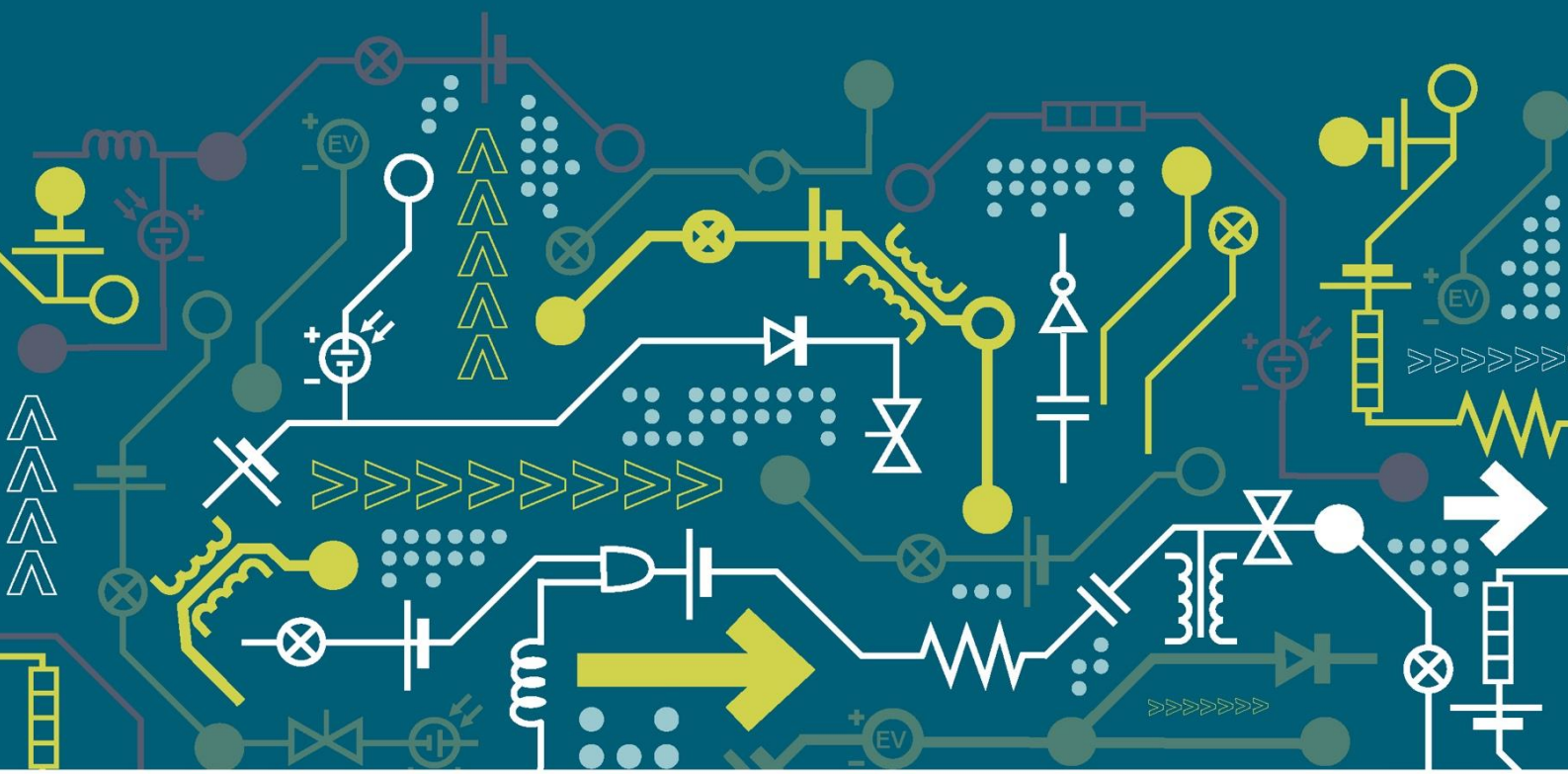
WPD INNOVATION

EFFS

NIC Progress Report

April 2020 – September 2020



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Version Control

Issue	Date
0.0	24/08/2020
0.1	27/08/2020
0.2	04/09/2020
0.3	09/09/2020
0.4	14/09/2020
0.5	25/09/2020
1.0	01/10/2020

Publication Control

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Contents

1 Executive summary

1.1 Introduction

The Electricity Flexibility and Forecasting System Project (EFFS or "the Project") is funded through Ofgem's Network Innovation Competition (NIC). EFFS was registered in October 2018 and will be complete by October 2021.

EFFS supports the Distribution System Operator (DSO) transition by developing and trialling a system to plan and dispatch flexibility services in operational timescales. EFFS is split into four workstreams:

1) Forecasting Evaluation and Requirements;
2) Implementation;
3) System and Trials Testing; and
4) Collaboration and Learning.

The Project is working collaboratively with the Scottish and Southern Electricity Networks' TRANSITION project and Scottish Power Energy Networks' FUSION project. Together with EFFS these projects are collectively known as TEF. All three TEF projects are coordinating with the Energy Network Association's Open Networks project[1]. EFFS has already shared forecasting algorithms and, as it is scheduled to start trials ahead of the other two projects, will continue to share learning as it will often be first to tackle common issues.

1.2 Overall project progress

This document represents the Project's fourth six-monthly project progress report and covers progress from April 2020 to the end of September 2020. The third progress report, spanning October 2019 to March 2020, covered the capture of EFFS architectural requirements, identification of an additional system requirement of an EFFS Tool to interface with and automate the PSS/E tool, reconfiguration of AMT-SYBEX's Networkflow product and completion of the TEF Stage Gate Report. Since then, the Project has completed its development and deployment phases, which has included the following key achievements:

- Finalisation of the EFFS system design and architecture;
- Reconfiguration and Factory Acceptance Testing (FAT) by AMT-SYBEX of their Affinity Networkflow solution to support the forecasting, optimisation and service management requirements;
- Procurement, contract award and mobilisation of PSC Consulting to carry out the development of a power flow analysis interface, known as the EFFS Tool, to automate power flow studies within Power System Simulator for Engineering (PSS/E);
- Mitigation of operational risks relating to the novel COVID-19 pandemic;
- Completion of Gateway Review 2 with Ofgem and progression into Workstream 3: System and Trials Testing; and
- Deployment of Affinity Networkflow onto WPD infrastructure.

