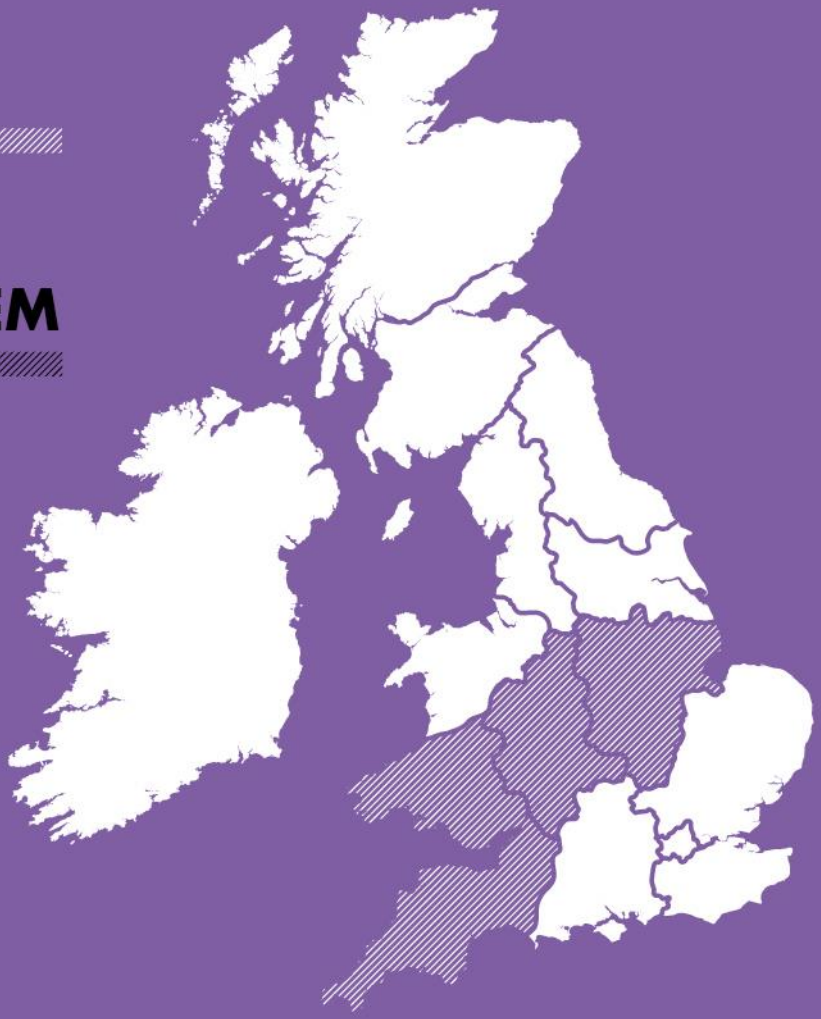
WESTERN POWER DISTRIBUTION

EFFS

ELECTRICITY FLEXIBILITY AND FORECASTING SYSTEM

EFFS
WPD_EN_NIC_003

NIC MAJOR PROJECT PROGRESS REPORT
REPORTING PERIOD: OCT 2018 – MAR 2019



RIIO NIC NETWORK INNOVATION COMPETITION

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Contents

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Glossary

Term	Definition
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
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
HV	High Voltage
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.
ITT	Invitation to Tender
IPR	Intellectual Property Register
LCT	Low Carbon Technologies
LV	Low Voltage
NIC	Network Innovation Competition

Term	Definition
ON	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 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.
Successful Delivery Reward Criteria (SDRC)	The Project specific criteria set out in the Project Direction against which the Project will be judged for the Successful Delivery Reward.
TEF	TRANSITION, EFFS and FUSION Projects
WPD	Western Power Distribution

1 Executive Summary

The Electricity Flexibility and Forecasting Systems 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 design to plan and despatch flexibility services in operational timescales. EFFS is a 3-year project split into four workstreams: 1) Forecasting Evaluation and Requirements, 2) Implementation, 3) System and Trials Testing, 4) Collaboration and Learning. EFFS is working collaboratively with the Scottish and Southern Electricity Networks' TRANSITION project and Scottish Power Energy Networks' FUSION project and will share forecasting algorithms developed within EFFS. EFFS is also work closely with the Energy Network Association's Open Networks project[1].

1.1 Overall Project Progress

This is the first project progress report. It covers progress from initial registration in October 2018 to the end of March 2019.

