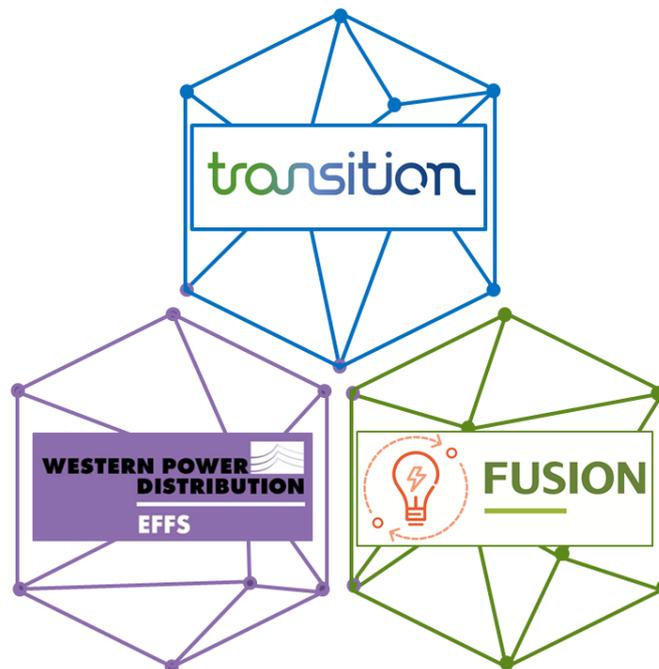


**SP Energy Networks,
Scottish and Southern
Electricity Networks,
Western Power
Distribution**

July 2018

**Compliance
Document**



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Executive summary

In 2017 three projects were submitted for the Network Innovation Competition that supported the transition from Distribution Network Operator (DNO) to Distribution System Operator (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 SP Energy Networks.

The three projects look at different aspects of the DSO transition with differing aims and areas of focus. These are described in more detail in Section 1.2.

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 specific detail of these conditions along with the actions taken to satisfy them are described in detail in Section 2 "Project Conditions", with key highlights set out below.

- **T.E.F. Projects have reduced the NIC funding requirement by £2.28 million since receipt of Project Directions through collaboration and voluntary contributions. Thus, since the initial FSPs in August 2017, the NIC funding requirement has reduced by £3.95 million.**
- The efficiencies identified have reduced the overall funding requirement from NIC from £21.32m to £19.04m, as set out below;

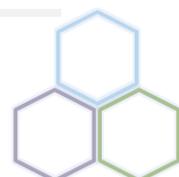
T.E.F.	Original (£k)	Revised (£k)
Total Project Costs	£24,010	£22,101
Voluntary Contribution	£47	£630
Partner Contribution	£963	£963
Compulsory Contribution	£2,401	£2,210
NIC Funding Request	£21,319	£19,035

- The individual project programmes have been better aligned to ensure that the early learning and products from any project can be incorporated into the other projects at the earliest opportunity. This is particularly important in areas such as forecasting which is a requirement across all the projects;
- This alignment of the project programmes, especially at the crucial Stage Gate, allows a further opportunity to review the scope of each project, with the potential to produce further efficiency benefits for customers;
- A robust Governance Structure has been created to ensure that the T.E.F. projects are focussed on delivery and are still aligned with the wider industry transition to DSO;

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- The T.E.F. projects have produced a plan to engage and communicate with wider industry stakeholders in a collaborative manner to provide clear and consistent messages on the projects' objectives and progress. The Gantt chart overleaf demonstrates the alignment of the shared Stage Gate and wider activities; and
- The Collaboration Strategy proposed for the T.E.F. projects has been reviewed and endorsed by the Open Networks Steering Group.

This document also outlines the proposed next steps in this collaboration, as well as demonstrating that the remaining project conditions have been satisfied. This has been achieved by an intensive period of collaborative working during the first part of 2018 amongst the three T.E.F. project partners. Work has provided a clear view of how the projects will relate to each other and to the Open Networks (ON) project. Mapping each project against the products in each workstream has clarified the key points of interaction, what inputs the projects require from Open Networks and how they will contribute toward the overall delivery of the ON project. This is detailed in the "ENA Engagement" section of this document. In most cases, the requirements relate to access to ON outputs, and therefore, are not expected to be unduly burdensome and will not interfere with the ON delivery programme.

Governance arrangements have been agreed to support continued engagement between the T.E.F. projects and Open Networks for their mutual benefit, and a proposed governance structure is described in Section 3.1. The governance structure proposed will ensure that T.E.F. will engage with the ON project throughout the life of the three projects.

Other positive outcomes of the collaboration work include:

- A reduction in the NIC funding requirement of approximately £2.28m;
- A reduction of the requirement for National Grid System Operator participation;
- Alignment of project timescales to create a common Stage Gate, prior to the deployment stage of each project;
- Comparison of high-level trial definitions to ensure no unnecessary duplication, with a commitment to ensure alignment as further trial details are determined;
- More effective, coordinated stakeholder engagement, streamlining the process, saving them time, and reducing potential for confusion and stakeholder fatigue; this will be another key area of engagement between T.E.F and ON;
- Additional benefits and learning outcomes have been identified from the collaborative activities;
- A clear understanding of the commonality and difference between the projects;
- A governance structure that will assist ongoing collaboration as projects progress.

By working collaboratively, the three projects will deliver better value than the original independent project approach. T.E.F. will build on outputs from the Open Networks project to demonstrate and validate its outcomes, which is essential to inform and de-risk the transition to DSO.

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1. Background

In 2017 three projects were submitted for the Network Innovation Competition that supported the transition from Distribution Network Operator (DNO) to Distribution System Operator (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 SP Energy Networks.

In the Project Directions issued by Ofgem for TRANSITION, EFFS and FUSION (T.E.F.), several conditions were included including the need to reduce the risk of unnecessary duplication and ensure the projects deliver complementary learning. All the project participants welcome the opportunity to collaborate and ensure that collectively, the three projects deliver best learning outcomes and value for money.

Each of the partners recognise that this document represents the first step in what will be an ongoing process to identify further areas of shared learning and opportunities to deliver a better outcome for customers as the projects progress. This process will be enabled by the new governance structure which includes regular intra-project meetings, as well as the substantive Stage Gate at the end of the development phase. Section 3.2 provides details of the evidence which will be provided at Stage Gate, enabling Ofgem to make an informed decision on proposals to commence of the implementation phase of the projects.

1.1 Document structure

Within this document, we have detailed how we have satisfied the eight conditions outlined in the Project Directions, how collaboration impacts on the projects' performance against the funding criteria and the Project Deliverables, new governance processes to drive collaboration have been agreed, and amendments to project programmes, budgets, and learning outcomes as a result of the collaboration.