[1] TRANSITION and FUSION are NIC funded projects that bid in the same year as EFFS that also relate to flexibility services. The projects' approval was conditional on collaboratively identifying benefits to be delivered through shared working. The projects continue to work closely to ensure shared benefits are delivered and will need to demonstrate this to progress beyond a common stage gate assessment. Open Networks is an ENA managed industry wide project relating to DSO transition which looks to provide shared analysis, roadmaps, models etc. and promote standardisation.

1.3 Business Case

There have been no changes to the benefits case to date. For information, the original business case benefits are included in Appendix 1

1.4 Learning and dissemination

A number of insights have been gained during the development and deployment phases of the EFFS system. These outcomes originate from learning within the project, broader industry developments and pragmatic decisions made during the implementation of the solution. For more details, please refer to section 6.

1.5 Project risks

The EFFS project risk register was formally created at project commencement. It is a live document and is updated regularly. A total of 45 risks have been raised, 31 of which have been closed, leaving a total of 14 live risks. Mitigation action plans are identified when raising a risk and the appropriate steps then taken to ensure risks do not become issues wherever possible. Of the 13 live risks none are ranked as severe, 4 are ranked major, 8 are ranked as moderate and 1 is ranked as minor.

Section 8.2 of this report outlines the current top risks associated with successfully delivering EFFS as captured in our risk register. Section 8.3 provides an update on the most prominent risks reported in the previous progress report.

2 Project Manager's report

2.1 Project background

The EFFS project was awarded funding in October 2018 under the 2017 Network Innovation Competition (NIC). It will specify and trial the additional system functionality required by a Distribution Network Operator (DNO) to help the transition to DSO as given in the following objectives:

- Enhancing the output of the ENA Open Networks project, looking at the high-level functions a DSO must perform, provide a detailed specification of the new functions validated by stakeholders, and the inclusion of specifications for data exchange;
- Determining the optimum technical implementation to support those new functions;
- Creating and testing that technical implementation by implementing suitable software and integrating hardware as required; and
- Using and testing the technical implementation, which will involve modelling the impact of flexibility services.

The first objective has been achieved by the production of the DSO requirements specification with the input from industry stakeholders. The technical specification documents that have been developed meet the second objective with the third and fourth objectives relating to the build and trial phases of the project respectively.

EFFS will focus on 33kV networks and above as these are the parts of the network where the case for flexibility as an alternative to reinforcement is currently strongest. This is reflected in WPD's BaU roll out of flexibility services via Flexible Power. This is because reinforcement costs at 33kV and above are highest and the number of flexibility customers that may be able to provide relevant services is also highest due to the ability to aggregate the impact of flexibility customers connected downstream. This is in contrast to the LV network where reinforcement costs are considerably lower and currently LV connected flexibility services are sparse.

The design of the EFFS functions and processes will aim, where possible, to ensure that they could be adapted to lower voltages at a later date. E.g. when the higher levels of flexible EV charging may offer widespread services.

Ofgem have obliged EFFS to work collaboratively with two other NIC projects, TRANSITION and FUSION, which are also exploring the DSO transition. Project funding was dependent on an initial assessment of collaborative benefits and associated budget reduction to ensure that synergies were exploited, and duplication was avoided. An update on this is provided in section 2.4, TEF Collaboration. Similarly, the ENA's Open Networks project is also working to determine the new skills and functions that DNOs will need to develop in order for the DSO transition to take place. EFFS is working closely with Open Networks via the TEF collaboration, contributing to and receiving information from several products across the workstreams.

The Project Partners involved in EFFS are:

- Western Power Distribution: Project Lead/Funding DNO (licensee);
- AMT-SYBEX: Third Party Lead Supplier; and
- National Grid Electricity System Operator (ESO).

Furthermore, the project has the following key stakeholders:

- Energy Network Association's Open Networks project;

- Scottish and Southern Electricity Networks, as Project Lead/Funding DNO (licensee) of the TRANSITION project;
- Scottish Power Energy Networks as Project Lead/Funding DNO (licensee) of the FUSION project;
- Capita Employee Benefits data science team as Design Authority of the Forecasting Partner; this service is provided through AMT-SYBEX
- Smarter Grid Solutions (Forecasting Partner);
- Centrica as managers of the Cornwall Local Energy Market project; and
- EDF Energy.

These relationships are depicted in Figure 2-1 below.

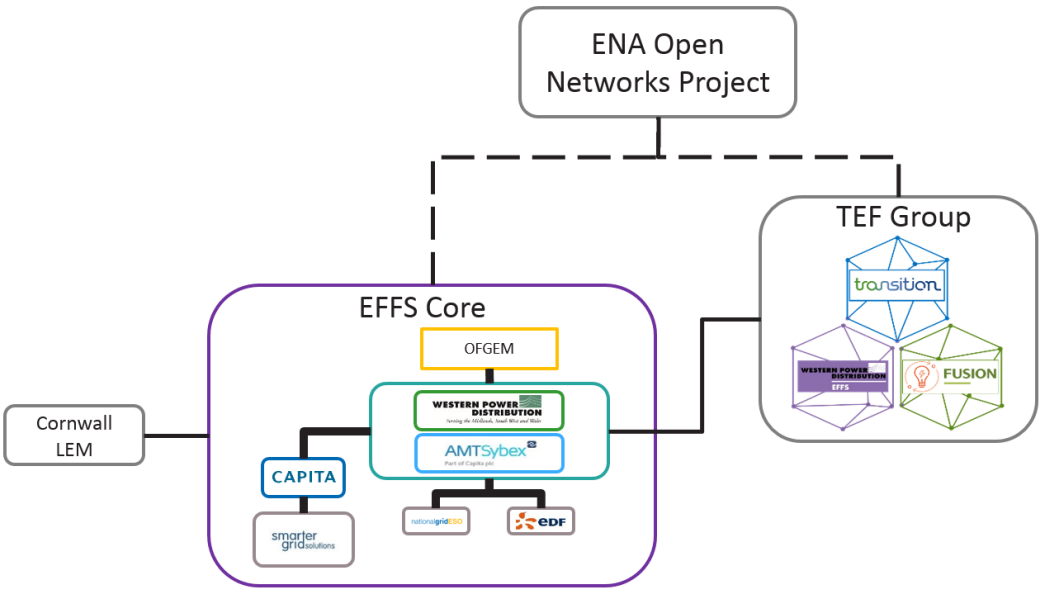

Figure 2-1 EFFS key stakeholders

The Project commenced in October 2018 and is scheduled to complete in October 2021. The Project has four workstreams as shown in Figure 2-2. This report details the progress of the Project over the last 6 months, April 2020 to September 2020. The reporting period is depicted on Figure 2-2 by the blue shaded box.