The key achievements in the reporting period are as follows:

- Contract close with Project Partner AMT-SYBEX;
- Contract close with Project Partner National Grid Electricity Transmission PLC;
- Procurement, contract close and mobilisation of the Project's Forecasting Partner, Smarter Grid Solutions;
- EDF Energy engaged for supplier input;
- Completion of project mobilisation;
- Delivery of the Project's first Ofgem deliverable, the Mobilisation Exit Report;
- T.E.F. collaboration and coordination in progress;
- DSO system requirements document started; and
- Seven DSO system requirements workshops completed to date, including:

1. ENA Future Worlds: Smart Grid Architecture Models
2. Business Processes
3. Commercial Agreements & Frameworks and Market Interaction 1
4. Forecasting Design
5. Optimisation
6. Capacity Engine
7. Power ON

[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 an initial period of collaborative working to identify benefits from shared working. The projects continue to work closely to ensure that collaborative benefits are delivered and will need to demonstrate this to progress beyond a common stage gate assessment. Open Networks is an industry wide project relating to DSO transition which looks to provide shared analysis, roadmaps, models etc. and promote standardisation,

1.2 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.

1.3 Learning and Dissemination

Given the early stage of the project, the focus of work has been on generating the learning that can be disseminated at a later stage. A good deal of learning has been generated from the various workshops which has been circulated internally for validation. This learning will be published externally as part of the DSO functional requirements specification document due in the coming months. Similarly, learning from the forecasting evaluation work will be published shortly after the period covered by this report. An informal dissemination event has been organised for TEF members to understand the hardware and software arrangements used by SGS to create the forecasts and the actions required to replicate these to enable their own forecasting.

In the meantime, a standard project overview slide set has been developed and published on the EFFS page of the innovation website as well as a short video explanation of the project. In addition to these highlights, further activities are given in section 2.6.3.

1.4 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 25 risks have been raised, 4 of which have been closed, leaving a total of 21 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 21 live risks none are ranked as severe, 4 are ranked major, 9 are ranked as moderate and 8 are ranked as minor.

Contained within Section 8.1 of this report are the current top risks associated with successfully delivering EFFS as captured in our Risk Register. Section 8.2 provides an update on the most prominent risks identified at the project bid phase.

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 to help the transition to DSO by exploring forecasting, conflict avoidance and market communications requirement.

The aim of the EFFS project is to explore the new capabilities that DNOs will require in order to perform new functions as DSOs. It will trial a new system that supports several key functions of a DSO via 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;
- Using and testing the technical implementation, which will involve modelling the impact of flexibility services.

As well as proving the system, this testing phase will create learning relevant to forecasting the likely benefits of flexibility services and the impact of changing network planning standards.

EFFS will focus on networks that are 33kV or above as these are the voltages where alternatives to reinforcement are likely to be implemented first. 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.

As there were three NIC projects relating to DSO transition in the same year, Ofgem requested EFFS, TRANSITION and FUSION to assess and demonstrate how they could work collaboratively before the projects were given final authorisation. The main driver of this was to ensure that synergies were exploited, and duplication was avoided. This is explained in further detail in section 1.6.1, TEF Collaboration.

Similarly, the ENA's Open Networks project is also working to determine the new skills and functions that DNOs need to develop in order for the DSO transition to take place. EFFS will be working closely with Open Networks contributing to and receiving information from several products across the workstreams.

The Project Partners are;

1. Western Power Distribution: The Lead/Funding DNO (licensee);
2. AMT-SYBEX: The Third-Party Lead Supplier, who is responsible for the overall delivery of the Project; and
3. National Grid ESO.

Additionally, the project has the following key stakeholders;

- Capita as Design Authority of the Forecasting Partner; this service is provided through AMT-SYBEX;
- Smarter Grid Solutions (Forecasting Partner); and
- Centrica as managers of the Cornwall Local Energy Market project;
- EDF Energy.

These relationships are summarised in Figure 1 below.

