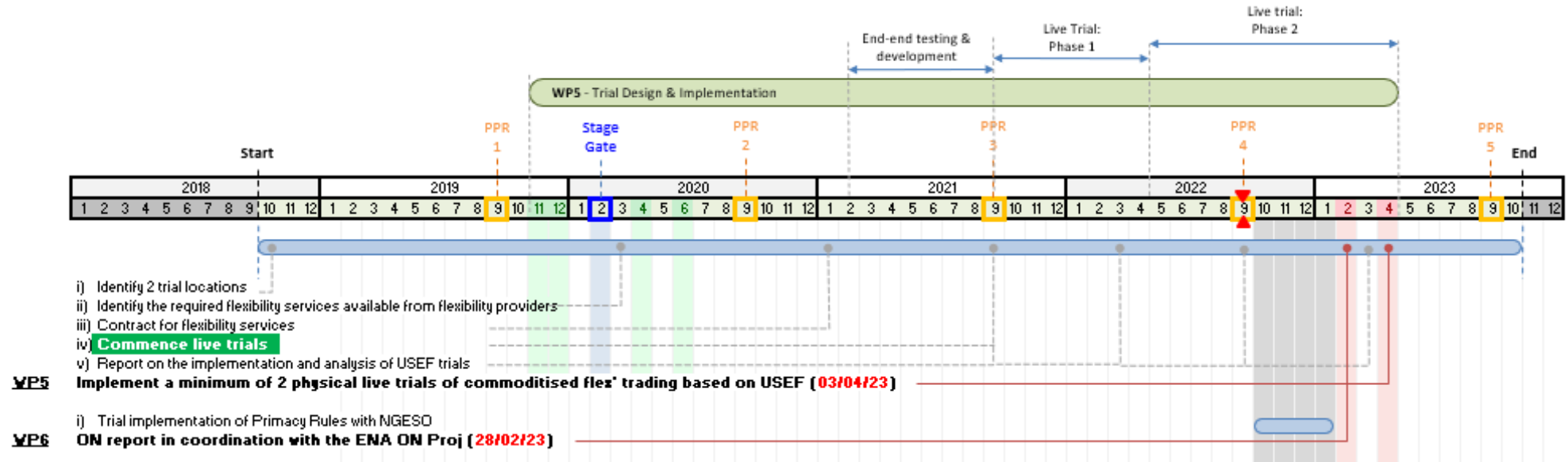


Figure 6: Timeline for implementing WP5

The excerpt below from Section 8 – ‘Project Deliverables’ summarises the progress made under WP5 during the reporting period and briefly describes the key activities planned for the next reporting period.

Ref	Project Deliverable	Due Date (Ofgem)	Evidence required	Status		Progress update
				Not started	Ongoing	
				Not started	Ongoing	Complete
5	Implement a minimum of two physical and live trials of commoditised flexibility based on the USEF framework.	3/4/23	5.1	Identify two trial locations.	Ongoing	<ul style="list-style-type: none"> Tender packs have been published as part of 2 x FUSION Flex Tender exercises launched in September 2020 and 2021 respectively. These tender packs sought to procure flexibility services that address network needs at the following two trial locations; <ul style="list-style-type: none"> - St. Andrews Primary Substation - Leuchars Primary Primary Substation These tender packs can be found on the FUSION website and they specify the flexibility services that we wish to procure at each trial site
			5.2	Identify the required flexibility services available from flexibility providers. (Phase 1)	Ongoing	<ul style="list-style-type: none"> The first of the FUSION Flex Tender exercises sought 250kW of flexibility at each of the above trial locations for the duration of Phase 1 of the live trials. Responses to the FUSION Flexibility Tender #1 confirmed that <u>all</u> of the flexibility services that the Project sought to procure were available from local providers.
				Identify the required flexibility services available from flexibility providers. (Phase 2)	Ongoing	<ul style="list-style-type: none"> The second of the FUSION Flex Tender exercises sought 4.5MW of flexibility at each of the above trial locations for the duration of Phase 2 of the live trials. Responses to the FUSION Flexibility Tender #2 were received in December 2021 and 500kW of available flexibility capacity was contracted across seven congestion points on the 33kV and 11kV networks.
			5.3	Contract for flexibility services. (Phase 1)	Ongoing	<ul style="list-style-type: none"> Flexibility Service agreements have been signed for Phase 1 of the live trial. These were signed with the 2 x successful respondents to the 'Invitation to Tender' (ITT) for the FUSION Flex Tender #1
				Contract for flexibility services. (Phase 2)	Ongoing	<ul style="list-style-type: none"> Flexibility Service agreements have been signed for Phase 2 of the live trial. These were signed with the 2 x successful respondents to the 'Invitation to Tender' (ITT) for the FUSION Flex Tender #2
			5.4	Undertake live trials. (Phase 1)	Ongoing	<ul style="list-style-type: none"> Phase 1 of the FUSION trials successfully went live in September 2021 The live trials are operating according to plan for addressing our learning objectives Services being traded include: Secure, Sustain and Dynamic Flexibility services are being traded at least 4 times per week Trading and dispatches are typically day-ahead or same-day. Data is being gathered for analysis in accordance with the Phase 1 'learning objectives' and 'evaluation methodology'
				Undertake live trials. (Phase 2)	Ongoing	<ul style="list-style-type: none"> Phase 1 of the live trial successfully went live in September 2021 and concluded at the end of March 2022 Phase 2 of the live trial commenced the day after the completion of Phase 1 (April 2022) and is due to run until the end of March 2023.
			5.5	Report on the implementation and analysis of USEF trials	Ongoing	<ul style="list-style-type: none"> The success of the trials is being continually monitored and evaluated against pre-defined success criteria The findings of this evaluation is being periodically reported and the learnings disseminated in 6-monthly 'interim trial learnings reports' (ITLR). The first two if these ITLR reports have been published on the FUSION website. The next (ITLR#3) is due for publication in Nov 2022.