Work Type	Workstream	Description	H1 2018	H2 2018	H1 2019	H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
Implementation	1	Forecasting Evaluation, Co-ordination and Requirements	Ofgem Approval		Gateway Review 1					
Implementation	2	System Design, Development, System Test					Gateway Review 2			
Implementation	3	Onsite Testing, Trials and Conflict Management						Gateway Review 3		
Implementation	4	Collaboration and Knowledge Dissemination								Closedown Report

Figure 2-2 EFFS timeline overview

The Project has progressed well over the past 6 months with the approval by Ofgem of the TEF Stage Gate, the finalisation of the EFFS system design and completion of Gateway Review 2. This has enabled the project to progress into Workstream 3: Onsite Testing and Trials. Areas of focus for the purposes of this report include:

- System Design;
- Development
- Deployment; and
- TEF Stage Gate Report.

2.2 System Design

The EFFS system design was specified as part of the first activity in the EFFS project's Workstream 2 and has now been finalised during this reporting period. The system design built on the relevant DSO requirements defined in Workstream 1 and specifies the design principles for how EFFS will be delivered from a functional perspective. While some functionality detailed in the system design is generic and transferable to other DNOs, the design phase also reflected WPD specific systems within or interacting with EFFS.

Figure 2-3 below provides a functional overview of the system as defined in the system design phase.

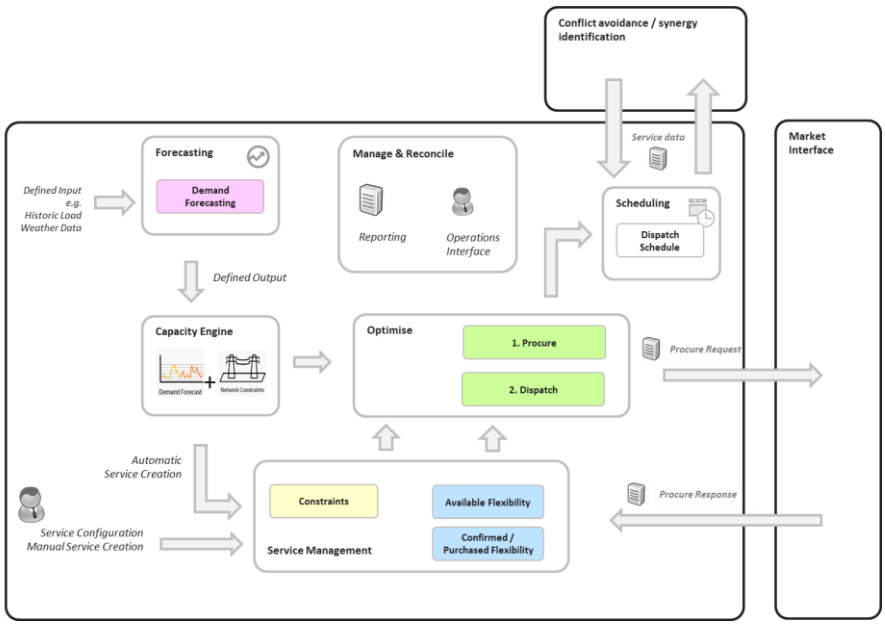

Figure 2-3 EFFS core functions

Since the EFFS system design documents were published, work has continued to define the technical architecture for the system and to finalise several aspects of the design, where certain requirements could not be specified in detail. This involved the appointment of an overall System Architect, who provided an independent end to end review of the system design to date. Their recommendations included the simplification of some elements of the system where complex processes or adjustments had previously been proposed. The technical complexity of the system has been a long-standing risk for the EFFS project. The simplifications, which do not affect the overall deliverables for the Project, were viewed as a sensible approach to mitigate this risk.

The simplifications included the removal of some of the adjustments made to forecasts, which were included to support the potential modelling of 11kV feeders in the future. This was not essential to the demonstration of EFFS functionality. Similarly, the approach to providing two key areas of functionality has been confirmed. These areas are the power flow analysis for multiple contingency scenarios required to support the capacity engine, and the requirement for cleansing the input data to the forecasting system.

While WPD has been addressing the data quality issues highlighted by the NIA project Time Series Data Quality, there are still a number of data quality issues remaining in the EFFS trial area. Therefore, to maximise the quality of the forecasts, data cleansing functionality is being provided by the same tool that will provide the PSS/E analysis.

The activities during this reporting period have also included the design and develop of the “EFFS Tool” by PSC Consulting. The EFFS Tool has two key functions: cleansing the historic time series data that will be used by NetworkFlow for forecasting and determining and validating network constraints using PSS/E, The EFFS Tool has also been designed in a modular way that allows for the quick and easy extension of its functionalities if required.Figure 2-4 provides an end to end flow chart of the system including the EFFS Tool.