- Chapter 1 - This chapter gives a brief summary of the three NIC projects, particularly highlighting the different focus of each project as well as areas for possible collaboration. This section also outlines the work which has been undertaken since the Project Directions were issued, and the areas identified with potential for beneficial collaboration.
- Chapter 2 reproduces the conditions contained in the Project Directions, with commentary on how these have been addressed.
- Chapter 3 details the main elements of collaboration identified across the three projects, the new governance arrangements, and the combined Stage Gate.
- Chapters 4, 5, 6 and 7 contain detail on the financial implications of the collaboration and the change to the overall NIC funding request.

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- Chapter 8 discusses the impact of collaboration on the projects' learning objectives, contribution to the NIC criteria, and Project Deliverables.

The appendices contain further detail as referenced throughout the document.

1.2 Overview of the NIC projects

TRANSITION

TRANSITION aims to develop a "proof of concept" Neutral Market Facilitator (NMF) Platform to test market models produced by the Open Networks Project. The project will recruit market participants (i.e. providers of flexibility) to undertake trials in up to two network areas. The main aim is not to develop fully functional software, but to demonstrate operation of market models designed by the Open Networks Project, to provide evidence for future strategy and requirements of market participants and Electricity System Operators.

EFFS

Electricity Flexibility and Forecasting System (EFFS) will support the DSO transition by defining, building and testing the software required to plan and despatch flexibility services in operational timescales. This will include the development of forecasting algorithms at a range of time horizons, confirmation of DSO functional requirements, technical design and implementation followed by a trial involving customers already recruited for existing flexibility projects.

FUSION

FUSION will carry out trials based on the USEF market model which is currently being deployed in the Netherlands and developed by organisations in Germany, Belgium, Denmark and France. The project will adapt the USEF framework for the GB market, aligning with the developed Open Networks project models where practicable.

1.3 Determining areas for collaboration

To develop this collaboration plan, the outcomes and objectives of each project had to be aligned against a common framework. Therefore, the projects mapped their outputs to the Open Networks Workstream 3: Product 2 Functional and System Requirements. The document outlines the current level of competence (from 1 to 5) of GB, and the expected future competence against a range of functional requirements identified by the Open Networks project, as shown below. This use of this matrix provided a structured approach, which demonstrated how the outputs from the three T.E.F. projects are informing the development of these requirements. It readily demonstrates the fundamental differences between the projects and also areas for possible collaboration.

The mapping of each T.E.F. project to the ENA Open Network project matrix is given in Appendix 1.



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Functional Groupings	Current	ST (to end 2018)	MT (start 2019 to end ED1)
Balancing	1	2 2 2 2 2 2 2 2 2	4 3 3 3 3 3 3 3 3
Network Operation	1 3 2 3 2 2	3 4 2 3 3 2 2 4 3 3	5 4 4 4 5 4 4 5 5 4
Investment Planning	3 3 1 1 3 2 2 2	4 4 3 3 4 3 3 3	4 4 4 4 4 4 4 4 4
Connections & Connection Rights	3 1 3 2 2 2 2	4 2 3 4 3 3 3 3 3	4 3 4 4 4 4 4 4 4
System Defence & Restoration	2 1 2 2 2	3 2 2 3 2 2 2 3 3 2	4 4 4 4 4 4 4 4 4 4
Service/Market Facilitation	1 1 1 1	2 2 2 2 2 2 2 2 2	4 3 3 3 3 3 3 3 3 3
Service Provision	1 1 1 1 1	2 2 3 3 3 3 2 2 3 2	3 3 4 4 4 4 3 3 3 4 3
Last Resort Asset Owner	1	2 2 2 2 2 2	3 3 3 3 3 3 3 3
Charging	competency level not yet defined	competency level not yet defined	competency level not yet defined
Forecasting	Regulation Codes & Frameworks	Forecasting	Forecasting
Commercial & Whole System Frameworks	Commercial & Whole System Frameworks	Regulation Codes & Frameworks	Regulation Codes & Frameworks
Whole System Co-ordination	Whole System Co-ordination	Commercial & Whole System Frameworks	Commercial & Whole System Frameworks
Power System Analysis	Power System Analysis	Whole System Co-ordination	Whole System Co-ordination
Contractual Arrangements	Contractual Arrangements	Power System Analysis	Power System Analysis
Dispatch	Dispatch	Contractual Arrangements	Contractual Arrangements
Pricing	Pricing	Dispatch	Dispatch
Outage Planning	Outage Planning	Pricing	Pricing
Data Management	Data Management	Outage Planning	Outage Planning
Settlement	Settlement	Data Management	Data Management
Contract & Service Compliance	Contract & Service Compliance	Settlement	Settlement
		Contract & Service Compliance	Contract & Service Compliance

Figure 1.1: Open Networks Functions and Competencies for Current, Short-term and Medium-term

In the discussions following this exercise, several areas for further exploration were quickly identified. These include:

- Governance;
- Programme alignment and Stage Gates;
- Stakeholder and industry engagement;
- Forecasting;
- Trials; and
- Software development and procurement

As well as weekly calls and ad-hoc updates, T.E.F. held several workshops to progress the collaboration plan across specific areas; where required these workshops included subject matter experts from the business or the project partner organisations, for example in forecasting, stakeholder engagement, and procurement discussions. A full list of the workshops undertaken is shown in Appendix 2.

The table overleaf gives a summary of some key areas for collaboration, based on the original project scopes.



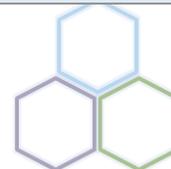
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	TRANSITION	EFFS	FUSION	
	Original project scopes prior to collaboration			Collaboration Potential
Approx. Duration	5 Years	3 Years	5 Years	
Open Networks Market models	Will demonstrate at least one market model defined by Open Networks	Will develop software which aims to be agnostic to market model	Will demonstrate the USEF market model; this can be considered as a hybrid of Open Networks Models.	<ul style="list-style-type: none"> • Development of DSO functional requirements for selected market models. • Detailed SGAM modelling of ON market models. • Stakeholder engagement and education about the market models.
Trials	Up to two trial locations across GB, each with three trial phases within two-year duration. Trial requirements and locations to be determined based on final design of ON market models.	Will link in with Project ENTIRE and Cornwall Local Energy Market project to demonstrate operation of the software.	One trial location, with three trial phases within two-year duration. Trial location is in East Fife.	<ul style="list-style-type: none"> • Method for characterisation of trial location such as flexibility, customer base, network configuration etc. • Non-project-specific dissemination materials for local stakeholder engagement. • Potential to reduce overall number of trial locations whilst maintaining learning outcomes.
Stakeholder Engagement	National stakeholder dissemination. Local stakeholder engagement. Market participant recruitment.	National stakeholder dissemination.	National stakeholder dissemination. Local stakeholder engagement. Market participant recruitment.	<ul style="list-style-type: none"> • National dissemination and engagement can be shared. • Some materials and methods for recruitment of market participants can be shared; the projects can use