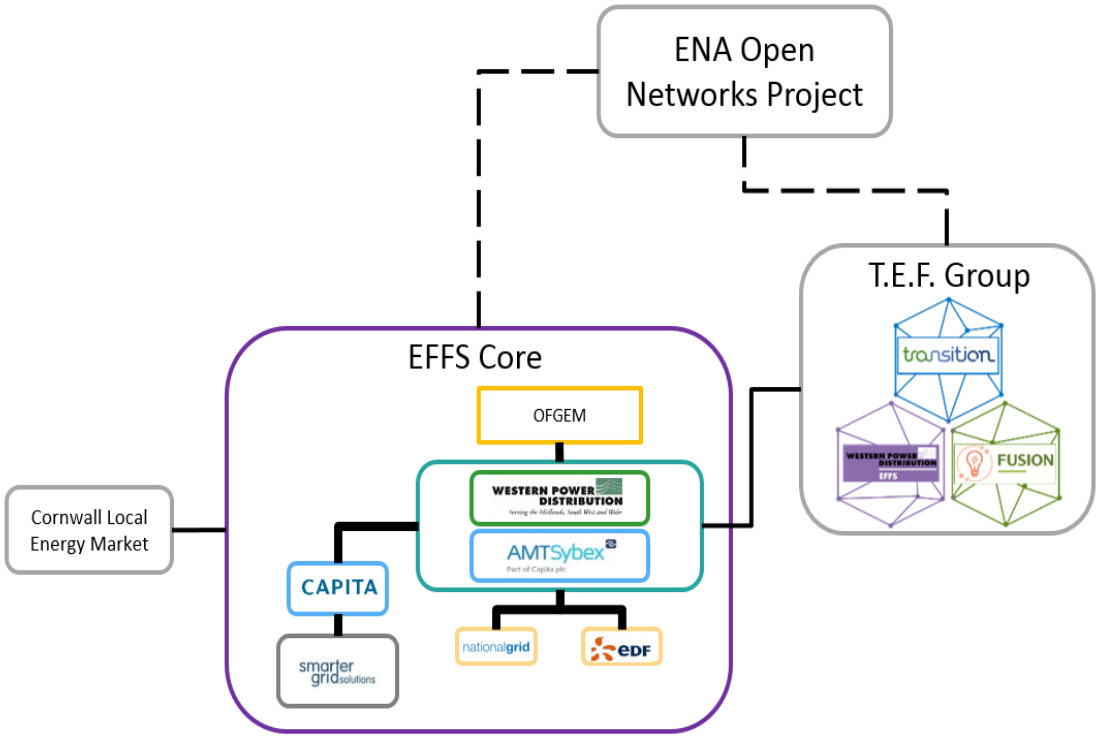

Figure 1: EFFS Key Organisations

The Project commenced in October 2018 and is scheduled to complete in October 2021. The Project has four workstreams as shown in Figure 2. This Report details the progress of the Project, focusing on the last six months, October 2018 to March 2019. The reporting period is depicted in Figure 2 by the blue shaded box overleaf.

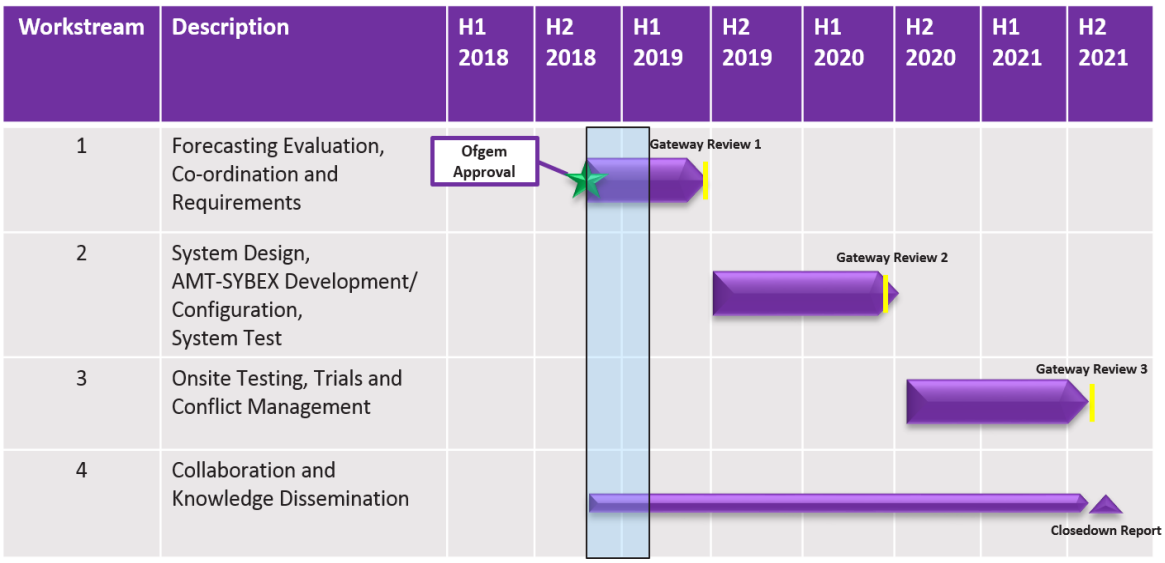

Figure 2: EFFS Timeline

The project has been progressing well in all areas with specific focus on the following areas:

- Contracts and Procurement;
- Governance;
- WS1 – System requirements specification;
- WS1 – Forecasting evaluation; and
- WS4 – Collaboration, learning and knowledge dissemination.