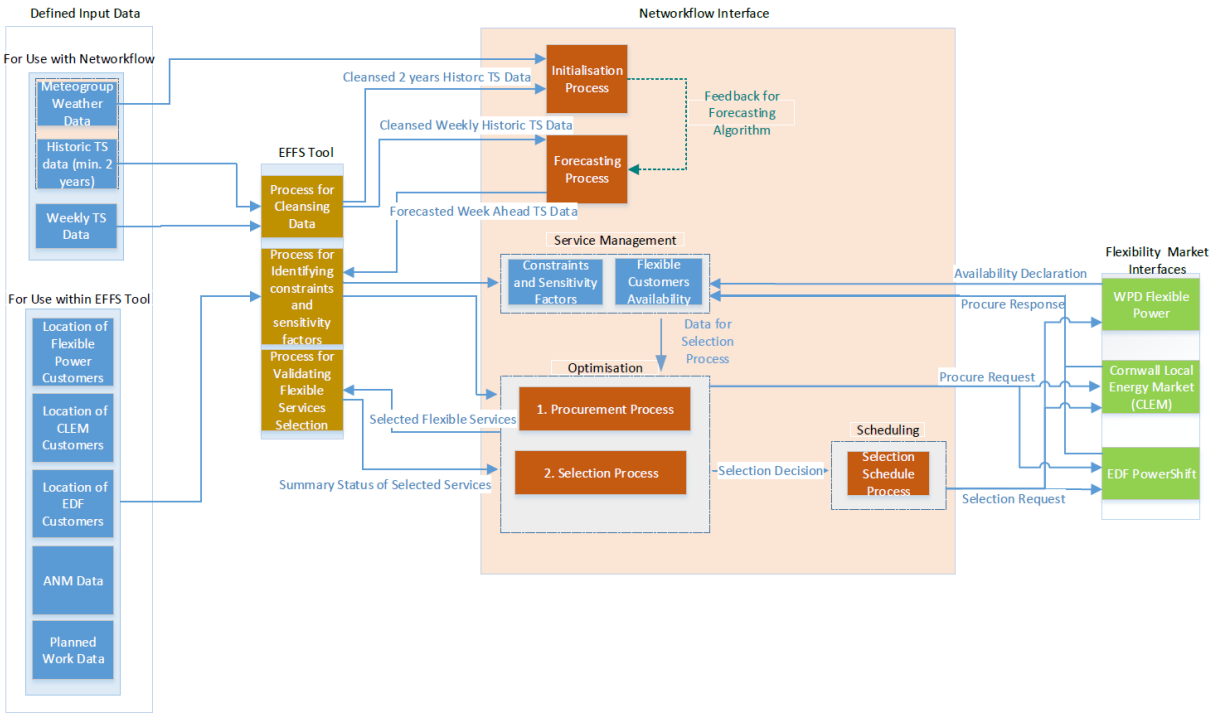

Figure 2-4 EFFS end to end flow chart

A description of the various elements in Figure 2-4 are provided below:

Defined Input Data

- Historic Time Series (TS) data that can either be weekly or for a minimum duration of two years;
- Weather data that is used for the initialisation process of the Data Processing System (DPS);
- Location of flexible customers for the participant flexible platforms;
- Active Network Management (ANM) data; and
- Details of planned outages on the network.

Networkflow Interface

Data Processing System:

- The initialisation process which allows DPS to create the database for the forecasting algorithm; and
- The forecasting process which generates the forecasted TS data for the week ahead.

EFFS Tool

- The cleansing capability for checking and correcting the historic time series data;
- The process for identifying the network constraints and sensitivity factors of the flexible customers based on forecast time series data provided from Networkflow; and
- The process for validating whether the selected flexible services resolve the network constraints.

Service management

- Consists of the constraints and sensitivity factors and the flexible customers' availability.

Optimisation

- The optimisation process that receives the identified constraints and sensitivities and calculates the flexibility requirements in order to issue a procurement request to the flexible market interface; and
- The selection process which processes all the available data and selects the optimal flexible services.

Scheduling

- The scheduling function that receives the output of the optimisation process (selection decision) for user validation for converting to the final flexible service schedules to be issued to the flexible platforms. This intermediate step allows the user to review the final selection prior to issuing the procurement selection.

Flexibility Market Interface

- Communication of availability and procurement decisions with WPD Flexible Power platform;
- Communication of availability and procurement decisions with the Cornwall Local Energy Market platform; and
- Communication of availability and procurement decisions with EDF PowerShift platform.

The design activities for both the EFFS Tool and the EFFS core system (Affinity Networkflow) were completed in June 2020 and October 2019 respectively.

2.3 Development

2.3.1 Networkflow

Following the completion of the design activities, AMT-SYBEX completed their final reconfiguration and internal testing activities on their Affinity Networkflow product in May 2020. The last areas to be completed related to the process engine and the optimisation algorithms, as well as regression testing. The development concluded with successful completion of Factory Acceptance Testing (FAT) and the release of an exit report to WPD in July. The exit report provided the appropriate evidence to demonstrate that the product had passed internal factory testing and was ready to be deployed onto the WPD network.

Following the further refinement of the EFFS system architecture, WPD raised a change request with AMT-SYBEX for the provision of some additional requirements relating to the certain interface exchanges and the inclusion of sensitivity factors in the optimisation process. The change request saw the development of a series of scripts that converted bespoke interface formats into those supported by the core product (and vice a versa). The scripts were delivered in September 2020, in readiness for the Project's Site Integration Testing (SIT).

AMT-SYBEX deployed their Affinity Networkflow product onto the WPD Network in August 2020. Following the production of a Technical Architecture Proposal by AMT-SYBEX for Affinity Networkflow, the WPD Information Resources (IR) team prepared the required infrastructure and environments for the phases of testing and trials. This enabled AMT-SYBEX to successfully deploy the software, to complete their deployment and configuration phase. After successful deployment of the software on to WPD systems, AMT-SYBEX began their assurance testing on Affinity Networkflow. This testing was conducted using WebEx software to provide AMT-SYBEX the remote access to WPD systems due to social distancing measures that are currently in place. Figure 2-5 and Figure 2-6 provide screenshots of the testing that was conducted.

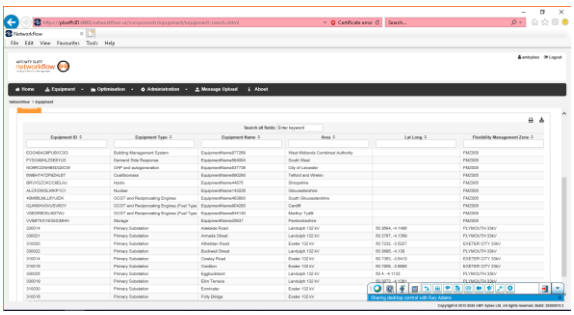

Figure 2-5 Equipment checks in Networkflow

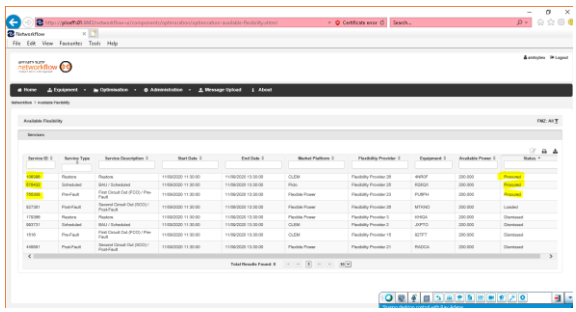

Figure 2-6 Procurement service checks in Networkflow

With the assurance testing now complete, work is progressing on finalising the plans for Site Integration Testing (SIT), Site Acceptance Testing (SAT) and the trials for EFFS. The SIT will focus on testing the performance of each of the individual elements and interfaces identified in Figure 2-4 and ensuring the EFFS solution as a whole performs in line with the criteria set out in the design documentation. A number of different testing scenarios and acceptance criteria are currently being finalised in line with this requirement.

2.3.2 EFFS Tool

The EFFS Tool provides historic time series data cleansing and an interface between the forecasting systems and PSS/E to identify constraints in order to assess the requirement for flexibility services. As discussed above, the design of the tool has been completed during this reporting period to support the end-to-end system and develop the main processes, operation and interfaces. This included the development of the functional requirements and operational philosophy of the EFFS tool as well as the data exchange interfaces and the power system studies to be performed. The completed design phase resulted in formalising the input and output templates to be used with the main parties involved in the project to ensure a common understanding of the data formats and timelines. Throughout this period, PSC engaged closely with WPD and AMT-SYBEX to understand each stage of the process to ensure the EFFS tool would efficiently and consistently interpret input data, carry out the relevant power system analysis functions and provided details of constraints along with requirements for flexibility services.