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	Wide industry engagement and consultation on proposed platform.			learning from the Cornwall Local Energy Market project.
Requirements definition	Building on Open Networks outputs, develop specific DSO requirements suitable for using in open procurement exercise.	Develop specific requirements for DSO relating to forecasting and operational dispatch. Build on the outputs from Open Networks.	Building on USEF, develop specific DSO requirements suitable for using in an open procurement exercise.	A joint requirements review has been added to test the alignment and robustness of functional requirements developed in the design phase of each project.
Procurement	Run a procurement exercise for provision of a trials platform.		Run a procurement exercise for provision of a trials platform.	Potential to run a joint procurement is discussed in Section 4 Financial commentary.
Software development	Develop a beta-platform suitable for trials which integrates with SSEN and ENWL existing infrastructure.	Develop forecasting and dispatch algorithms, based on outcomes of initial academic work.	Develop a beta-platform suitable for trials which integrates with SPEN existing infrastructure.	<ul style="list-style-type: none"> • A review of requirements at Stage Gate will inform the possibility of sharing elements of software development. • Algorithms developed by EFFE will be shared and may be used by other projects.
Engagement with Open Networks	See Section 1.3	See Section 1.3	See Section 1.3	<ul style="list-style-type: none"> • New governance structure ensures ON oversight of the three projects' progress and learning outcomes. • Joint engagement with Product Leads throughout the life of T.E.F.

Table 1.1: T.E.F. comparison summary chart, using **original** project scopes prior to collaboration

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2. Project conditions

Collectively, the three T.E.F. projects firmly believe that they have satisfied all the conditions in the respective Project Directions and that all the projects should now be able to proceed to the next stage. Each of the conditions is described below along with a brief description of the approach taken and signposts to the relevant section in the document for further information.

a. Project budget

An updated project budget (this may include the cost of complying with this condition) which is sufficiently justified and, where appropriate, includes reduced costs from those identified during the Full Submission process as a result of identifying and removing areas of unnecessary duplication between TRANSITION, FUSION and EFFS.

The three projects have worked together to detail and set out revised budgets which reflect the collaborative delivery of T.E.F. Each licensee will demonstrate the fulfilment of their own budget conditions. These revised budgets will be sent directly to Ofgem as part the final document pack. This work has resulted in a reduction to the overall T.E.F. NIC funding request of **£2.28m**. This is in addition to the £1.7m savings previously identified by FUSION in their resubmission and the identified potential future savings which could be realised after the Stage Gate. These are fully detailed in Chapters 4,5,6 and 7.

Each of the three projects has included additional collaboration activities including additional cross-project peer reviews of requirements, and attendance at regular joint project meetings as part of the new governance arrangements. We have absorbed the additional costs associated with the development of this document and will absorb additional future costs due to enhanced cooperation activities.

b. Trial

Trial definitions and requirements for all three projects in order to ensure delivery of complementary learnings.

The T.E.F. projects each aim to undertake trials to assess the functionality of DSO models and software, to inform the transition to DSO. From our work to date, we are clear that each of the planned trials is looking to demonstrate different aspects of the DSO transition, with no unnecessary duplication. Further detail about the proposed trials and complementary learning outcomes is detailed in Section 3.5 Trials.



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c. Requirements

Definition of requirements for the three projects relating to the use of complementary market models for accessing flexibility.

The T.E.F. projects will each support the investigation and evaluation of specific market models defining the procedures for accessing flexibility in the distribution network. Whilst the three projects have differing approaches to defining the market models, as detailed in Section 3.5 Trials, steps have been taken to ensure the trials deliver complementary learning. Each demonstration of market models will harness learning from the Open Networks project and further inform the transition to DSO.

d. Stage gate

Stage gates that will allow the continued validity of the proposed trials to be tested in terms of delivering beneficial learning for network customers against the wider industry, policy and regulatory landscape, and aligning the phasing of the projects such that all three (TRANSITION, FUSION and EFFS) have successfully concluded the Design Stage in a complementary manner; any one project will not commence the deployment stage without prior approval of the Authority.

T.E.F. projects have made considerable efforts to align project programmes wherever possible. This includes not only a common Stage Gate shared by all projects, but also alignment of requirements development, stakeholder engagement, consultation, trials, and knowledge dissemination. The collaborative programme and further details on the Stage Gate is shown in 3.2 Programme alignment and Stage Gates.

T.E.F. will share a common Stage Gate, facilitating a peer review of developed technical specifications. The projects will report on the Stage Gate outcomes and seek approval from the relevant authorities, recognising the unique nature of each project. Authorisation of deployment commencement is the responsibility of the Authority.

T.E.F. will not proceed unless there are clear benefits for consumers and a clear consensus from stakeholders, industry and regulators. There will be one major Stage Gate for all three projects, delivering updated business cases and collaborative budgets to Ofgem, and giving the option to proceed, modify or stop any of the projects.

e. Stakeholder management

A coordinated dissemination plan so that all interested stakeholders are informed of each of the Project's and each of the other projects' outputs and learning in a coordinated fashion.

A coordinated engagement and dissemination plan has been agreed between the T.E.F. projects and is further defined in 3.3 Stakeholder and Industry engagement.

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All three projects recognise the benefits of a coordinated approach to ensure all interested stakeholders are informed in a clear manner. The projects further recognise the benefit of building on the language and engagement techniques of the Open Networks project.

Detailed information including events, language, consultation, and branding are also provided in this section.

f. Collaboration plan

An explanation of the cooperation activities for the three projects. This will identify how all the projects will interact with each other to deliver a complementary and coordinated set of learning outcomes to maximise benefits to consumers, how peer review of outputs will work, who will be attending project meetings, and how the various work packages will align with and complement each other, without unnecessarily duplicating, the Open Networks activities, including taking account of wider stakeholder views.

This document sets out the main areas of cooperation between T.E.F., and the governance structure which includes regular meetings to ensure further opportunities for collaboration or shared outcomes can be realised.

Peer review of each projects' learning outcomes at Stage Gate will be an opportunity to assess further potential for sharing in the development and deployment phases of each project, and a joint learning outcomes report at the end of the projects will ensure stakeholders have access to a single source of learning.

The "ENA Engagement" section of this report details how the work packages of T.E.F. align with each other, and with the Open Networks project.

g. Project deliverables

Updated set of Project Deliverables to replace those set out in Part 10 (Project Deliverables) below. These should be based on the reviews described above.