5.2.6 WP6 - Dissemination

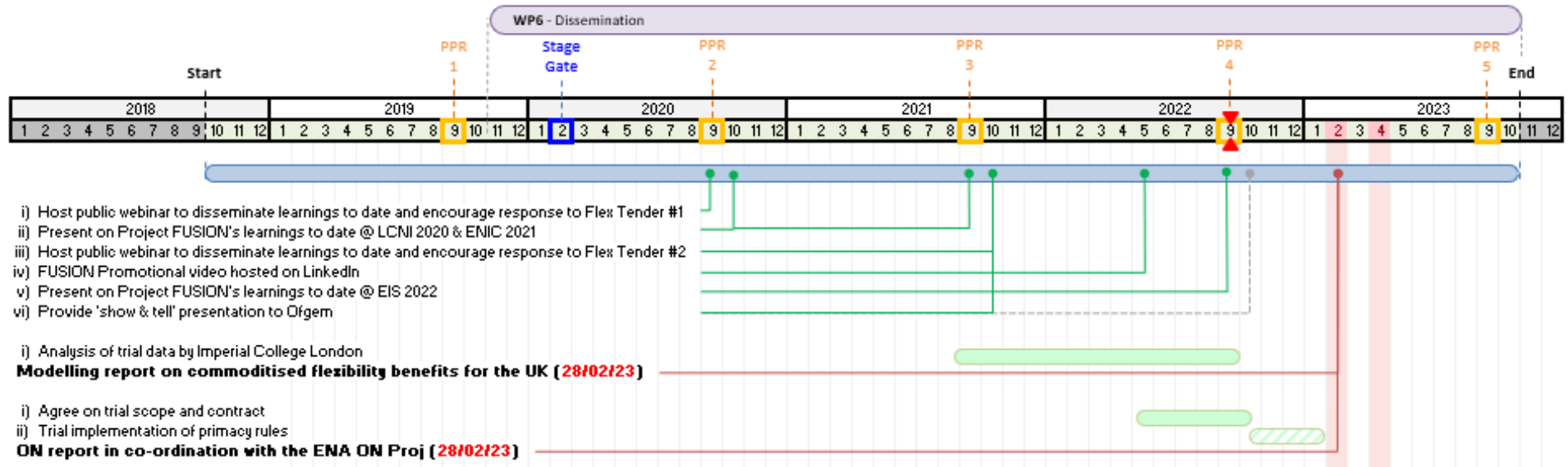


Figure 7 below shows the timescale for implementing WP6 and the associated Project Deliverables that it seeks to address over that period.

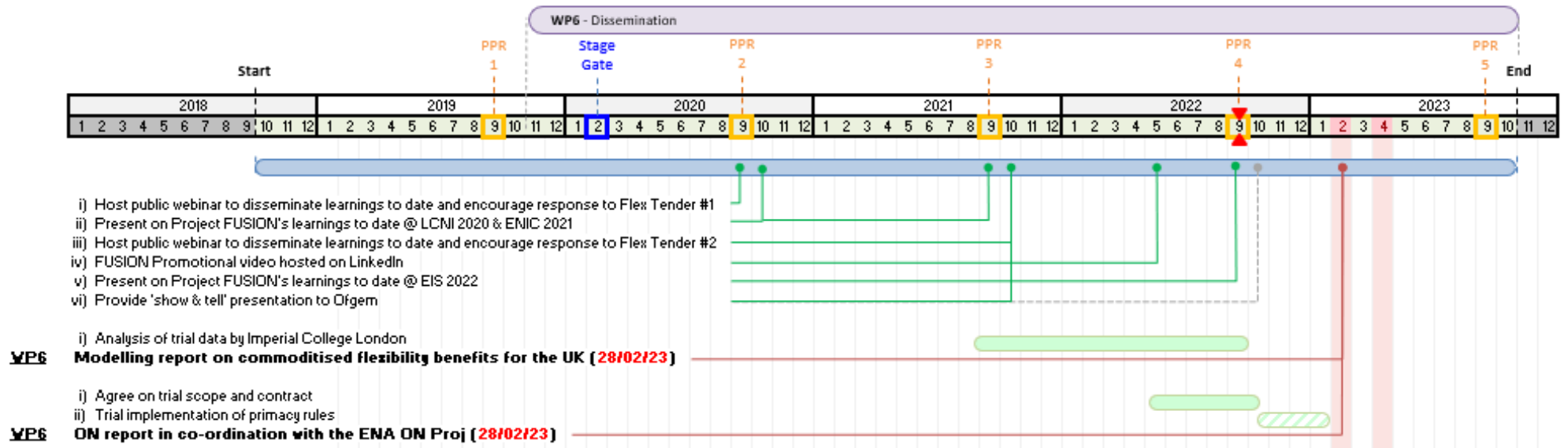


Figure 7: Timeline for implementing WP6

One notable dissemination activity within this reporting period was the publication of a [project update video](#) hosted on LinkedIn.

The excerpt below from *Section 8 – ‘Project Deliverables’* summarises the progress made under WP6 with respect to the specific deliverables during the reporting period.

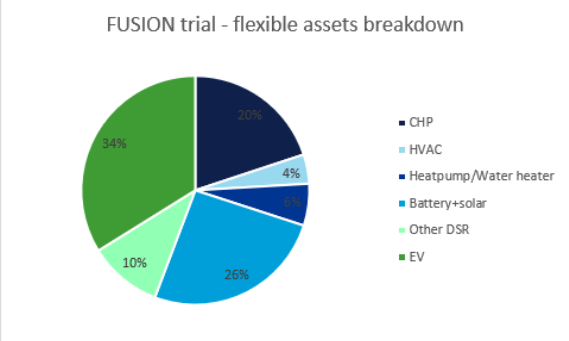
Ref	Project Deliverable	Due Date (Ofgem)	Evidence required		Status	
					Not started	Ongoing
6	Modelling report on commoditised flexibility benefits for the UK (ICL).	28/2/23	6.1	Academic modelling report on GB flexibility	Ongoing	<ul style="list-style-type: none"> Imperial College London (ICL) shared a first iteration of the draft report looking solely at the local trial area, for internal review in Q2 2022. Work has been ongoing since then on the development of the full report in Q4 2022 and all necessary inputs have been provided to ICL for them to elaborate that output.

Ref	Project Deliverable	Due Date (Ofgem)	Evidence required		Status		Progress update
					Not started	Ongoing	
7	Open Networks report in coordination with the ENA Open Networks Programme.	28/2/23	7.1	Report on coordination and hierarchies of control for flexibility, in collaboration with the ENA Open Networks Programme.	Ongoing	<ul style="list-style-type: none"> FUSION in finalising a contract with NGENSO to conduct trials of Primacy Rules in Q4 2022 A learnings report will be produced by FUSION, in coordination with the ENA (WS1a P5) in February 2023 	
N/A	Comply with knowledge transfer requirements of the Governance Document.	28/09/20xx	i	Annual Project Progress Reports which comply with the requirements of the Governance Document.	Complete	<ul style="list-style-type: none"> PPR_01 completed in September 2019 and published on the Project FUSION website PPR_02 completed in September 2020 and published on the Project FUSION website PPR_03 completed in September 2021 and pending publication on the Project FUSION website 	
		2/11/23	ii	Completed Close Down Report which complies with the requirements of the Governance Document.	Not started		
		30/10/19	iii	Evidence of attendance and participation in the Annual Conference as described in the Governance Document.	Complete	<ul style="list-style-type: none"> Project FUSION presented a progress update at the ENIC event in October 2020 	

5.3 Project Highlights

Table 7 below elaborates the successes already summarised in Section 3.2 – ‘Project Highlights – Concise Summary’