The EFFS tool is being developed in Python scripting language for compatibility with PSS/E as the selected power system analysis tool. To enable ease of interaction between the various stages of the EFFS processing, a graphical user interface (GUI) has also been developed. The build phase consisted of a number of activities as detailed below:

- Cleansing of historic weekly time series generation and demand data for analysis by the Networkflow forecasting engine;
- Receipt of week-ahead forecast generation and demand data and setting up the PSS/E model;
- Contingency identification in the power system model that includes analysis of planned outages and circuit outages;

- Running of time series and contingency analysis to identify system constraints;
- Identification of flexibility services that can resolve constraints; and
- Outputting required flexibility services and associated sensitivity factors

The final build was completed in September 2020 and the tool is ready for SIT to ensure it operates correctly on WPD systems and data transfers between the various parties operate on the correct timescales and are error free as discussed in section 2.3.1. In early 2021 this moves into the overall live system trial phase during which period flexibility services will be identified to resolve theoretical or real constraints, initially through a manual process and moving to a more automated process as the trial develops.

2.4 TEF Collaboration

In 2017, three projects were awarded funding requests from the NIC that supported the transition from DNO to DSO. Collectively known as TEF, these were:

- Our submission, Electricity Flexibility and Forecasting Systems (EFFS);
- TRANSITION, submitted by Scottish and Southern Electricity Networks and Electricity North West; and
- FUSION, submitted by Scottish Power Energy Networks.

The three projects look at different aspects of the DSO transition with differing aims and areas of focus. Ofgem included additional conditions in the Project Directions to reduce the risk of unnecessary duplication, improve delivery efficiency and ensure the projects deliver complementary learning. The principles of engagement for the TEF projects are defined in section 5 of NIC 2017 Compliance Document.

TEF Delivery Board Meetings

Collaboration and coordination activities between the TEF projects have again progressed well over this reporting period. TEF project delivery board meetings during the reporting period were facilitated through virtual means due to the COVID-19 pandemic. The project TEF delivery board meetings have acted as regular touchpoints for the TEF group to review each other's progress, to coordinate areas of collaboration, such as relevant deliverables, events and presentations, as well as to identify any further areas of collaboration.

The TEF group has further collaborated in the following aspects:

- Use of EFFS generated forecasting learning by TRANSITION;
- Collective engagement with ENA Open Networks project; and
- Production of the TEF Stage Gate Report.

TEF Stage Gate Report

The TEF Stage Gate Report was a deliverable to Ofgem that was agreed as part of the TEF Compliance Document, which enabled all three projects to receive funding from Ofgem. The report was submitted to Ofgem in February 2020, and approval received from Ofgem the following month in March 2020. The document provided evidence that the TEF has been, and will continue, fulfilling their commitments to collaboration and avoidance of duplication. One of the most notable benefits of TEF collaboration was the realisation of £148.9k of new savings since the projects commenced. Such improvements in value for money were achieved through the ongoing collaboration activities, voluntary contributions and commitment to maintain, if not increase, shared learning across all topics

3 Business Case

At the time of writing, there have been no changes to the anticipated benefits to be gained by the Project. For information, the original business case benefits have been included in this document as Appendix 1.

4 Progress against Budget

Table 4-1 EFFS spend to date

Spend Area	Budget (£k)	Expected Spend to Date (£k)	Actual Spend to Date (£k)	Variance to expected (£k)	Variance to expected %
Labour	397.4	268.3	213.6	54.7	20%
Equipment	58.0	46.3	0.7	45.6	98%
Contractors	2029.7	1,123.0	877.7	245.3	22%
IT	630.1	630.1	500.0	130.1	21%
IPR Costs	0.0	0.0	0.0	0.0	0%
Travel & Expenses	39.7	26.8	23.7	3.1	12%
Payments to users & Contingency	82.0	65.9	0.0	65.9	100%
Decommissioning	0.0	0.0	0.0	0.0	0%
Other	101.8	0.0	0.0	0.0	0%
TOTAL	**3,338.8**	**2,160.3**	**1,615.7**	**544.7**	**25%**

4.1 Comments around variance

Table 4-2 EFFS spend variance commentary

Spend Area	Variance to expected %	Commentary
Labour	20%	A minor variance in labour due to lesser than expected project management charge.
Equipment	98%	To date, no physical equipment has been procured under the project budget.
Contractors	22%	Underspend to date due to a lesser utilisation of forecasting and trial support sanctions.
IT	21%	Underspend to date due to a lesser utilisation of forecasting and trial support sanctions.
IPR Costs	0%	N/A
Travel & Expenses	12%	Travel expenses have been less than anticipated due to greater use of remote meetings.
Payments to users & Contingency	100%	To date, no contingency has been utilised.
Decommissioning	0%	N/A
Other	0%	N/A

5 Deliverables

Progress against the Project's deliverables has been as expected with the fifth project deliverable "PD5 - Implementation and System Delivery" on track to be delivered on 19 October 2020 on budget. While the Project has performed an operational replan, there has been no impact to the delivery timetable of the Ofgem Project Deliverables. Significant progress is being made towards the next project deliverable "PD6 - Completion of on-site system testing"

5.1 EFFS Project Deliverables

Table 5-1 details the Project's deliverables in line with the Project Direction (see Project Direction ref: WPD EMID / EFFS / 28 September 2018' for further details). Note: the Project's deadlines were revised part way through the TEF sign-off process which continued for a further three months. As it was not possible to revise the deadlines to reflect this additional time, the deadlines being worked to are stated separately in the 'Deadline' column as agreed with Ofgem.