The T.E.F. Projects have reviewed Project Deliverables and made changes as required to align the timelines and collaborative outcomes of the projects. The updated Project Deliverables for each project are attached in Appendix 12 for review by Ofgem.

h. ENA Open Networks endorsement

The endorsement of the Open Networks Steering Group (or equivalent) for the actions taken and the proposed next steps.

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The ENA Open Networks project has consistently been highlighted as a principal industry engagement body by all three NIC projects, both during the Full Submission development phase and during the collaboration activities. The T.E.F. projects have presented at Open Networks workstreams 1, 2, and 3, and the Steering Board, as detailed in 3.3 ENA Engagement.

The Steering Board was presented with a draft of this document for review at the Steering Board meeting on 22nd March 2018. Review comments have been incorporated into this final document, which was circulated for review ahead of the 25th June 2018 meeting of the Open Networks Steering Group. To ensure the comments had been accurately captured and we were progressing in the right direction, key stakeholders including the ENA and BEIS were engaged with directly ahead of the convening of the Steering Group.

On the 25th June 2018 the Open Networks Steering Group approved the Collaboration Document for formal submission to the regulator.

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3. Collaboration Workstreams

T.E.F. have undertaken concerted and considerable actions to meet the Ofgem conditions set out in the project direction documents. The first stage of this process was to conduct a detailed sharing exercise on the objectives, outputs and timescales of each project. The DSO functions and competences identified in WS3 of Open Networks provided a framework against which to identify areas for collaboration or potential duplication (these are reproduced in Appendix 1).

To facilitate and structure collaboration activities, the DNOs have identified five key workstreams for collaboration:

- 3.1 Governance
- 3.2 Programme alignment and Stage Gates
- 3.3 Stakeholder and industry engagement
- 3.4 Forecasting
- 3.5 Trials

These workstreams were outlined at the start of the collaboration process, and have formed the basis on which collaboration efforts have been undertaken, and around which meetings and workshops have been held.

The following section outlines the collaborative activities within each workstream, by considering: collaborative efforts; workstream specific outcomes; and where possible, identify benefits of collaboration meeting the evaluation criteria outlined in the NIC governance document.

Underpinning the collaboration in all areas is a commitment by T.E.F. to use the common definitions and nomenclature developed by the Open Networks project.

3.1 Governance

Each of the three projects will remain individually responsible for compliance with their Project Direction and the requirements of the NIC Governance document. However, there is an ongoing need for collaboration amongst the three projects in the longer term. The governance arrangements for achieving this are outlined in the figure below, with further details including terms of reference and membership contained in Appendix 3.



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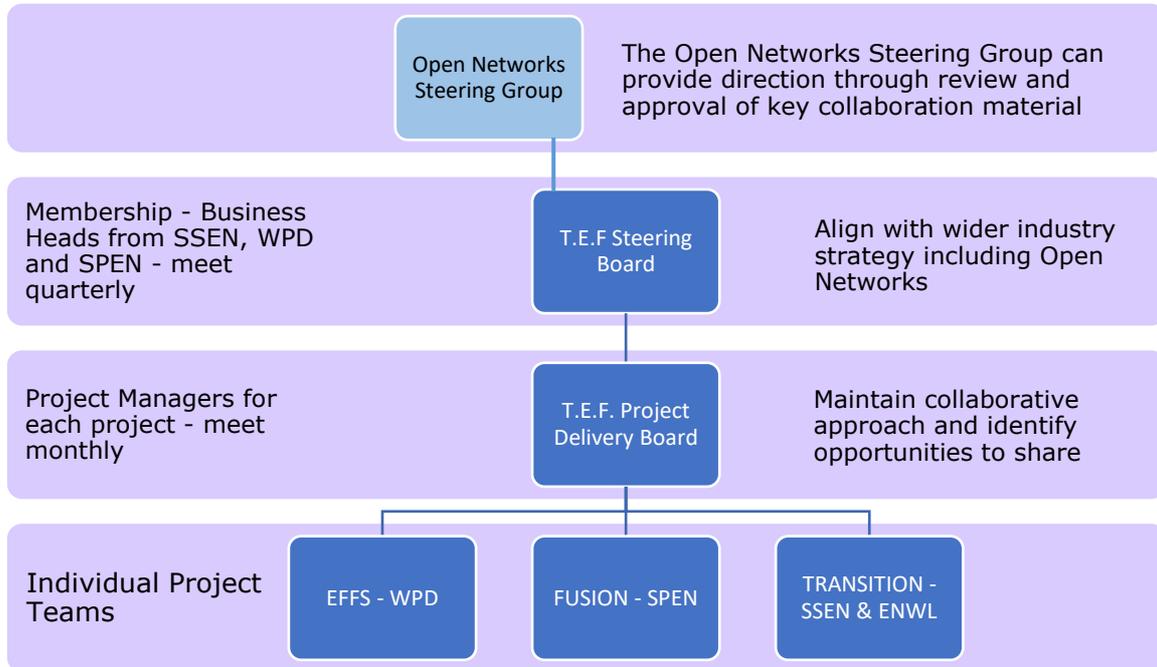


Figure 3.1: T.E.F. governance arrangements

3.2 Programme alignment and Stage Gates

T.E.F. Project Programmes

The T.E.F. programmes have been aligned to ensure a combined Stage Gate after the development Phase, and shared consultation, dissemination, and if possible procurement exercises. This is shown overleaf.

Due to the shorter duration of the EFFS project, the combined Stage Gate falls within a package of work. At this point, EFFS will have carried out some early development work which may usefully inform the Stage Gate. It should be noted that the combined, major Stage Gate, does not supersede the additional project stage gates and review points which were included in the original project submissions.



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T.E.F. Project Summary of activities