Table 7: Project Highlights

Ref	Deliverable Affected	Summary of Highlight	Brief Detail														
1	WP5: Live Trial	Phase 2 ‘go-live’ achieved	<ul style="list-style-type: none"> ▪ Phase 2 go-live achieved April 2022. ▪ Flexibility being dispatched 4days/week in response to both real and simulated events across 7 congestion points on our local network: <ul style="list-style-type: none"> ○ 2 x Primary Substations (33kV) ○ 5 x feeders (11kV) ▪ Some high-level facts & figures: <ul style="list-style-type: none"> ○ Most of the flexibility is being provided by EV chargers <div style="text-align: center;">  <table border="1"> <caption>FUSION trial - flexible assets breakdown</caption> <thead> <tr> <th>Asset Type</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>CHP</td> <td>20%</td> </tr> <tr> <td>HVAC</td> <td>4%</td> </tr> <tr> <td>Heatpump/Water heater</td> <td>1%</td> </tr> <tr> <td>Battery+solar</td> <td>26%</td> </tr> <tr> <td>Other DSR</td> <td>10%</td> </tr> <tr> <td>EV</td> <td>34%</td> </tr> </tbody> </table> </div> <ul style="list-style-type: none"> ○ SP Energy Network, through Project FUSION, has issued 332 flex orders, representing the dispatch of 48.1 MWh of remunerated flexibility in the day-ahead and intraday market ○ The trial is testing a fully USEF-based market mechanism that is characterised by several innovative elements, to which we have linked the project learning objectives. 	Asset Type	Percentage	CHP	20%	HVAC	4%	Heatpump/Water heater	1%	Battery+solar	26%	Other DSR	10%	EV	34%
Asset Type	Percentage																
CHP	20%																
HVAC	4%																
Heatpump/Water heater	1%																
Battery+solar	26%																
Other DSR	10%																
EV	34%																

			<ul style="list-style-type: none"> ○ Free bids: The USEF Free Bids mechanism is considered beneficial by aggregators because it 1) provides more opportunity for revenue through enabling additional revenue outside of long-term contracts and 2) enables the aggregator to bring time-dependent flexibility that cannot be committed long-term (up to double the amount in some cases). From the DSO perspective, the free bid mechanism allows to request flexibility outside the availability window and thus there are no availability costs attached, being those costs much higher than the utilisation costs. For example, during the St. Andrews tournament, the DSO received free bids from aggregators to support the grid in case of overload at the substation. The free bids prices stayed within the range of offers within long-term contracts, except in a couple of occasions during the tournament in which the price doubled. As part of the upcoming Intermediate Learning Reports, FUSION will calculate how much the DSO could save in availability thanks to free bids. ○ D-programmes (baseline): During the trial, FUSION is testing the baseline recommended by USEF and ENA, the nomination baseline. This was achieved by the so-called, D-programmes. Aggregators have praised the simplicity and inclusivity of D-programmes and regard them as one of the best features of USEF. Baselineing the energy consumption has proved a challenge because of the timing (day-ahead), type of assets that participate in the trial, many of them residential, and the sizes of the portfolios. Within FUSION, smaller portfolios showed an accuracy 30%- 60% lower than larger portfolio sizes. Overall, the nomination baseline performance has been poor. The baselines have, in general, showed a positive bias (up to 20%), which means that the baseline was overestimated. Regarding the error, the baseline has shown over 100% (average) RRMSE⁴. When compared to the historical (8 in 10 method), the historical baseline has shown slightly better results, but still not sufficient to be considered a “good” baseline since it results in over 50% RRMSE.⁵ This demonstrates that the baseline remains a challenge and FUSION will explore with aggregators what the improvement possibilities are.
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⁴ Root-mean-square deviation

⁵ These results reflect the data of one of the aggregators.

			<ul style="list-style-type: none"> ○ The Market Coordination Mechanism (MCM): USEF MCM facilitates flexibility trading and consists of five phases – contract, plan, validate, operate and settle. During the trial, the contract phase was populated at the procurement stage whereas the phases from ‘plan’ to ‘operate’ were conducted day-ahead and intraday. FUSION has investigated what shorter time frames could mean for the DSO flexibility procurement. The analysis has shown that, applying a confidence factor due to forecast inaccuracy, the DSO could save 3-8% procurement capacity and energy by moving to shorter timeframes. This can translate to a reduction of long-term contracts for flexibility, reduction of energy dispatch and increase network reliability. ○ The USEF flexibility trading protocol (SHAPESHIFTER): The overall experience with the protocol and FUSION is that it is user-friendly, even for aggregators with less experience in trading, as it facilitates participation in flexibility markets. The automated bidding and settlement processes that USEF offers are extremely beneficial for smaller assets, which would otherwise have higher proportional management costs. The benefit of standardisation for the wider industry and for the aggregators in particular is recognised by all participants, as the use of multiple platforms would create additional burden for market participants. A number of improvements to the protocol have been suggested by FUSION. The SHAPESHIFTER steering technical committee will implement some of the suggestions in the next release.
	Realisation of Network Benefits		<ul style="list-style-type: none"> ● Project FUSION provided flexibility to support the DNO in managing local network needs during the following real events: <ul style="list-style-type: none"> - A planned outage of a transformer at St. Andrews Primary substation (Apr 2022) - A large sporting event; the St. Andrews Open (July 2022)  <ul style="list-style-type: none"> ● For further detail, please refer to <i>Appendix 3 – Network benefit</i>

		Realisation of Customer Benefits	<ul style="list-style-type: none"> • Participation in Project FUSION has delivered material benefits to SP Energy Networks customers. • Reported benefits include the following: <ul style="list-style-type: none"> - Third party investment in hardware for energy monitoring, control and storage - Reduction in CO₂ footprint - Income from flexibility trading - Strategic alignment with DNO to help plan for achieving their aspirations for decarbonisation within a congested network • For further detail, please refer to <i>Appendix 3 – Network benefit</i>
3	WP6: Dissemination	Interim learnings published	<ul style="list-style-type: none"> • The following reports provide quantitative analysis of the empirical data generated from the trial to date: <ul style="list-style-type: none"> - ITLR#1 - ITLR#2
		Good progress against the 2 x pending deliverables due in Feb 2023.	<p>CBA modelling report</p> <ul style="list-style-type: none"> • 1st incomplete draft of modelling report shared by ICL in Q2 2022 for internal review. • 1st complete draft of modelling report anticipated Q4 2022. <p>Open networks report</p> <ul style="list-style-type: none"> • FUSION & NGENSO to conduct trials of primacy rules in Q4 2022, with an associated learnings report planned for submission to Ofgem in February 2023.

5.4 Project Issues

No significant problems have been encountered or identified during this reporting period. Those minor issues are summarised in *Section 3.3 – ‘Project Issues – Concise Summary’*.