2.2 Contracts and Procurement

2.2.1 AMT-SYBEX

Work on developing the contract between WPD and AMT-SYBEX took place during the period of collaboration with TRANSITION and FUSION before Ofgem approval. This advance work enabled the contract to be signed within the first week following Ofgem approval.

2.2.2 National Grid

A formal agreement has been developed to document the participation required by National Grid Electricity Transmission PLC, a project partner, to support the project. This was complicated by the need to specify the areas of collaboration upfront when there are several unknowns. Similarly, in specifying National Grid's involvement there was a need to avoid duplication of their effort between supporting EFFS and participation in Open Networks. An example of this was their initial reluctance to provide a participant to the EFFS workshop on conflict avoidance on the basis that they would participate with the relevant ON product later in the year.

2.2.3 EDF Energy

EDF Energy's participation in EFFS is covered by a Memorandum of Understanding document prepared before the project received final authorisation from Ofgem which is still considered appropriate.

2.2.4 Forecasting Partner (Smarter Grid Solutions)

Capita's Chief Data Scientist and his team of experts were recruited by AMT-SYBEX (part of Capita) during the EFFS bid to act as Design Authority on the EFFS project. The team assisted with the appointment of a forecasting partner to carry out the relevant research and deliver a robust forecasting algorithm. The joint project team including the Design Authority data science experts, supported by our Procurement team, developed a detailed forecasting requirements specification to issue to interested parties to encourage tenders for the research work. TRANSITION and FUSION were involved in revising the scope of the forecasting work before this was published.

The requirements were shared on the Achilles platform[2] and those entities which had previously expressed an interest in the project were also invited to bid. Following receipt of initial bids, a shortlist of potential partners was agreed, and Show & Tell sessions held with a panel consisting of parties from WPD, AMT-SYBEX and Capita. After reviewing all the final submissions taking into account experience in relevant projects, pricing, forecasting experience and approach and ability to mobilise, the decision to appoint Smarter Grid Solutions (SGS) was made. SGS commenced work in December 2018.

The following table details the current status of procurement for the Project.

Provider	Services/goods	Area of project applicable to	Anticipated delivery dates
AMT-SYBEX	Networkflow Solution	Trials	28/07/2020
AMT-SYBEX	Project management and consultancy	ALL	29/10/2021
AMT-SYBEX	Forecasting design authority	Forecasting Evaluation	31/05/2019
National Grid ESO	National system operator consultancy and support	Requirements and Trials	04/06/2021
Smarter Grid Solutions	Forecasting evaluation	Forecasting Evaluation	31/05/2019

Table 1: EFFS Procurement Status

[2] The Achilles platform is a procurement system used to ensure compliance with EU legislation by notifying all registered parties relevant to the request.

2.3 Governance

A number of activities have been completed as part of the project mobilisation that have related to project governance. Many of these actions were specified in advance as evidence to be included in the project's first Ofgem deliverable, the Mobilisation Exit Report.

2.3.1 Project Review Group

The EFFS Project Review Group (PRG) was established following the project kick-off meetings in October 2018. The PRG meets on a quarterly basis.

The role of the PRG is to:

- Ensure the project is aligned with organisational strategy;
- Ensure the project makes good use of assets;
- Assist with resolving strategic level issues and risks;
- Approve or reject changes to the project with a high impact on timelines and budget;
- Assess project progress and report on project to senior management and higher authorities;
- Provide advice and guidance on business issues facing the project;
- Use influence and authority to assist the project in achieving its outcomes;
- Review and approve final project deliverables; and
- Perform reviews at agreed stage boundaries.

2.3.2 Project Initiation Document

A project initiation document was created to serve as a baseline record for the project, which had developed considerably since the production of the original NIC documentation as a result of the collaborative work with the TRANSITION and FUSION projects.

2.3.3 Project Plan

A detailed project plan with breakdown by project workstream and milestones has been completed. This plan is now live and is being managed by the project manager supported by the delivery manager using the project's SharePoint, file sharing facility between partners.

2.3.4 Project SharePoint

A project SharePoint was established to facilitate document management and sharing using the WPD standard folder structure. Additionally, access was granted to a TEF SharePoint to facilitate similar sharing across the TEF projects.