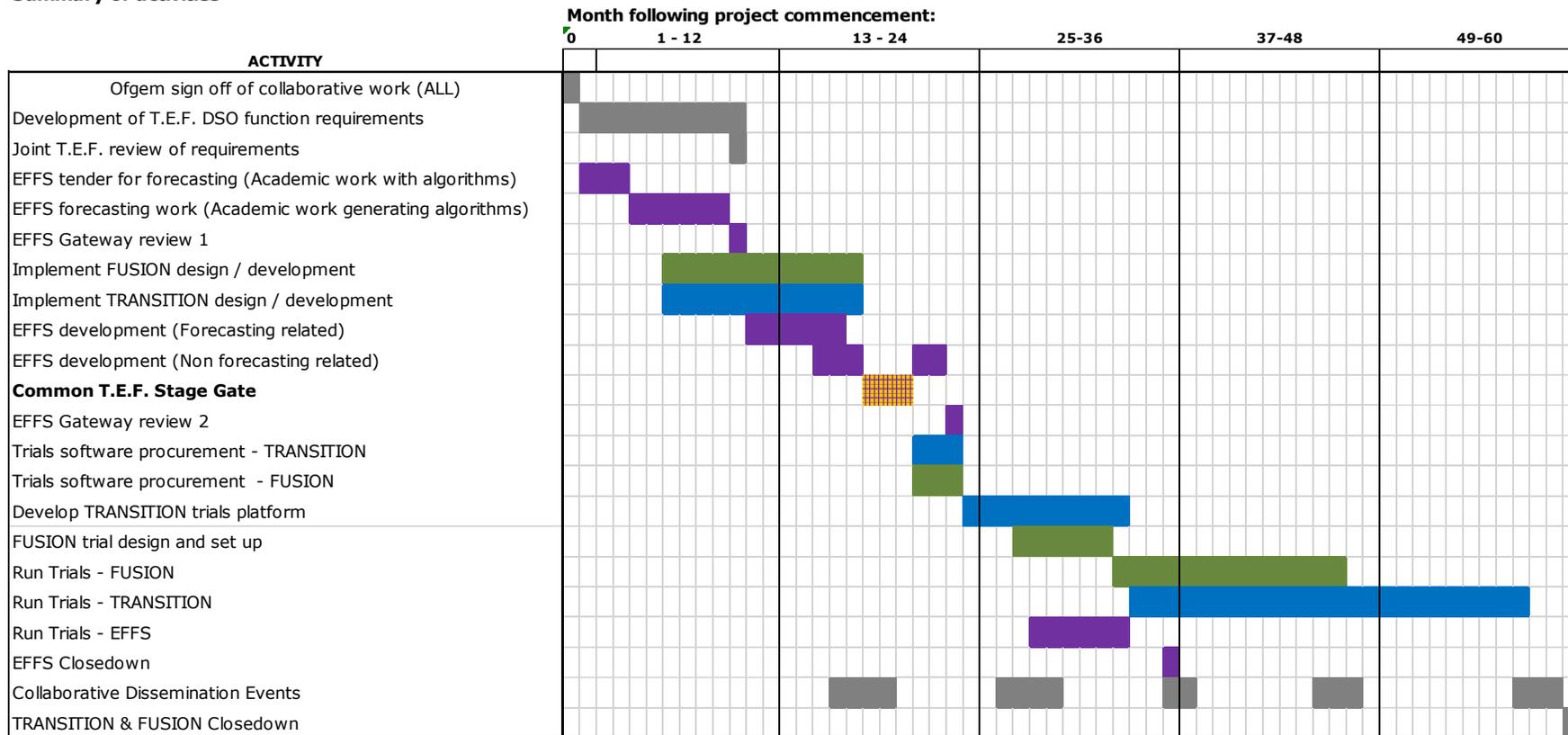
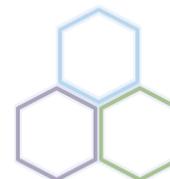


Figure 3.2: T.E.F. Activity Timelin

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Aligning Stage Gates

The key Stage Gate at the end of the development stage is an important juncture in the T.E.F. projects, providing a formal opportunity to review progress, compare outcomes and ensure that the programme is still aligned with wider industry initiatives. The Stage Gate is deliberately planned at the end of the development phase and allows an opportunity to review the scope and programme of the deployment phase to capitalise on learning gained to date and avoid any unnecessary duplication. The three projects have made significant effort to realign their respective programmes to allow for a coordinated Stage Gate approximately 18 months after commencement.

There are many potential outputs from the Stage Gate, including a change of scope, cost reduction or cessation of one or more of the projects, all of which will bring benefits for customers. This is particularly important for TRANSITION, which is awaiting further model outputs from ON before it can confirm the scope and location of trials.

Stage Gate Report

In line with condition d. of the project conditions, T.E.F. propose the evidence listed below will be provided to enable Ofgem to test the continued validity of the proposed trials in terms of delivering beneficial learning for network customers against the wider industry, policy and regulatory landscape.

Area of collaboration	Comment
Evidence of collaboration up to Stage Gate	
Detailed system design	T.E.F. will demonstrate the effectiveness of their combined efforts to develop a coordinated specification which will include interfaces to DNO-specific systems.
Evidence to test validity of continuing the projects	
Stakeholder feedback	T.E.F. will review feedback from the design phase to determine stakeholder support for continuation of the projects and that their requirements have been incorporated.
Forecasting (load and generation)	T.E.F. will outline opportunities for collaboration in this area as described in section 3.4 (including potential for shared-use or shared-procurement options)
Business cases	T.E.F. will deliver updated business cases for deployment of the proposed systems in GB based on updated deployment costs and up-to-date policy and industry roadmaps (including Open Networks).
Market Platform	Early learning from existing market platform trials will be analysed by T.E.F. to inform deployment phase design.
System design and procurement	T.E.F. will be in a position to fully identify areas of collaboration savings following completion of the design

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	phase including areas of: data exchange, DER control interfaces, service delivery validation, customer recruitment.
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T.E.F. will deliver a **single** Stage Gate report to the Project Steering Board with a recommendation on how best to proceed (stop, modify, proceed); approval will be sought from Open Networks and Ofgem as outlined in Figure 3.3. below, and in Appendix 4.

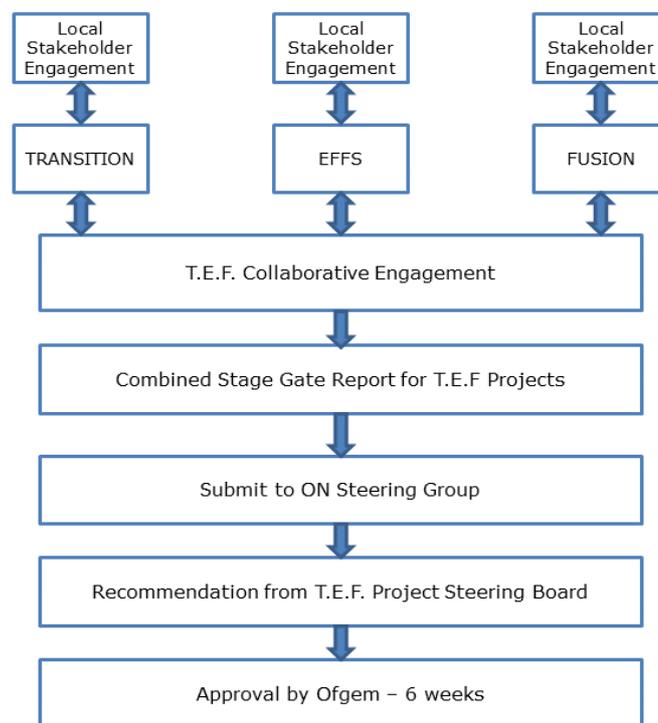
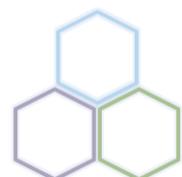


Figure 3.3: T.E.F. Stage Gate Approval Process

To summarise, T.E.F. will not proceed unless there are clear benefits for consumers and a clear consensus from stakeholders, industry and regulators. There will be one major Stage Gate for all three projects, delivering updated business cases and collaborative budgets to Ofgem, and giving the option to proceed, modify or stop any of the projects. This process results in:

- ✓ Each project retaining individual gates and review points.
- ✓ Collaborative analysis of business case to proceed and budget requirements.