6 Progress against Budget

To date, Project FUSION has underspent by 24% relative to the forecast expenditure. A breakdown of this variation in expenditure and a summary explanation for these perceived variations is provided below in 'Table 9: Variation between forecast & actual expenditure' & 'Table 10: Explanation for perceived variations in expenditure' respectively.

Costs until Sep-22 (£)	Cost Categories										
	Labour	Equipment	Contractors	IT	IPR Costs	Travel & Expenses	Payments to users	Contingency	Decommissioning	Other	Total
Forecasts (FSS)	1,334,203	332,765	2,605,628	300,000	-	160,529	82,500	30,147	-	-	4,845,772
Actuals (incl. Accruals)	1,096,465	-	2,598,420	-	-	-	-	-	-	-	3,694,885
Variation (%)	-17.82%	-100.00%	-0.28%	-100.00%	0.00%	-100.00%	-100.00%	-100.00%	0.00%	0.00%	-23.75%

Table 8: Variation between forecast & actual expenditure.

Cost Category	Variation	Explanation
Labour	-18%	<ul style="list-style-type: none"> Efficiency to leading and delivering the project was optimised. Therefore, lesser than the planned SPD staff was assigned and charged to the projected. SPD labour included; <ul style="list-style-type: none"> SPD Staff Cost associated with the submission of the FUSION proposal for approval by the regulator SPD travel expenses Any contingency costs <p>NB: Cost related to the agency staff has been reported as Contractors in line with the Regulatory Reporting Pack (different to previous years' PPR)</p>
Equipment	-100%	<ul style="list-style-type: none"> The equipment budget originally accounted for the cost of the sub-metering equipment that would be required as part of the WP2 flexibility quantification exercise, and for the cost of the DSO Platform (hardware) The sub-metering equipment for was used, but their cost was accounted for under the 'Contractors' cost category. Hence the equipment cost category shows a variation of 100%, but there in fact is no variation.
Contractors	0%	<ul style="list-style-type: none"> Aligned with the project forecasts, submission (FSP).
IT	-100%	<ul style="list-style-type: none"> The IT budget accounted for the DSO Platform (software) and its integration with DNO and aggregators' systems. The DSO Platform was successfully procured in a preceding reporting period, and any costs associated with maintenance and enhancements in this reporting period were accounted under the 'Contractors' cost category. Due to which, we find zero costs in the 'IT' cost category or 100% variation albeit there're payments made for the IT.
Travel & Expenses	-100%	<ul style="list-style-type: none"> Rather than being captured separately, travel costs were accounted for under the 'Contractors' and 'Labour' categories. (Most of the stakeholder engagement work has been completed by SPD, with the associated travel & expenses being captured under the 'Labour' cost category). Consequently; <ul style="list-style-type: none"> the variation in the 'Travel and Expenses' cost category is 100% the 'Labour' cost category has been inflated
Contingency	-100%	<ul style="list-style-type: none"> This small contingency budget was provided to cater for unexpected costs that did not fit within any of the above categories. Because most of the key deliverables to-date relied on fixed-fee Call-Off agreements with Partners, any unexpected costs were either borne by the Partner or absorbed by deploying in-house Labour from the Licensee. Consequently; <ul style="list-style-type: none"> the variation in the 'Contingency' cost category is 100% the 'Labour' cost category has been inflated

Table 9: Explanation for perceived variations in expenditure

6.1 Assumptions Used & their Limitations

6.1.1 Adjustment of the ‘forecast’ periods to align with the ‘reporting’ period

Ideally, when comparing actual and forecast expenditure, data would be available that corresponds to the same time period. However, in the case of the FUSION project the ‘forecast’ periods and the ‘reporting’ periods are out of phase, which makes their relative comparison complex.

This situation is described in more detail below, along with the assumptions used in eliciting a meaningful analysis of the available data and the associated limitations of those assumptions.

Actual monthly expenditure data is readily available for Project FUSION, dating right back to the project commencement on 28th September 2018.

When assessing the financial performance of Project FUSION over the PPR period, the actual expenditure data is readily available for analysis. However, the difficulty lies in quantifying the forecasted project expenditure for the corresponding 12-month PPR periods. Unfortunately, because Project FUSION did not commence at the start of the financial reporting year, the time periods used in the FSS to ‘forecast’ project expenditure are not synchronous with those used for the 12-monthly Project Progress Reporting.

Figure 11 ‘Non-synchronous reporting periods for ‘Forecast Project Expenditure’ & ‘Project Progress Reporting’ below helps to illustrate this asynchronous relationship.

	2018				2019				2020				2021																										
Calendar month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
Forecasting Period (financial year)	FY_1				FY_2				FY_3				FY_4																										
Reporting Period	PPR_01								PPR_02																														

Figure 8: Non-synchronous reporting periods for ‘Forecast Project Expenditure’ & ‘Project Progress Reporting’

In the FSS, Project Expenditure is forecast for each **financial** year.

The FUSION project was originally planned to commence in January 2018. Therefore;

- The first forecast period forecasted in the FSS corresponds to Jan, Feb & Mar 2018 (the last 3 months of the financial year 2017/18)
- Subsequent forecast periods in the FSS correspond to 12-month financial years, until the forecast end date.

The actual expenditure over a given PPR reporting period does not directly correspond to any of the discrete forecast periods within the FSS.

If Project FUSION had commenced on 1st April, then comparing actual and forecast expenditure over any given financial year would have been a straightforward exercise. Unfortunately, however, that has

not been the case, and that means that quantifying the forecast expenditure over a given 12-month PPR reporting period requires some assumptions to be made.

Namely, we have had to:

- i. Disaggregate the forecast expenditure over each financial year into monthly spend*.
- ii. Carve-out from that financial year the forecast expenditure up to and including December only.
- iii. Sum the resultant forecast expenditure with that from the remainder from the previous financial year.

* Disaggregating the yearly forecast expenditure into a monthly forecast has employed the following assumptions:

1. Generally, forecast annual expenditure has been assumed to be uniformly distributed over the constituent 12 months.
2. The exception to this rule being where, within a given financial year of the forecast, a large expense can be confidently anticipated to occur within specific months. In which case its inclusion in any given PPR period has been a function of the timing of that anticipated expense.

A breakdown of the monthly forecast expenditure during the PPR period is provided in Figure 13 'Actual Monthly Expenditure (Postings including Accruals) vs FSS Monthly Apportioned Forecasts'.

6.1.2 Accrued costs

When expressing the actual expenditure for the FUSION Project during the reporting period, the following 'accrued' costs have been included for September 2022.

These costs have not yet been invoiced for, but the associated work is expected to be completed by end of cut-off period. Therefore, the costs are accounted for as having been already 'accrued';

September 22 Accruals		
Cost Category	Detail	£
Labour	Labour - SPD - Q3 2022	65,009.87

7 Project Bank Account

A dedicated bank account was made available by SPD to act as the Project Bank Account in to which Ofgem deposited the project funds.