Table 5-1 EFFS deliverables

Ref.	Project Deliverable	Deadline	Evidence	NIC funding request (100%)	Status
1	Mobilisation Exit Report	Project Direction 17/12/18 WPD plan 18/03/19	A mobilisation exit report will be produced, including evidence of: • Forecasting partner tender accepted • Collaboration agreements signed • Detailed plan with breakdown by project work stream and milestones • Project staff mobilised • Workplaces set up • Governance structure in place • Project Mandate/Charter Agreed • Project Initiation Document signed off • Co-ordination plan developed with any other successful DSO related NIC bid to minimise overlap.	10%	Complete
2	Output from the forecasting	Project Direction 08/04/19 WPD plan 05/07/19	Publication of report showing forecasting options evaluated and selected options. Presentations at conferences and workshops to disseminate output.	6%	Complete
3	Development of requirements specification for DSO functionality	Project Direction 15/04/19 WPD plan 12/07/19	Production of requirements specification document outlining for DSO functionality, common protocols and approach to supporting these functionalities. Electricity Networks Association (ENA) and stakeholder collaboration strategy document (delivered a fixed period of time following publishing of ENA workshop output). Letters of support from key stakeholders (e.g. ENA Working Group) outlining agreement with specification document.	9%	Complete

Ref.	Project Deliverable	Deadline	Evidence	NIC funding request (100%)	Status
4	Development of EFFS Design Specification document	Project Direction 15/07/19 WPD plan 16/10/19	Production of set of Design models and documents outlining specific EFFS functionality and approach to delivering this functionality. Report detailing review of functional specification document at key stages.	15%	Complete
5	Implementation and System Delivery	Project Direction 20/07/20 WPD plan 19/10/20	Build and delivery of the completed EFFS system, including technical design package release, deployment and configuration and system handover.	3%	Complete
6	Completion of on-site system testing	Project Direction 02/11/20 WPD plan 01/02/21	Test report demonstrating completion of on-site testing to required standards; includes integration, user acceptance, operational and performance testing. Supply of additional supporting documentation evidencing this claim, to include test plans, scripts, exit reports and screenshots. Report detailing completed user training.	22%	In progress
7	Trials design and preparation	Project Direction 30/11/20 WPD plan 01/03/21	Strategy document outlining trials approach and methodology, detailing approach to plant, system operations, supplier / aggregator and tandem operations trials. Co-operation plan showing how duplication with other DSO NIC projects has been avoided and, if possible, how testing between projects will be carried out.	31%	On track
8	Trials – execution and knowledge capture	Project Direction 01/06/21 WPD plan 31/08/21	Completion report demonstrating outcomes of trial phases alongside test scripts, exit reports etc. Letter of support from external stakeholders and partners confirming completion of project trial phase and acceptance of results.	2%	On track
9	Gateway reviews	Project Direction 26/03/19 20/05/20 07/06/21 WPD plan 25/06/19 19/08/20 06/09/21	Delivery of gateway report at the end of Workstream 1, Workstream 2 and Workstream 3, detailing progress against the project benefits and costs.	2%	Gateway review 1 – complete Gateway review 2 – complete On track
Common Project Deliverable					
N/A	Comply with knowledge transfer requirements of the NIC Governance Document.	End of Project	1. Annual Project Progress Reports that comply with the requirements of the Governance Document. 2. Completed Close Down Report which complies with the requirements of the Governance Document. 3. Evidence of attendance and participation in the Annual Conference as described in the Governance Document.	N/A	In progress

6 Learning Outcomes

The following learning outcomes have been recorded in the Project's Learning Log in the last six months:

6.1 Modifications for the Cornwall Local Energy Market

The Project has been informed that the Cornwall LEM may be decommissioned in H2 2020 and could be inactive completely from the start of 2021 onwards. This could result in the Cornwall LEM platform being unable to take part in the EFFS trials. In light of this information, a decision has been made to continue engagement with the Cornwall LEM to prospectively enable them to be part of the EFFS system testing phase, in order to gain as much learnings as possible. The possibility of Cornwall LEM's trial involvement will then be reviewed at an appropriate point, once a final decision on the decommissioning has been made. EFFS will support the Cornwall LEM interface via a manual process.

6.2 Conflict Avoidance with ESO

During the system design phase of EFFS a high level flexibility service conflict avoidance process and data exchange was agreed with National Grid ESO (NGESO). However, since then the project has been unable to define detailed requirements especially with relation to APIs, how to identify conflicts and how to resolve them. The relevant ENA ON products (e.g. 2019 WS1A P3: Final Report - DSO Services: Conflict Management & Co-optimisation) have not provided the anticipated level of detail required to support with this. Moreover, the vast majority of NGESO flexibility services are not planned in advance so would not be subject to a 'world B' conflict avoidance approach where there is a reliance on advance visibility of services by both parties. Therefore, the project is not currently in a position to specify and build an automated solution for conflict avoidance with NGESO. In order to fulfil the projects learning objectives, it has been proposed that a manual data exchange and conflict avoidance process be put in place to support the EFFS trials. The exact approach will depend on the level of engagement from NGESO, both in defining the process and in the trial execution.

6.3 System Architecture Refinement

The solution defined via the requirements and design phase of the project was deemed appropriate for an enterprise BAU solution and to support the transition to DSO. However, during a review of the system architecture these were determined to be too onerous to implement in the context of an NIC trial. Therefore, during the system design and build phase, a number of design refinements were made to ensure the solution is appropriate, deliverable and pragmatic. For example, the EFFS system will no longer integrate in real time with WPDs Network Management System (NMS) as this is not essential for the demonstration of the solution and will avoid extra cost, complexity and security requirements.

6.4 Additional forecasting requirements

Another addition to the original plan is the inclusion of some follow-on work relating to forecasting. This follows on to recommendations from the original report by SGS to explore the use of engineering models but also extends the use of weather data to use forecast values as well as historic data. However, this additional exploratory work did not significantly increase the accuracy of the forecasting or was inconclusive. Given this the decision was made that it did not offer value for money further exploring this or including these additional factors in the EFFS trials solution.

7 Intellectual Property Rights

A complete list of all background IPR from all project partners has been compiled. The IP register is reviewed on a quarterly basis. No additional foreground IP has been identified and registered in this reporting period.

8 Risk Management

8.1 General

Our risk management objectives are to:

- Ensure that risk management is clearly and consistently integrated into the project management activities and evidenced through the project documentation;
- Comply with WPDs risk management processes and any governance requirements as specified by Ofgem; and
- Anticipate and respond to changing project requirements.

These objectives will be achieved by:

- Defining the roles, responsibilities and reporting lines within the project delivery;
- Team for risk management;
- Including risk management issues when writing reports and considering decisions;
- Maintaining a risk register;
- Communicating risks and ensuring suitable training and supervision is provided;
- Preparing mitigation action plans;
- Preparing contingency action plans; and
- Monitoring and updating of risks and the risk controls.

8.2 Current Risks

The EFFS risk register is a live document and is updated regularly. There are currently 14 live project-related risks. Mitigation action plans are identified when raising a risk and the appropriate steps then taken to ensure risks do not become issues wherever possible. In Table 8-1 we give details of our top five current risks by category. For each of these risks, a mitigation action plan has been identified and the progress of these are tracked and reported.