Further detail on the T.E.F. Stage Gate is given in Appendix 4.



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3.3 Stakeholder and Industry engagement

ENA Engagement

The three projects recognise the need to take a coordinated approach to external engagement. As many industry bodies and wider stakeholders are represented on ENA working groups and projects, it is prudent for the T.E.F. team to engage via the ENA where practicable. While this incorporates all ENA working groups and projects, there is focus on the Open Networks (ON) project as it leads the transition to a DSO environment which all three projects propose to test elements of.

T.E.F. have identified the products within the workstreams which the project teams will require to have ongoing engagement with, ensuring we build upon ON outputs and inform the scope of any future workplan.

The T.E.F. team has already presented at workstreams 1, 2 and 3, and the Steering Group. Ongoing coordination with the workstreams, product leads, Advisory Group, and Steering Group is described in Appendix 5 ENA Engagement.

Stakeholder engagement

Collaboration across stakeholder engagement will minimise the risk of stakeholder confusion or fatigue, and save costs for events and materials developed. T.E.F. have committed to sharing all national events, using common language and definitions (in line with the Open Networks Glossary), aligning timing of tenders and supplier engagement, and use of common graphics and materials where possible for local engagement. Full detailed proposals for shared national events, common graphics, consultation and engagement are given in Appendix 6.

Electricity System Operator engagement

During project development, each of the three projects had separately approached the system operator to discuss engagement with their project. The system operator (SO) is recognised as a key stakeholder for each project. To ensure a collaborative approach and minimise the resource requirements the T.E.F. projects have developed a table showing areas of shared engagement with the SO. This table is shown in Appendix 7 and has been shared with the SO; the collaborative approach shows 30 saved days of SO resource.

Additionally, the projects recognise that the SO will bring valuable knowledge to the T.E.F. projects through learning gained in numerous other innovation projects and their commitment to development as outlined in the Electricity System Operator Forward Plan 2018/19¹.

¹ Electricity System Operator Forward Plan 2018/19:

https://www.nationalgrid.com/sites/default/files/documents/NG_SO_Forward_Plan_270318.pdf



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3.4 Forecasting

Improved forecasting capability will be a key element of the successful transition to DSO, therefore, each of the three T.E.F. projects have a forecasting element. Given the importance of forecasting for the success of DSO, it is crucial that this is widely investigated to ensure that the best outcomes are developed. The forecasting work across the projects considers differing forecasting timeframes, differing forecasting outputs and differing integration requirements, all of which will provide essential learning for the future DSO operation.

The core of the EFFS project is to take a completely fresh approach to forecasting and develop new algorithms from first principles, rather than relying on existing techniques such as regression analysis. The key aim is to use these forecasts to determine operational requirements and deploy flexibility accordingly. For clarity, there is no budget within the FUSION and TRANSITION projects for development of algorithms.

In contrast, FUSION and TRANSITION are looking to use forecasting within the overall market platform being developed to allow the trial of local flexibility markets. From the work SPEN and SSEN have done it is envisaged that it should be possible to undertake the trials using forecasting products which are already available in the market place.

- ✓ T.E.F. will work collectively to define DSO forecast requirements for operational timescales, resulting in a single set of requirements.
 - Due to the importance of this work, and the differing market models of each project, there is no cost saving as all three should still complete this work, however the resulting single set of requirements will be more robust given the scrutiny of multiple project partners.

- ✓ EFFS will engage with the FUSION and TRANSITION teams to actively influence and engage with the scope of works and evaluation of bids for the EFFS academic work on forecasting algorithms. If considered beneficial, the derivation of algorithms can be extended to use data provided by SPEN and SSE to ensure regional suitability. Options for jointly managed forecast work, or shifting the timescales for EFFS forecasting work were considered, but the preference remains for the EFFS forecasting work to begin early to be able to inform the other projects.
 - This is additional work, and will ensure that the academic scope of work delivers outputs suitable for use across all projects.
 - This early engagement maximises the likelihood that the work undertaken in this academic study can usefully inform the later procurement of software by FUSION and TRANSITION.



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- ✓ TRANSITION and FUSION will use the EFFS-derived metrics for comparing accuracy of forecasting methods within their tenders for 'off-the-shelf' trial software after Stage Gate.
 - Potential combined savings of up to £450k may be achievable through TRANSITION and FUSION at Stage Gate.
 - The approach will ensure a fair and consistent approach to selecting forecast software for operational timescales.
 - TRANSITION and FUSION will proceed with compliant procurement exercises as originally planned for the trials software; with the current timescales, the EFFS partner AMT-Sybex would be able to bid in as part of that tender, and develop the forecast software alongside other development within the projects.

By ensuring we use a consistent terminology and comparison metrics devised by EFFS, T.E.F. can deliver learning on the operation of multiple software options. Despite the different approaches to forecasting work across the T.E.F. projects, the combined outputs will deliver learning which will help determine the forecasting requirements for a DSO to support both flexibility market operation and the operational requirements of the network. To ensure this learning is aligned, the three projects have committed to develop and use a common set of metrics to define requirements and measure success of the forecasting tools.

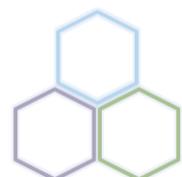
There are strong opportunities for collaboration and knowledge sharing amongst the three projects. The T.E.F. project managers, including expert consultant resource, have held multiple teleconferences, and held a full day workshop to align the most appropriate approach to collaboration on forecasting across the projects.

From these discussions, it was clear that the EFFS project will produce outputs at an early stage which may be able to be utilised within the other two projects, resulting in a potential saving of up to £450k at Stage Gate through TRANSITION and FUSION. The algorithms, which should be available prior to the Stage Gate, could be included in the FUSION and TRANSITION procurement as an option for suppliers to use; the metrics created to determine the accuracy of the new forecast algorithms could also be used in assessing tenders, creating a consistent approach to scoring.

Further details on the forecasting work are included in Appendix 8.