A copy of the latest bank statement for the Project Account is provided below in Figure 9 informing the transaction made to that account and the interest earned over the term.

NB: The project bank account was changed from The Royal Bank of Scotland (83-07-06 19658883) to Santander Bank (09-60-01 55951252) on 30th June 2022.

Bankline



Statement for account 83-07-06 19658883 from 01/09/2021 to 20/09/2022

Short name:	SP DISTRIBUTION PLC	Currency:	GBP
Alias:	SP DISTRIBUTION PLC	Account type:	CORP CASH MANAGER PL
BIC:	RBOSGB2L	Bank name:	Royal Bank of Scotland
IBAN:	GB65RBOS83070619658883	Bank branch:	GLASGOW CITY BRANCH

Date	Narrative	Type	Debit	Credit	Ledger balance
	CLOSING BALANCE				235.58Cr
31/08/2022	31AUG GRS 19658883	INT		0.02	235.58Cr
29/07/2022	29JUL GRS 19658883	INT		0.02	235.56Cr
30/06/2022	SIBA SPD 1965888 ELBANK051851488 SIBA SPD 1965888 CHPS CHG £000.00 CHAPS TFR	ITL	2,865,783.29		235.54Cr
30/06/2022	30JUN GRS 19658883	INT		235.54	2,866,018.83Cr
31/05/2022	31MAY GRS 19658883	INT		251.22	2,865,783.29Cr
29/04/2022	29APR GRS 19658883	INT		199.40	2,865,532.07Cr
31/03/2022	31MAR GRS 19658883	INT		24.34	2,865,332.67Cr
28/02/2022	28FEB GRS 19658883	INT		21.98	2,865,308.33Cr
31/01/2022	31JAN GRS 19658883	INT		24.34	2,865,286.35Cr
31/12/2021	31DEC-GRS 19658883	INT		25.63	2,865,262.01Cr
06/12/2021	ZZ83013600020460 ELBANK050797162 SP DISTRIBUTION INTER A/C TFR	ITL	786,696.70		2,865,236.38Cr
30/11/2021	30NOV GRS 19658883	INT		32.02	3,651,933.08Cr
29/10/2021	29OCT GRS 19658883	INT		29.02	3,651,901.06Cr
30/09/2021	30SEP-GRS 19658883	INT		30.01	3,651,872.04Cr
	OPENING BALANCE				3,651,842.03Cr
Totals			3,652,479.99	873.54	

NB: Transactions with today's or next business day's date may still be subject to confirmation and may subsequently be reversed from your account.

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FUSION Project Progress Report – September 2022



BANCO SANTANDER SUC LONDRES
Account Extract: GBP - 09600155951252

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Type	Amount	Client ref.	Bank Ref.	Date	Description
Opening balance: 0.00				Date: 30/06/2022	Final balance: 2,865,783.29
MSC	2,865,783.29	ELBANKO51851488	EZ/CHE/000201819	30/06/22	/LCLC/528/LCLD/CHAPS Receipt/EREF/ELBANKO51851488/IREF/EZ/CHE/000201819/BIC/RBOSGB2L/ULTD/SP DISTRIBUTION PLC OCHIL HOUSE,10 TECHNOLOGY AVENUE,/IBAN/GB65RBOS83070619658883/ACTY/CURRENT ACCOUNT/REMI/SIBA SPD 19658883/UETR/3e902322-f88f-41ec-a628-2442c0062c68
Opening balance: 2,865,783.29				Date: 01/07/2022	Final balance: 2,865,783.29
Opening balance: 2,865,783.29				Date: 04/07/2022	Final balance: 2,865,783.29



BANCO SANTANDER SUC LONDRES
Account Extract: GBP - 09600155951252

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Opening balance: 2,865,783.29				Date: 09/08/2022	Final balance: 2,865,783.29
Opening balance: 2,865,783.29				Date: 10/08/2022	Final balance: 2,865,783.29
Opening balance: 2,865,783.29				Date: 11/08/2022	Final balance: 2,865,783.29



BANCO SANTANDER SUC LONDRES
Account Extract: GBP - 09600155951252

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Opening balance: 2,865,783.29				Date: 21/09/2022	Final balance: 2,865,783.29
Opening balance: 2,865,783.29				Date: 22/09/2022	Final balance: 2,865,783.29

Figure 9: Bank statement

8 Project Deliverables

Table 10 below provides a comprehensive ‘status report’ of the progress made to date against each of the Project Deliverables and indicates next steps.

Ref	Project Deliverable	Due Date (Ofgem)	Evidence required		Status	Progress update
					Not started	
					Ongoing	
					Complete	
1	Report on flexibility quantification in East Fife.	4/12/19	1.1	Report on quantification of the flexibility market value in E Fife, including robust assessments across voltage levels, market sector, industry type.		<ul style="list-style-type: none"> Completed and published on the FUSION website in Nov 2019 https://www.spenergynetworks.co.uk/userfiles/file/FUSION_Quantifying_Flexibility_Report.pdf
2	Public consultation on USEF	29/11/19	2.1	Deliver the consultation document on the basis of workshops.		<ul style="list-style-type: none"> Completed & published on FUSION website in June 2019 https://www.spenergynetworks.co.uk/userfiles/file/SPEN_USEF_Consultation_Document.pdf
			2.2	Hold an open consultation for a 3-month duration.		<ul style="list-style-type: none"> An 8-week open consultation was successfully held between 08/07/19 and 02/09/19 During that time, 2 x stakeholder events were held in Glasgow & London to promote stakeholder participation and respond directly to questions.
			2.3	Report on consultation responses and analysis.		<ul style="list-style-type: none"> Completed and published on the FUSION website in Nov 2019 https://www.spenergynetworks.co.uk/userfiles/file/USEF_Consultation_Report.pdf?v=1.2
			2.4	Report on associated changes to USEF implementation plan.		<ul style="list-style-type: none"> Completed and published on the FUSION website in Nov 2019 https://www.spenergynetworks.co.uk/userfiles/file/Associated_Changes_to_USEF_Implementation_Plan_Exec_Report.pdf?v=1.2
3	USEF implementation plan	2/4/20	3.1	FUSION USEF implementation plan.		<ul style="list-style-type: none"> Completed and published on the FUSION website in March 2020. https://www.spenergynetworks.co.uk/userfiles/file/FUSION_USEF_Implementation_Plan.pdf
			3.2	Report on GB specific reference implementation of USEF.		<ul style="list-style-type: none"> Completed and published on the FUSION website in March 2020. https://www.spenergynetworks.co.uk/userfiles/file/GB_Ref_Implementation_of_USEF.pdf
4	USEF process implementation	2/6/20	4.1	Provide specification of communication and procurement platform.		<ul style="list-style-type: none"> Completed and published on the FUSION website in May 2020. https://www.spenergynetworks.co.uk/userfiles/file/D4.1_specification_of_communication_and_procurement_platform.pdf
			4.2	Provide specification of communication protocols between market participants.		<ul style="list-style-type: none"> Completed and published on the FUSION website in May 2020. https://www.spenergynetworks.co.uk/userfiles/file/D4.2_specification_of_communication_protocols_between_market_participants.pdf
			4.3	Provision of template flexibility contracts.		<ul style="list-style-type: none"> Completed and published on the FUSION website in June 2020. https://www.spenergynetworks.co.uk/userfiles/file/D4.3_Template_Flexibility_Contract.pdf
			4.4	Quantify market participant costs for implementing USEF interface compatibility.		<ul style="list-style-type: none"> Completed and published on the FUSION website in May 2020. https://www.spenergynetworks.co.uk/userfiles/file/D4.4_quantification_of_market_participant_costs_for_implementing_USEF.pdf