Table 8-1 EFFS project risks

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
There is a risk that there may be a lack of availability of WPD project teams (business and IT) to support the project.	Major	Early engagement of business stakeholders to support resource scheduling. Escalate WPD resource issues to Project Review Group where appropriate.	Review of system by System Architect to identify and resolve system design gaps. Outsourcing of PSS/E development work to PSC.
There is a risk that the flexibility platform providers are unable to provide resource or numbers of usable customers to meet project requirements	Major	Regular calls with providers to ensure that they have good awareness of project requirements.	All flexibility platform providers have been informed of the project near-term activity and are able to provide resource or testing.

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
There is a general risk that the remote access arrangements in place due to the COVID-19 situation are less effective than direct access. Additionally, there is an increased the probably of project team sickness that could cause delays.	Major	Use webinar facilities (MS Teams, Skype, Zoom, GoToWebinar) to hold virtual meetings. Temporarily use Webex for remote access to support activities on WPD environment.	Discussions have taken place between the project team and WPD IR to consider alternative arrangements
There is a risk that the requirements specified by the project are too complex to be delivered within the time and budget of the project.	Major	Review system design with System Architect. Refine/simplify processes where possible. Outsource provision of PSS/E tool including data cleansing to third party.	The project's System Architect design review refined and simplified processes where possible.
There is a risk that the Networkflow software solution may not be able to interface to other third-party systems.	Major	Simply interfaces where possible and ensure simplification are comprehensively tested prior to trials.	Refinement have been made to simplify interfaces and factory acceptance testing has been passed on this refinement.

Table 8-2 provides a snapshot of the risk register, detailed graphically, to provide an on-going understanding of the projects' risks.

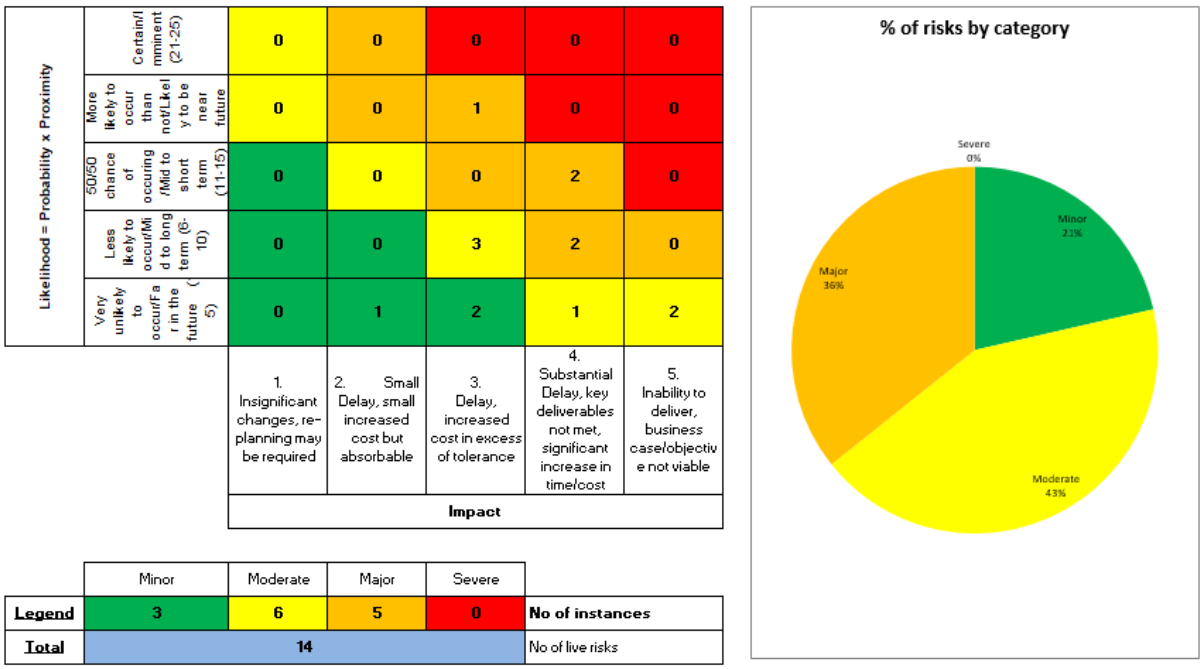

Table 8-2: Graphical view of Risk Register

Error! Reference source not found. provides an overview of the risks by category, minor, moderate, major and severe. This information is used to understand the complete risk level of the project.

8.3 Update for risks previously identified

An update on the most significant risks from the previous six-monthly report is given Table 8-3.

Table 8-3 Update of risks in previous report

Details of the Risk	Previous Risk Rating	Current Risk Rating	Mitigation Action Plan	Progress
Lack of availability of WPD project teams (business and IT) to support the project.	Major	Major	Early engagement of business stakeholders to support resource scheduling. Escalate WPD resource issues to Project Review Group where appropriate.	The project has found it difficult to engage with some areas of the business at times during this period.
There is a general risk that the Coronavirus outbreak could see draconian measures introduced, such as the lockdown that has been seen in China/Italy, which would slow/halt project activities. EFFS project team members could catch the virus and be off work due to recovery and quarantine requirements (company, government).	Major	Major	Use webinar facilities (MS Teams, Skype, Zoom, GoToWebinar) to hold virtual meetings. Temporarily use Webex for remote access to support activities on WPD environment.	This risk remains as Webex is not an ideal replacement for direct access. As such other means of remote system access remain under consideration.
There may not be sufficient customers signed up via flexible power that are willing to provide sufficiently low capacity short duration events to cover to demonstrate the full range of EFFS functionality.	Major	Moderate	Ensure alignment with BAU requirements so that BAU payments can be used for Flexible power services. Increase engagement with Flexible Power team at WPD.	Ongoing
There is a risk that the requirements specified by the project are too complex to be delivered within the time and budget of the project.	Major	Major	Review system design with System Architect. Refine/simplify processes where possible. Outsource provision of PSS/E tool including	The project's System Architect design review refined and simplified processes where possible.

			data cleansing to third party.	
Insufficient resource / time to witness Networkflow FAT.	Major	Closed	AMT-SYBEX to provide demos of Networkflow functionality. AMT-SYBEX submission of FAT Exit Reports to WPD.	Closed

9 Consistency with Project Direction

The scale, cost and timeframe of the project has remained consistent with the registration document, a copy of which can be found here:

https://www.westernpower.co.uk/projects/effs

10 Accuracy assurance statement

This report has been prepared by the AMT-SYBEX Project Manager (Elliot Warburton), reviewed by the WPD Project Manager (Sam Rossi Ashton) and approved by the Innovation Team Manager (Yiango Mavrocostanti).