3.5 Trials

The full scope and details of trials for each of the T.E.F. projects cannot be specified until additional work has been undertaken during the design phase of the projects. This reflects our collective aim to ensure any trials remain relevant as our understanding of DSO functionality and stakeholder preferences improves during the design phases of the projects. Yet, since the FSP resubmissions, considerable progress has been made in DSO World development with in Open Networks which has helped TRANSITION to remove a trail ahead of Stage Gate and allowed FUSION



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to begin discussing synergies with USEF. The projects will meet regularly to discuss learning outcomes and consider areas for shared or enhanced learning outcomes through aligning deliverables, and furthermore the Stage Gate criteria will require that trial plans:

- are well documented;
- do not cause unnecessary duplication;
- have assessed opportunities to improve learning by collaboration;
- are an efficient means to achieve the learning outcomes.

Each of the projects' trial programmes will aim to demonstrate the operation of software, and validate the functional requirements, business logic and data exchanges associated with a DSO market model under a range of conditions. A number of elements are common to all projects; the investigation of these elements using different locations, market models, customers, and software will inform a wide range of possible future DSO outcomes. The list below shows a selection of outcomes from the trials.

- Measure forecasting accuracy and time horizons.
- Measure asset response time and service delivery.
- Assess suitability of market & directly connected interfaces to assets.
- Assess co-ordination method with other third parties (Suppliers, TSO, DSO).
- Validate that the selection of flexibility assets by the software is optimal.
- Compare the actual impact on the network to the modelled impact to inform strategies for flexibility service procurement and deployment.
- Validate the expected operating costs of flexibility services.
- Provide output on the impact of flexibility on fault restoration to inform the P2/6 review.
- Inform the likely operating costs of flexibility services.
- Demonstrate different service provision technologies i.e. DSR, generation and storage.
- Investigate different control options i.e. directly controlled or controlled via third parties.
- Trial over all Network types (Overhead and Ground Mounted/ Underground), rural and urban locations.
- Test software optimisation by trialling in areas with a high number of flexibility service providers.

Additional detail around some considerations for each project is outlined in Appendix 9, including market model, trial location, and learning outcomes.

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4. Financial Summary

Note: all costs detailed in this section reflect those stated in the full submission spreadsheets for each project, with start dates of January 2018.

Throughout this collaboration exercise, the T.E.F. projects have promoted value for money, and each licensee has taken ownership to identify savings through a unified approach. The NIC funding required has been reduced by **£2.28 million since receipt of Project Directions in January 2018**. Reductions have been achieved via shared stakeholder engagement, TRANSITION scope reduction (achieved by capitalising on shared learning) and increased licence contributions for EFFS and TRANSITION. The FUSION project identified savings during the bid phase which were presented as part of their October 2017 full submission proposal (FSP) re-submission. Thus, **since the initial FSPs in August 2017, the NIC funding requirement has reduced by £3.95 million.**

Each of the three projects has contributed to the overall reduction in NIC funding requirements. The primary commitments from each licensee summarised below.

TRANSITION [Scottish and Southern Electricity Networks]

- £1.7 million saved through scope rationalisation due to T.E.F. collaboration and ON World development progress;
- £90k saved through aligned and or combined stakeholder engagement;
- £183k voluntary contribution through freezing the original compulsory licensee contribution;
- £250k additional voluntary contribution addition from SSEN as evidence of direct support from SSEN.

>> 16.2% reduction in NIC funding request.

EFFS [Western Power Distribution]

- £10k saved through aligned and or combined stakeholder engagement;
- £150k voluntary contribution addition from WPD as evidence of direct support from the business. Made in addition to the £46,930 original voluntary contribution made at time of full submission;
- £963k partner contribution (as identified in full submission).

>> 5.4% reduction in NIC funding request.

FUSION [SP Energy Networks]

- £1.7 million saved through scope rationalisation as detailed in Section 7*.

>> 24.0% reduction in NIC funding request*

*realised at re-submission stage and prior to the issue of the Project Direction in Jan. 18.



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A summary of the savings identified is shown in Figure 4.1.