Ref	Project Deliverable	Due Date (Ofgem)	Evidence required		Status	Progress update
					Not started	
					Ongoing	
					Complete	
5	Implement a minimum of two physical and live trials of commoditised flexibility based on the USEF framework.	3/4/23	5.1	Identify two trial locations.		<ul style="list-style-type: none"> Tender packs have been published as part of 2 x FUSION Flex Tender exercises launched in September 2020 and 2021 respectively. These tender packs sought to procure flexibility services that address network needs at the following two trial locations; <ul style="list-style-type: none"> - St. Andrews Primary Substation - Leuchars Primary Primary Substation These tender packs can be found on the FUSION website and they specify the flexibility services that we wish to procure at each trial site
			5.2	Identify the required flexibility services available from flexibility providers. (Phase 1)		<ul style="list-style-type: none"> The first of the FUSION Flex Tender exercises sought 250kW of flexibility at each of the above trial locations for the duration of Phase 1 of the live trials. Responses to the FUSION Flexibility Tender #1 confirmed that all of the flexibility services that the Project sought to procure were available from local providers.
				Identify the required flexibility services available from flexibility providers. (Phase 2)		<ul style="list-style-type: none"> The second of the FUSION Flex Tender exercises sought 4.5MW of flexibility at each of the above trial locations for the duration of Phase 2 of the live trials. Responses to the FUSION Flexibility Tender #2 were received in December 2021 and 500kW of available flexibility capacity was contracted across seven congestion points on the 33kV and 11kV networks.
			5.3	Contract for flexibility services. (Phase 1)		<ul style="list-style-type: none"> Flexibility Service agreements have been signed for Phase 1 of the live trial. These were signed with the 2 x successful respondents to the 'Invitation to Tender' (ITT) for the FUSION Flex Tender #1
				Contract for flexibility services. (Phase 2)		<ul style="list-style-type: none"> Flexibility Service agreements have been signed for Phase 2 of the live trial. These were signed with the 2 x successful respondents to the 'Invitation to Tender' (ITT) for the FUSION Flex Tender #2
			5.4	Undertake live trials. (Phase 1)		<ul style="list-style-type: none"> Phase 1 of the FUSION trials successfully went live in September 2021 The live trials are operating according to plan for addressing our learning objectives Services being traded include: Secure, Sustain and Dynamic Flexibility services are being traded at least 4 times per week Trading and dispatches are typically day-ahead or same-day. Data is being gathered for analysis in accordance with the Phase 1 'learning objectives' and 'evaluation methodology'
				Undertake live trials. (Phase 2)		<ul style="list-style-type: none"> Phase 1 of the live trial successfully went live in September 2021 and concluded at the end of March 2022 Phase 2 of the live trial commenced the day after the completion of Phase 1 (April 2022) and is due to run until the end of March 2023.
			5.5	Report on the implementation and analysis of USEF trials		<ul style="list-style-type: none"> The success of the trials is being continually monitored and evaluated against pre-defined success criteria The findings of this evaluation is being periodically reported and the learnings disseminated in 6-monthly 'interim trial learnings reports' (ITLR). The first two of these ITLR reports have been published on the FUSION website. The next (ITLR#3) is due for publication in Nov 2022.
6	Modelling report on commoditised flexibility benefits for the UK (ICL).	28/2/23	6.1	Academic modelling report on GB flexibility		<ul style="list-style-type: none"> Imperial College London (ICL) shared a first iteration of the draft report looking solely at the local trial area, for internal review in Q2 2022. Work has been ongoing since then on the development of the full report in Q4 2022 and all necessary inputs have been provided to ICL for them to elaborate that output.

Not started
Ongoing
Complete

Ref	Project Deliverable	Due Date (Ofgem)	Evidence required	Status	Progress update
7	Open Networks report in coordination with the ENA Open Networks Programme.	28/2/23	7.1 Report on coordination and hierarchies of control for flexibility, in collaboration with the ENA Open Networks Programme.	Ongoing	<ul style="list-style-type: none"> FUSION in finalising a contract with NGENSO to conduct trials of Primacy Rules in Q4 2022 A learnings report will be produced by FUSION, in coordination with the ENA (WS1a P5) in February 2023
N/A	Comply with knowledge transfer requirements of the Governance Document.	28/09/20xx	i Annual Project Progress Reports which comply with the requirements of the Governance Document.	Complete	<ul style="list-style-type: none"> PPR_01 completed in September 2019 and published on the Project FUSION website PPR_02 completed in September 2020 and published on the Project FUSION website PPR_03 completed in September 2021 and pending publication on the Project FUSION website
		2/11/23	ii Completed Close Down Report which complies with the requirements of the Governance Document.	Not started	
		30/10/19	iii Evidence of attendance and participation in the Annual Conference as described in the Governance Document.	Complete	<ul style="list-style-type: none"> Project FUSION presented a progress update at the ENIC event in October 2020

Table 10: Project Deliverables - Status Report

9 Data Access Deliverables

The 'Publicly Available Data Sharing Policy' is available to view via the following link:

FUSION Webpage (<https://www.spenergynetworks.co.uk/pages/fusion.aspx>)

10 Learning Outcomes

Table 11 to **Error! Reference source not found.** below outline the learning outcomes generated under each of the Work Packages during the reporting period:

WP1 – Stakeholder Engagement			
Ref	Activity Summary	Further Detail	Output / Value Delivered
1	Flexibility Procurement	<ul style="list-style-type: none"> • Webinar to promote our flex tender • Regular follow-up 1-2-1 calls with aggregators and local customers • Matchmaking to catalyse viable partnerships • Contract negotiation 	<ul style="list-style-type: none"> • Successfully procured all the specified flexibility required for Phase 2 of the FUSION live trials.
2	Engagement with wider industry via the ENA / TEF	<ul style="list-style-type: none"> • WS1a P5 – Primacy rules <ul style="list-style-type: none"> ○ FUSION has been working closely with WS1a P5 to add value 	<ul style="list-style-type: none"> • A CBA report was prepared by FUSION in Q4 2022 (final draft pending) exploring the commercial viability of specific primacy rules with respect to the various stakeholders involved. • A trial between SP Energy Networks has been scoped and is planned to commence in October pending completion of contracts

Table 11: Learning Outcomes - WP1

WP5 - Trial			
Ref	Activity Summary	Further Detail	Value Delivered
1	Live trials	We are 12month into our live trial of a fully commissioned end-end market of USEF compliant platforms.	The following reports provide interim learnings from the trial to date: <ul style="list-style-type: none"> - ITLR#1 - ITLR#2 A third ITLR report is due to be available on our website in November 2022.