2.3.5 Project Resource

This is a list of the key EFFS project partner resources, all of whom are fully engaged:

Organisation	Name	Role
WPD	Nigel Turvey	Project Sponsor
WPD	Roger Hey	DSO Projects and Systems Manager
WPD	Jennifer Woodruff	Project Manager
AMT-SYBEX	Richard Holifield	Governance Lead
AMT-SYBEX	John Hayling	Quality Assurance
AMT-SYBEX	Elliot Warburton	Delivery Manager
AMT-SYBEX	Mike Pearson	Lead Consultant
AMT-SYBEX	Andrew Hodgson	Solution Architect
AMT-SYBEX	David Pratt	Technical Consultant
National Grid ESO	Cian McLeavey-Reville	Innovation Manager

Table 2: EFFS Project Partner Resources

2.4 Workstream 1 - Forecasting Evaluation

The forecasting evaluation will determine optimal forecasting arrangements for different time-horizons (within day to six months ahead). The optimal algorithmic options will provide forecasts of network generation and load at half hourly resolution. These forecasts are then used as an input to a capacity assessment to identify potential future network issues.

As outlined in section 2.2.4, SGS has been contracted to develop and evaluate methods for forecasting load and generation for EFFS but it is hoped that their findings can be used within TRANSITION and FUSION.

The project has been split into phases:

- Mobilisation;
- Design and Data;
- Build and Test; and
- Reporting.

The Mobilisation and Design and Data phases are now complete. These have seen the creation and signoff of the project initiation document, provision of WPD data to SGS, the database design and build, and the first version of the toolchain. The team is now in the Build and Test phase where three models have been developed as part of the forecasting method. The three models compare one well established statistical method for time-series forecasting (ARIMA) with two more innovative methods. (Long/Short Memory Neural Networks, and XGBoost)

A series of Use Cases have been defined to evaluate the models' performance for different voltage levels and time horizons, and currently the team is working through the first stage of evaluation. Further features will be added to the models to determine their impact on the forecasting process, and improvement of accuracy metrics.

2.5 Workstream 1 - DSO System Requirements

Seven DSO system requirements workshops have been completed to date. These include:

1. **ENA Future Worlds: Smart Grid Architecture Models**: A walkthrough was carried out of the different future worlds defined by Open Networks Workstream 3 that detail various models for the transition to DSO. The key output was to understand the differences per world for key EFFS functions.

2. **Business Processes**: High-level business processes for EFFS were defined through the lens of the ENA Future Worlds' World B and identify all key stakeholders and business areas / functions.

3. **Commercial Agreements & Frameworks and Market Interaction**: Discussions around how flexibility markets will work, both commercially and in terms of data exchanges. The output of this was a number of high-level messages and processes being designed for EFFS to interact with markets, plus the principle that EFFS will only procure flexibility via market platforms. Much detail of how the various markets will work is still to be confirmed.

4. **Forecasting Design**: This workshop was a kick-off meeting with the Project's Forecasting Partner, SGS, and all key project stakeholders to discuss and agree the scope, approach and outputs of the forecasting evaluation work.

5. **Optimisation**: This workshop agreed the principles of commercial optimisation that WPD want EFFS to apply. Three optimisation processes were defined corresponding to the three stages of a flexibility service: procurement, arming and dispatch.

6. **Capacity Engine**: An approach for identifying capacity constraints on the network based on the forecasting output was agreed. The approach is to use a power flow analysis tool external to EFFS to generate accurate values to identify constraints.

7. **Power On**: This workshop was to discuss how EFFS needs to interact with Power On[3], WPDs control room system. The keys functions agreed were: visibility of planned outages for capacity calculations, access to within day time series data, ability of Power On users to dispatch via EFFS and also view available flexibility.

The DSO requirements continue to evolve, and the project team are making good progress. A work-in-progress draft version of the DSO requirement document was produced early in March 2019 to validate this progress and to ensure that the project is going in the right direction. This document was produced following a number of workshops which defined the high-level requirements, business processes and identified the features to be delivered. Both internal and

[3]Power On is WPD's Distribution Management System, used in the control room to manage the network in real-time.

wider industry stakeholders have been engaged in this process (including Scottish and Southern Electricity Networks, Electricity North West, Scottish Power Energy Networks, National Grid, ENA Open Networks, UK Power Networks and Northern Powergrid).