All efforts have been made to ensure that the information contained within this report is accurate. WPD confirms that this report has been produced, reviewed and approved following our quality assurance process for external documents and reports.

Glossary

Term	Definition
Affinity Networkflow or Networkflow	Proprietary software suite developed, licenced and maintained by AMT-SYBEX relating to the management of flexibility services for electricity networks.
Background IPR	Intellectual Property Rights owned by or licensed to a Project Participant at the start of a Project.
Distribution Network Operator (DNO)	Any Electricity Distributor in whose Electricity Distribution Licence the requirements of Section B of the standard conditions of that licence have effect (whether in whole or in part).
DSO	Distribution System Operator
EFFS	Electricity Flexibility and Forecasting System
ENA	Energy Networks Association
ESO	Electricity System Operator
FAT	Factory Acceptance Testing
Foreground IPR	All Intellectual Property Rights created by or on behalf of any of the Project Participants, their sub-Licensees, agents and sub-contractors as part of, or pursuant to, the Project, including all that subsisting in the outputs of the Project.
Full Submission Pro-forma	A pro-forma which Network Licensees must complete and submit to Ofgem in order to apply for funding under the NIC.
Funding Licensee	The Network Licensee named in the Full Submission as the Funding Licensee, which receives the Approved Amount and is responsible for ensuring the Project complies with this Governance Document and the terms of the Project Direction.
GB	Great Britain
Intellectual Property Rights (IPR)	All industrial and intellectual property rights including patents, utility models, rights in inventions, registered designs, rights in design, trademarks, copyrights and neighbouring rights, database rights, moral rights, trade secrets and rights in confidential information and know-how (all whether registered or unregistered and including any renewals and extensions thereof) and all rights or forms of protection having equivalent or similar effect to any of these which may subsist anywhere in the world and the right to apply for registrations of any of the foregoing.
NIC	Network Innovation Competition
NMS	Network Management System
ON-P	Open Networks project
Project	The Development or Demonstration being proposed or undertaken.
Project Bank Account	A separate bank account opened and used solely for the purpose of all financial transactions associated with a NIC Project.
Project Direction	A direction issued by the Authority pursuant to the NIC Governance Document setting out the terms to be followed in relation to the

Term	Definition
	Eligible NIC Project as a condition of its being funded pursuant to NIC Funding Mechanism.
Project Participant	A party who is involved in a Project. A participant will be one of the following: Network Licensee, Project Partner, External Funder, Project Supplier or Project Supporter.
Project Partners	Any Network Licensee or any other Non-Network Licensee that makes a contractual commitment to contribute equity to the Project (e.g. in the form of funding, personnel, equipment etc.) the return on which is related to the success of the Network Licensee's Project.
Project Supplier	A party that makes a contractual commitment to supply a product or service to the Project according to standard commercial terms that are not related to the success of the Project.
Relevant Background IPR	Any Background IPR that is required in order to undertake the Project.
Relevant Foreground IPR	Any Foreground IPR that is required in order to undertake the Project.
SGAM	Smart Grid Architecture Model
SIT	System Integration Testing
TEF	TRANSITION, EFFS and FUSION projects
WPD	Western Power Distribution

Appendix 1 – Project Benefits

This text is taken from the EFFS bid document.

Benefit 1 – Deferral or avoidance of conventional reinforcement

Work undertaken by UK Power Networks as part of the Smarter Network Storage project established that 10.8% of the 4,800 primary substation groups across Great Britain (GB) could benefit from flexible solutions, notably DSR and storage, enabling on average 3MW of traditional reinforcement to be deferred for up to 10 years.

It is therefore reasonable to argue that over 10 years £51.1m (10% of the expected general reinforcement cost within WPD at 2017/18 costs) of conventional reinforcement could be substituted with a smart flexibility services capability as the EFFS method will provide if rolled out across the WPD licensed areas. The analysis undertaken provided shows that savings of £33.8m in the 10 years to 2030 would be generated and £71.6m by 2050. By rolling this method out across the whole of the GB network would deliver savings of £114.4m by 2030 and £242.6m by 2050.

Benefit 2 – Additional flexibility in fault restoration

In areas where the EFFS system and method have been rolled out and delivering benefit as above, an additional benefit available to the network will be the option to make use of available local flexible capacity following a network fault. Ordinarily when a fault occurs at a local substation, network engineers will look to restore network capacity by reconfiguring the network through switching operations. Here, suitable flexible capacity would be utilised in addition to these switching routines in order to restore customers as quickly as possible. Using available flexibility in this way, by using generation and DSR to restore networks that would otherwise not be restored until repairs were complete, would improve restoration times. This may be especially pertinent in extreme cases where the number of concurrent faults exceeds the design assumptions. It is hoped that the high-volume testing of the EFFS system, a bench exercise including many simulated flexibility service providers, can give insights into the impact of differing levels of flexibility on restoration times to inform the potential review of P2/6 to consider the impact of flexibility services.

Benefit 3 – Reduced balancing costs via co-ordination with SO

The EFFS system and method will share all trigger and arming notifications with National Grid, the National Transmission System Operator (ESO) and potentially to any other party purchasing flexibility services that might be affected by DNO operations. The benefit of this will be to ensure that any conflict between the ESO and the DSO are managed. This will ensure that the ESO does not attempt to call on ancillary services that would create or worsen a constraint for DNOs. Resolving conflicts should minimise the overall costs for the system.

In addition, it will also ensure that services are not called that might have a major impact upon the flexible capacity requirement of the DSO. For example, the ESO looking to manage national system frequency within a zone which is significantly capacity constrained could be very costly and may either result in a greater call on flexibility reserve or an ineffective management of system frequency. At present it is difficult to know the exact potential for conflict between DSO and other flexibility service users and this work will clarify the position and therefore the estimate of benefits. Anecdotal conversations have suggested that in the Netherlands requests to use the same asset, were relatively frequent and that where the same asset was being sought by multiple parties, it was about a 50/50 split between the two parties wanting the asset to operate in the same way and wanting to operate the asset in different directions.

Benefit 4 – Increased / faster renewables connections.

The use of flexibility services via the EFFS method and system to facilitate customer connections could greatly increase both the speed and cost of providing the necessary connection. Where a connection requires additional substation capacity, conventionally a substation upgrade would be required. For

example, a new or upgraded transformer. Using flexibility services might avoid this work for a period of time.

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