Table 12: Learning Outcomes - WP5

11 IPR

Project FUSION complies with the Ofgem default position regarding the IPR ownership and no further IPR has been generated by FUSION during this reporting period nor is expected to be generated.

12 Risk Management

Project FUSION has taken a proactive approach of regularly reviewing the risk register, allocating clear ownership of each risk and putting in place appropriate mitigation measures.

12.1 Technical Risks

A summary of the technical risks currently affecting the project is presented below in Table 13

Risk No.	Issue	Risk Description	Potential Impact	Control measures applied during reporting period
1. Technical risks				
N/A				

Table 13: Project FUSION Technical Risks & Mitigation

12.2 Procurement Risks

Similarly, the risks regarding procurement have been presented in Table 14.

Risk No.	Issue	Risk Description	Potential Impact	Control measures applied during reporting period
2. Procurement, manufacturing and installation risks				
n/a				

Table 14: Procurement Risks & Mitigation

12.3 HSE and Operational Risks

Table 15: HSE & operational risks

Risk No.	Issue	Risk Description	Potential Impact	Control measures applied during reporting period
3. HSE and Operational risks				
3.01	Cyber security	The electricity flexibility marketplace is at risk of offensive cyber-attacks.	<ol style="list-style-type: none"> 1. Sensitive customer information is stolen. 2. Control of flexible demand is overridden by hostile agents. 	<ol style="list-style-type: none"> 1. Dialogue with internal cyber-security experts was opened early in the project and maintained throughout. 2. Precautionary measures and procedures were developed and diligently followed by the DNO, aggregators, and flexibility providers. At the EoI stage all interested parties are required to complete the cyber-security questionnaire. 3. The FUSION Flexibility Platform underwent penetration testing. 4. Standard resilience procedures are to be followed in the event of a cyber-attack.
3.02	Settlement procedures	Settlement procedures are not delivered to aggregators and customers in a professional manner.	<ol style="list-style-type: none"> 1. Financial settlements are delayed in time. 2. USEF users are dissatisfied with the flexibility market framework and may request adjustments. 	<ol style="list-style-type: none"> 1. Settlement procedures are well developed based on USEF foundation findings and established protocols. 2. FUSION closely liaised with accounts payable prior to the commencement of live trials to prepare for having to process settlements at the end of each month during live trials.

12.4 Project Management Risks

Risk No.	Issue	Risk Description	Potential Impact	Control measures applied during reporting period
4. Project Management risks				
4.01	Project filing management	Project management filing not updated - file information stored on emails and personal drives	Lack of clarity and transparency within the PM team	Shared folder to be maintained and updated weekly

Table 16: Project Management Risk & Mitigation

13 Accuracy Assurance Statement

I confirm that processes in place and steps taken to prepare the PPR are sufficiently robust and that the information provided is accurate and complete.

Signature: 

Name (Print): James Yu

Title: Future Networks Manger

Date: 5th October 2022

Signature: 

Name (Print): Michael Green

Title: Senior Innovation Engineer

Date: 5th October 2022

14 Material Change Information

During this reporting period, and indeed since its inception, Project FUSION has incurred no material changes, nor does it foresee any in the future.

Appendix 1 - Project Budget

The Project Budget below is taken directly from the latest FUSION Project Direction⁶.

ANNEX 1: PROJECT BUDGET

This is subject to changes resulting from condition 2.

Cost Category	Cost (£)
Labour	
	1,668,656.00
Equipment	
	482,765.00
	<u>332,765.00</u>
Contractors	
	3,031,430.00
	<u>2,916,630.00</u>
IT	
	300,000.00
IPR Costs	
	-
Travel & Expenses	
	216,213.99
	<u>181,213.99</u>
Payments to users	
	220,000.00
Contingency	
	51,780.00
Decommissioning	
	-
Other	
	-
Total	5,970,844.99
	<u>5,671,044.99</u>

⁶ [https://www.ofgem.gov.uk/system/files/docs/2018/10/fusion - direction amended 09 2018.pdf](https://www.ofgem.gov.uk/system/files/docs/2018/10/fusion_-_direction_amended_09_2018.pdf)



Appendix 2 - Monthly Expenditure

Months	Actuals (Incl. Accruals)											Forecasts (FSS Montly Apportioned)											
	Labour	Equipment	Contractors	IT	IPR Costs	Travel & Expenses	Payments to users	Contingency	Decommissioning	Other	Total	Labour	Equipment	Contractors	IT	IPR Costs	Travel & Expenses	Payments to users	Contingency	Decommissioning	Other	Total	
Jan-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Feb-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mar-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May-18	-	-	17,382	-	-	-	-	-	-	-	17,382	-	-	-	-	-	-	-	-	-	-	-	-
Jun-18	-	-	8,846	-	-	-	-	-	-	-	8,846	-	-	-	-	-	-	-	-	-	-	-	-
Jul-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sep-18	-	-	10,054	-	-	-	-	-	-	-	10,054	-	-	-	-	-	-	-	-	-	-	-	-
Oct-18	-	-	4,084	-	-	-	-	-	-	-	4,084	26,862	-	28,366	-	-	1,740	-	-	-	-	-	56,968
Nov-18	-	-	52,281	-	-	-	-	-	-	-	52,281	26,862	-	28,366	-	-	1,740	-	-	-	-	-	56,968
Dec-18	-	-	31,811	-	-	-	-	-	-	-	31,811	26,862	-	28,366	-	-	1,740	-	-	-	-	-	56,968
Jan-19	-	-	16,995	-	-	-	-	-	-	-	16,995	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Feb-19	-	-	28,614	-	-	-	-	-	-	-	28,614	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Mar-19	189,315	-	4,121	-	-	-	-	-	-	-	193,436	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Apr-19	-	-	11,909	-	-	-	-	-	-	-	11,909	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
May-19	-	-	157,254	-	-	-	-	-	-	-	157,254	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Jun-19	85,360	-	86,793	-	-	-	-	-	-	-	172,153	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Jul-19	-	-	164,700	-	-	-	-	-	-	-	164,700	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Aug-19	-	-	46,632	-	-	-	-	-	-	-	46,632	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Sep-19	83,960	-	65,929	-	-	-	-	-	-	-	149,890	27,850	395	60,209	-	-	3,979	-	818	-	-	-	93,250
Oct-19	-	-	20,899	-	-	-	-	-	-	-	20,899	27,850	20,395	60,209	20,000	-	3,979	-	818	-	-	-	133,250
Nov-19	-	-	97,701	-	-	-	-	-	-	-	97,701	27,850	20,395	60,209	20,000	-	3,979	-	818	-	-	-	133,250
Dec-19	1,801	-	98,511	-	-	-	-	-	-	-	100,311	27,850	20,395	60,209	20,000	-	3,979	-	818	-	-	-	133,250
Jan-20	-	-	27,862	-	-	-	-	-	-	-	27,862	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Feb-20	80,150	-	98,238	-	-	-	-	-	-	-	178,388	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Mar-20	73,471	-	9,333	-	-	-	-	-	-	-	82,804	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Apr-20	-	-	14,450	-	-	-	-	-	-	-	14,450	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
May-20	-	-	23,995	-	-	-	-	-	-	-	23,995	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Jun-20	57,144	-	121,305	-	-	-	-	-	-	-	178,449	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Jul-20	-	-	15,432	-	-	-	-	-	-	-	15,432	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Aug-20	-	-	73,419	-	-	-	-	-	-	-	73,419	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718
Sep-20	81,641	-	30,208	-	-	-	-	-	-	-	111,849	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	-	155,718