While the project team is making good progress with requirements capture, there is still a risk that the project will not get sufficiently detailed requirements in the timescales owing to dependencies on the ENA Open Network's project outputs, the evolution in the wider industry understanding around DSO and development of other systems within WPD. To mitigate this risk, where detail from the ON is not available ,we have made assumptions to allow us to progress. We are pro-actively engaging with the relevant product leads throughout the requirements capture to validate that our thinking aligns, the same product leads will also be invited to review the DSO requirements deliverable which will reduce the risk of a divergence in approach.

The following functional areas are still to be defined and workshops have been arranged accordingly:

- Management and reconciliation; and
- Co-ordination and conflict avoidance.

2.6 Workstream 4 – Collaboration and Knowledge Dissemination

2.6.1 T.E.F. Collaboration

In 2017, three projects were submitted for the Network Innovation Competition (NIC) that supported the transition from DNO to DSO. These were:

- TRANSITION, submitted by Scottish and Southern Electricity Networks and Electricity North West;

- Electricity Flexibility and Forecasting Systems (EFFS), submitted by Western Power Distribution; 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. In the Project Directions issued by Ofgem for TRANSITION, EFFS and FUSION (T.E.F.), additional conditions were included to reduce the risk of unnecessary duplication, improve delivery efficiency and ensure the projects deliver complementary learning. The principles of engagement for EFFS (and the other T.E.F. projects) are defined in section 5 of 'nic_2017_compliance_document_appendices_v2_public.pdf'; this document can be found at the following link:

https://www.ofgem.gov.uk/system/files/docs/2018/10/nic_2017_compliance_document_appendices_v2_public.pdf.

Within this, the following approach for post 2018 engagement was defined:

"Presently ON have only committed to their workplan for 2018. In subsequent years, the T.E.F. Project Delivery Board shall review the Open Networks Project Initiation Document (PID) and liaise with relevant Product Leads during the scoping phase to feed in cross project learning and facilitate alignment of key inputs and outputs. This will be approved by the T.E.F. Steering Board and ON Steering Group as required on an annual basis."

The principles of engagement for T.E.F. were also formally agreed in the T.E.F. collaboration document referenced above, which was submitted to Ofgem in June 2018.

Coordination activities between T.E.F. are in progress, which to date include:

- Establishment of the T.E.F. project steering group;
- Set up of a shared T.E.F. SharePoint set up by SSEN. Key project documents have been uploaded to, and are being actively managed by, the T.E.F. group;
- Review and identification of further areas of collaboration;
- Monthly face-to-face T.E.F. project delivery board meetings. Five meetings complete to date; 1) 25/10/2018 in Glasgow, 2) 04/12/2018 in Glasgow, 3) 18/01/2019 in London, 4) 21/02/2019, 5) 29/03/2019 in Glasgow;
- Combined T.E.F. support for individual and combined project events; and
- T.E.F. question and answer session to enable better understand of the WPD EFFS forecasting evaluation.

2.6.2 ENA ON Collaboration

Coordination activities between the ENA Open Networks and EFFS are in progress, which to date include:

- ENA Open Networks Consultations – 2019 PID consultation and 2018 future worlds consultation response;
- Ongoing engagement as part of the T.E.F. group via our T.E.F. Open Networks representative;
- Attendance at ENA policy framework discussion 01/02/2019 in London; and
- Attendance at ENA Future Worlds Stakeholder Event 03/09/2018 in London.

2.6.3 Project Learning and Dissemination

Project lessons learned and what worked well are captured throughout the project lifecycle. These are captured through a series of on-going reviews with stakeholders and project team members. These are reported in Section 5 of this report.

Key dissemination activities within the reporting period are as follows:

- A press release for the EFFS project was released by WPD and AMT-SYBEX in October 2018;

- EFFS project information were uploaded to the WPD website in October 2018;
- The EFFS project was represented by the WPD and AMT-SYBEX project team at the Low Carbon Networks & Innovation event in October 2018;
- T.E.F. project delivery board meetings. Five meetings complete to date; 1) 25/10/2018 in Glasgow, 2) 04/12/2018 in Glasgow, 3) 18/01/2019 in London, 4) 21/02/2019 in Glasgow, 5) 29/03/2019 in Glasgow;
- EFFS introductory slide pack and voiceover were uploaded to YouTube and the EFFS project webpage on the WPD website;
- ENTSO-E National Grid T.E.F. Event in December 2018;
- Forecasting Evaluation Q&A session with T.E.F. 19/03/2019;
- Ofgem Deliverable 1, the Mobilisation Exit Report, was signed off on 20/02/2019 and formally issued to Ofgem on 27/02/2019; and
- Collaboration between SGS and National Grid to share best practice in terms of forecasting approaches and methodologies.

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

Spend Area	Budget (£k)	Expected Spend to Date (£k)	Actual Spend to Date (£k)	Variance to expected (£k)	Variance to expected %
Labour	397.4	67.7	64.2	3.5	5.2%[1]
Equipment	58.0	-	-	-	-
Contractors	2,371.2	643.8	628.9	14.9	2.3%
IT	288.8	15.0	-	15.0	100.0%[2]
IPR Costs	-	-	-	-	
Travel & Expenses	39.7	6.8	0.5	6.3	92.6%[3]
Payments to users & Contingency	101.8	28.7	-	28.7	100.0%[4]
Decommissioning	-	-	-	-	-
Other	82.0	-	-	-	-
TOTAL	3,338.9	762.0	693.7	68.3	9.0%

4.1 Comments around variance

[1]Labour costs are slightly lower than expected due to less WPD staff time being available for the project than was planned for.

[2]No IT costs spent to date. This has not impacted the outputs of workstream 1.

[3]Travel and expenses costs are lower than expected as the forecasting work has involved more web technology and fewer face to face meetings than anticipated. Additionally, it was expected that WPD travel costs would be booked directly to the project which has not been the case.

[4]Contingency spend has not been required.

5 Deliverables

Progress against deliverables has been as expected with the first deliverable, the Mobilisation Exit Report, being delivered in this reporting period.

Significant progress has been made towards the next three deliverables which are:

- DSO functional requirements specification;
- Gateway review 1; and
- Forecasting evaluation report.

A full list of EFFS deliverables is given below.

5.1 EFFS Project Deliverables

Please note the deadlines were revised part way through the TEF signoff 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.

Ref.	Project Deliverable	Deadline	Evidence	NIC funding request (100%)
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%
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%

Ref.	Project Deliverable	Deadline	Evidence	NIC funding request (100%)
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%
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%
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%
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%
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%
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%

Ref.	Project Deliverable	Deadline	Evidence	NIC funding request (100%)
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%
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

6 Learning Outcomes

Forecasting Partner Procurement

Originally it was expected that the key project role of Forecasting Partner might be attractive to many academic institutions as well as commercial service providers - such as the party selected Smarter Grid Solutions - with expertise in this field. However, when the tender was issued in [October / November] 2018, in order to keep to project timescale and the closeness to the Christmas break, only four weeks was available for interested parties to prepare and respond to the tender. Of the tenders received only one involved an academic party and this was received as a joint bid in conjunction with a commercial organisation. A wider and increased field of bidders might have been achieved if:

- A longer prequalification process had been possible;
- more time had been allowed for parties to prepare their bids; and
- the process had not been as close as it was to the end of the year.

Project Requirements Evaluation

The project kicked off with a series of workshops designed to capture the full detailed requirements for DSO operation. However, it has not been possible to set out and agree a solution in the level of detail originally envisaged, since the EFFS project has progressed ahead of the majority of compatriot work in this field. The result being that some areas are having to be revised by rerunning follow-up work-shops when the necessary and external thinking has progressed to a sufficient level of detail. In retrospect, acknowledging that much of the work and necessary process is highly innovative and very new in nature, a two-part requirement gathering process might have been beneficial. This might have worked on an initial phase of developing a greater understanding for participants. Then running a second stage for actually capturing requirements, with participants having had more time to consolidate their understanding of how DSO might impact their business areas. The final workshops, which would have run later in the programme, would then have been able to pick up a greater level of detail.

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

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.

8.1 Current Risks

The EFFS risk register is a live document and is updated regularly. There are currently 21 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.

The most significant risk to the project is that EFFS is working to faster timescales than TRANSITION, FUSION or the Open Networks project. This results in EFFS having to take the lead in defining DSO functionality while still achieving engagement from stakeholders that had not expected to consider these issues until later in the year. Some stakeholders have accepted that this is a shift in timescales rather than additional workload. The workshops have been generally well received and have identified future collaborative opportunities. Therefore, the mitigation of this risk lies chiefly with demonstrating useful outputs to the stakeholders to ensure continued participation, and to ensure that the outputs from EFFS are sufficiently accepted by stakeholders such that the risk of Open Networks reaching significantly different conclusions is minimal.