Months	Actuals (Incl. Accruals)											Forecasts (FSS Monthly Apportioned)										
	Labour	Equipment	Contractors	IT	IPR Costs	Travel & Expenses	Payments to users	Contingency	Decommissioning	Other	Total	Labour	Equipment	Contractors	IT	IPR Costs	Travel & Expenses	Payments to users	Contingency	Decommissioning	Other	Total
Oct-20	-	-	29,543	-	-	-	-	-	-	-	29,543	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	155,718
Nov-20	-	-	113,811	-	-	-	-	-	-	-	113,811	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	155,718
Dec-20	-	-	100,070	-	-	-	-	-	-	-	100,070	27,859	20,961	82,658	20,000	-	3,972	-	268	-	-	155,718
Jan-21	81,641	-	81,141	-	-	-	-	-	-	-	500	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Feb-21	-	-	9,275	-	-	-	-	-	-	-	9,275	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Mar-21	1,885	-	4,615	-	-	-	-	-	-	-	6,500	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Apr-21	-	-	28,027	-	-	-	-	-	-	-	28,027	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
May-21	-	-	61,328	-	-	-	-	-	-	-	61,328	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Jun-21	61,215	-	10,913	-	-	-	-	-	-	-	50,302	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Jul-21	-	-	79,867	-	-	-	-	-	-	-	79,867	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Aug-21	-	-	188,986	-	-	-	-	-	-	-	188,986	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Sep-21	233,885	-	111,550	-	-	-	-	-	-	-	122,335	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Oct-21	195,044	-	307,268	-	-	-	-	-	-	-	112,224	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Nov-21	-	-	127,354	-	-	-	-	-	-	-	127,354	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Dec-21	-	-	24,036	-	-	-	-	-	-	-	24,036	27,863	1,375	43,848	-	-	3,090	-	268	-	-	76,444
Jan-22	65,010	-	16,799	-	-	-	-	-	-	-	81,809	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Feb-22	-	-	29,207	-	-	-	-	-	-	-	29,207	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Mar-22	65,010	-	7,168	-	-	-	-	-	-	-	72,178	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Apr-22	-	-	22,450	-	-	-	-	-	-	-	22,450	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
May-22	-	-	38,980	-	-	-	-	-	-	-	38,980	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Jun-22	65,010	-	58,030	-	-	-	-	-	-	-	123,040	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Jul-22	-	-	67,549	-	-	-	-	-	-	-	67,549	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Aug-22	-	-	74,500	-	-	-	-	-	-	-	74,500	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Sep-22	65,010	-	74,406	-	-	-	-	-	-	-	139,416	27,862	-	31,105	-	-	2,535	9,167	1,544	-	-	72,213
Totals	1,096,465	-	2,598,420	-	-	-	-	-	-	-	3,694,885	1,334,203	332,765	2,605,628	300,000	-	160,529	82,500	30,147	-	-	4,845,772

Figure 10: Actual Monthly Expenditure (Postings including Accruals)⁷ vs FSS Monthly Apportioned Forecasts

⁷ Occasional peaks in actual labour expenditure (e.g. March 2019) are due to the issue of a ‘bulk transfer’ which accounts for previous months’ labour costs.

Appendix 3 - Network benefit

The following slide is taken from the FUSION presentation given at the 2022 Energy innovation Summit, in which a case study was shared to illustrate how of the FUSION flexibility market has been providing network benefit by helping to accommodate the load associated with a major sporting event within a congested area of our network.

The graph in the top left shows the historical loading of the local primary substation. The amber lines shows how, during the 2015 St Andrews Open, the loading experienced at that primary substation was notably greater than in years when the event is not on.

In preparation for the 2022 event and in anticipation of similar increased loading on that asset, the FUSION market secured local flexibility availability that could be dispatched within 15mins to reduce loading on the asset if necessary.

The graph in the bottom right-hand corner shows the meter reading of one of the flexible assets that was dispatched (not out of necessity, but for learning purposes only) during the 2022 St Andrews Open. It illustrates the efficacy of the FUSION flexibility market to realise a fast and reliable reduction in local loading when required.

02 Network benefit

Processes & Technology/
Future Networks

Benefit to our network

Case study#1: The St Andrews Open

Provision of 15min-response standby capacity to help accommodate peak loads

St Andrews Primary Demand 2015/2019/2021

Power (MW)

Day/Time

— Demand 2019 — Demand 2021 — Demand 2015

Power / MW

Time

15

Appendix 4 - Customer benefit

The following slide is taken from the FUSION presentation given at the 2022 Energy innovation Summit, in which a case study was shared to illustrate some of the ways in which SP Energy customers have reported having benefited from their participation in the FUSION Project.

03 Customer Benefit





Benefit to our customers

Case study#2: University of St Andrews

How have you benefitted from the FUSION Flexibility Market?

Aggregator services:

- DSO flexibility trading

Benefits:

- 3rd party investment
 - Monitoring
 - Control
 - Storage
- CO₂ reduction
- Income from trading
- Strategy: 10-year Energy & Carbon Masterplan
 - The expansion **aspirations** of the university
 - The **challenges** that those aspirations pose to the network
 - The extent to which **flexibility release** from the university estate could **alleviate** those challenges

Opportunities:

- Electrification / decarbonisation / expansion in a congested network



16

Internal Use