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
ON output not sufficiently detailed or received in project timelines in order to inform development work.	Major	Pro-actively engage with ON key products e.g. conflict avoidance. DSO requirements document to be reviewed by ON.	Ongoing
There is a risk that the programme may be unable to gain consensus on the role of a DSO, data interfaces and the requirements, which the system must fulfil.	Major	To mitigate this, a proactive mechanism of escalation to the programme board will be in place to make decisions.	Ongoing
The DSO requirements specification cannot be completed in time to achieve WPD sign off by 21/05/19.	Major	Consequence of other risks, so mitigation plan as per the other items in this table.	Ongoing
Unable to support links to market platforms that are too diverse in their services, definitions, data items, process flows etc.	Major	Continue to work with market platforms to promote simple options that can be implemented	Ongoing
There is a risk that there may be a lack of availability of WPD work sites, data centres, project teams to support the project.	Moderate	Suitable accommodations in these areas will be identified by WPD and consulted with AMT-Sybex during project mobilisation and Workstream 1.	Ongoing

Table 8-1: Top five current risks (by rating)

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

Likelihood = Probability x Proximity						
	Certain/Imminent (21-25)	0	0	0	0	0
	More likely to occur than not/Likely to be near future (16-20)	0	0	0	0	0
	50/50 chance of occuring/ Mid to short term (11-15)	2	0	0	1	0
	Less likely to occur/Mid to long term (6-10)	0	2	1	3	0
	Very unlikely to occur/Far in the future (1-5)	1	1	2	4	4
		1. Insignificant changes, re-planning may be required	2. Small Delay, small increased cost but absorbable	3. Delay, increased cost in excess of tolerance	4. Substantial Delay, key deliverables not met, significant increase in time/cost	5. Inability to deliver, business case/objective not viable
		Impact				

	Minor	Moderate	Major	Severe	
Legend	8	9	4	0	No of instances
Total	21				No of live risks

Table 8-2: Graphical view of Risk Register

Chart 8-3 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.

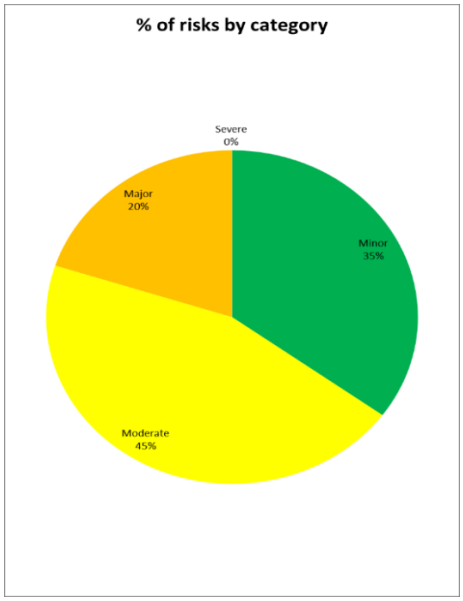

Chart 8-3: Percentage of Risk by category

8.2 Update for risks previously identified

As this is the first project progress report, rather than providing an update on the most significant risks from the previous report, the most significant risks identified at the start of the project are provided below with updates on their current risk status.

Details of the Risk	Previous Risk Rating	Current Risk Rating	Mitigation Action Plan	Progress
There is a risk that project contractors are not confirmed prior to project start.	Major	N/A	Closed	Closed
There is a risk that the programme may fail to obtain sufficiently flexible resources for inclusion during trials, due to lack of trial sites / data / staff with the necessary capabilities.	Major	Minor	WPD to pursue early engagement with potential client sites and secure early backing for resource booking.	Ongoing
There is a risk that there may be a lack of availability of work sites, data centres, project teams for the programme.	Major	Moderate	Suitable accommodations in these areas will be identified by WPD and consulted with AMT-Sybex during project mobilisation and Workstream 1.	Ongoing
There is a risk that the software solution may not be able to interface to WPD systems.	Moderate	Moderate	A rigorous requirements approval process at the end of Workstream 1 and a scoping study at the start of Workstream 2, as well as a strong management process.	Ongoing
There is a risk that the software solution may not be able to interface to other third-party systems.	Moderate	Moderate	A robust and proven design / solution to deliver connection to plant.	Ongoing

Table 8-4: Risks identified in the previous progress report

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 WPD EFFS Delivery Manager (Elliot Warburton of AMT-SYBEX), reviewed by the WPD EFFS Project Manager (Jennifer Woodruff) and approved by the Innovation Team Manager (Jonathan Berry).

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.

Appendix 1 – Project Benefits

Benefit 1 – Deferral or avoidance of conventional reinforcement for a period of time

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 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 and provided in Appendix 1 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 (SO) 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 TSO and the DSO are managed. This will ensure that the TSO 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 TSO 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.