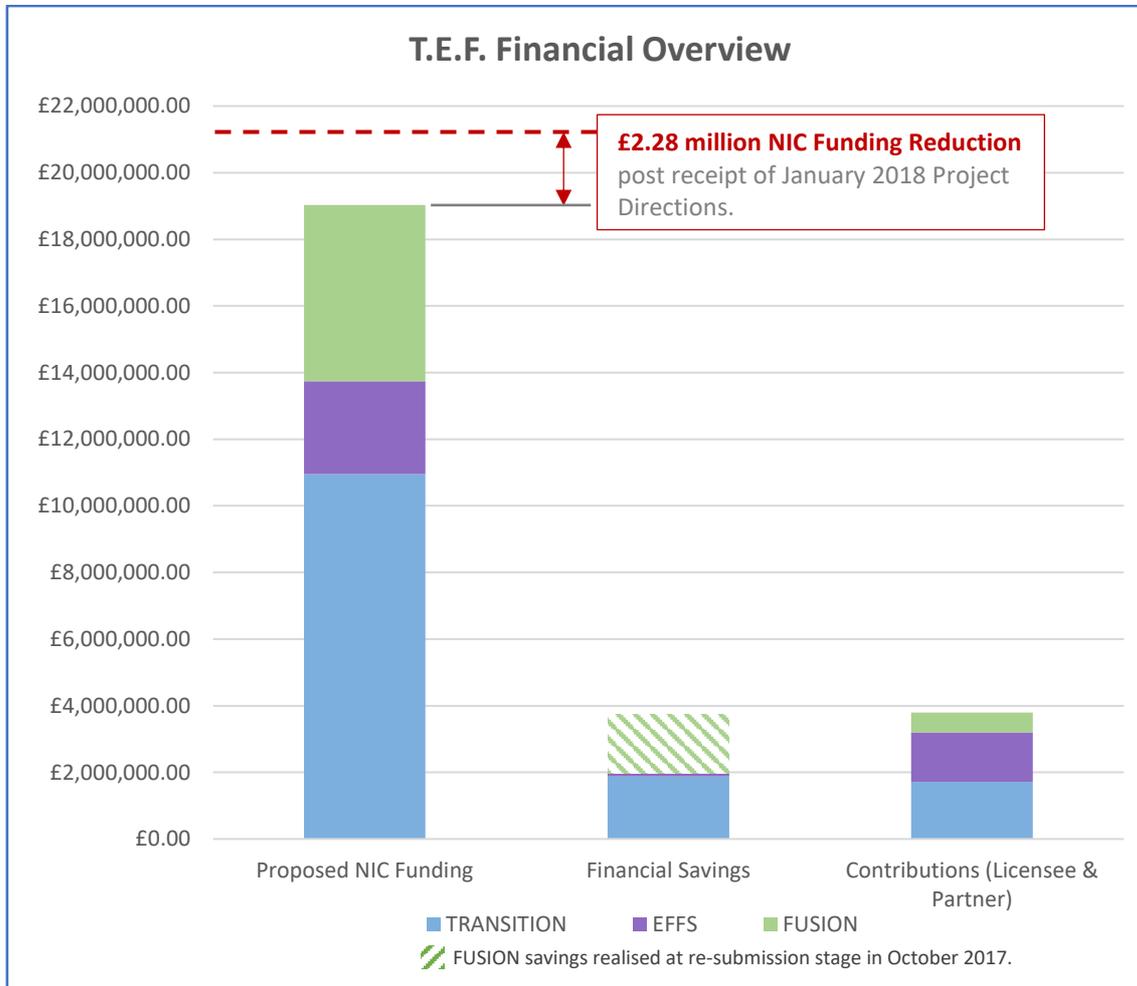


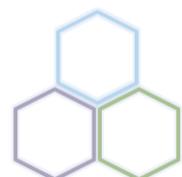
Figure 4.1: T.E.F. Financial Overview

While Figure 4.1 presents savings and contributions, it does not account for the new costs associated with progressing activities collaboratively. Additional costs associated with activities such as group review of procurement specifications have been incorporated into the project budgets with no increased funding requirement. All projects have committed to ongoing engagement with other projects to maximise shared learning.

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5. TRANSITION Financial Summary

Through the close working of the T.E.F. Project Delivery Board and Steering Board, TRANSITION can commit to significant savings which, when combined with a voluntary contribution from SSEN, results in a £2.1 million reduction in NIC funding requirement for delivery of the TRANSITION project alone.

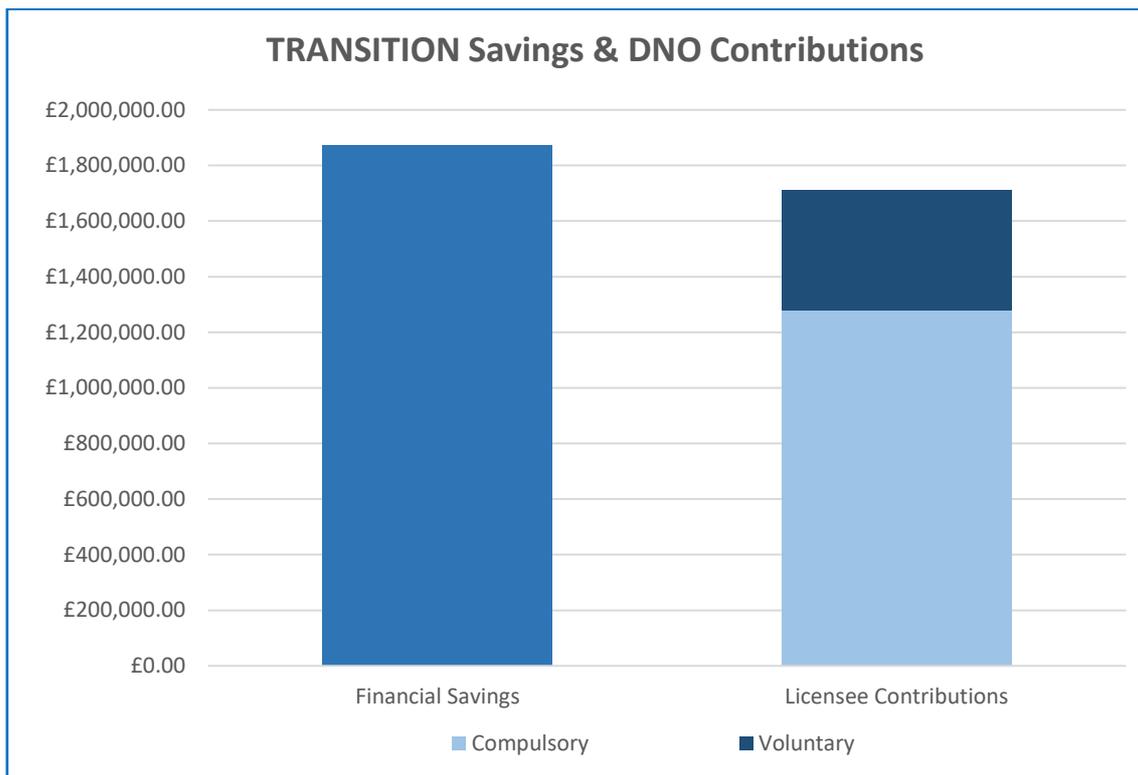


Figure 5.1: TRANSITION Savings and Contributions

5.1 Financial Contributions

Scottish and Southern Electricity Networks has chosen to freeze the initial compulsory contribution, maintaining the same financial value despite the reduction in overall project cost. This equates to financial support of £183k above the 10% compulsory licensee contribution.

SSEN is committed to the successful delivery of the TRANSITION project, believing it will play an important part in the industry transition to a DSO world. For this reason, SSEN will make an additional £250k voluntary contribution, emphasising the importance the business places on DSO-related innovation.

Thus, the TRANSITION project will be 13.4% funded by SSEN and partners ENWL.

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5.2 Identified Savings

TRANSITION has conducted in-depth analysis of the T.E.F. projects and identified savings which can be made through collaborating with the other two projects, while delivering the same, or improved learning outcomes. The two areas where financial reductions have been identified are stakeholder engagement and trial deployment.

Through aligning our stakeholder engagement activities and combining events where practicable, TRANSITION has been able to commit to a £90k saving. Importantly, while there will be additional costs created due to such collaboration, TRANSITION and the other two projects have agreed to absorb these costs.

TRANSITION believes there is significant value in trialling within more than one licence area by at least two DNOs. Through considerable progress in World development by Open Networks and analysis of the T.E.F. projects' scope, the potential reduction of TRANSITION deployment activities was identified; however, until each project has undergone detailed design, removing significant elements of the TRANSITION scope is a notable risk. While SSEN would prefer to realise trial deployment associated cost reductions at the Stage Gate, we understand the importance of optimising value for our customers as early as practicable. Thus, the TRANSITION project commits to removal of the physical trial within the ENWL licence area to unlock savings of more than £1.7 million. To ensure deliverables are still met, TRANSITION will draw on outputs from FUSION and the EFFS development of the Cornwall Local Energy Market, alongside key inputs from ENWL, our project partners.

Collaborating with the other T.E.F. projects may lead to much of the learning which would have been associated with a second trial deployment in another DNOs licence area. However, as SSEN, WPD and SPEN all utilise network management systems developed by the same company, there is a gap in learning which must be plugged ahead of wider industry roll out. Therefore, ENWL (who utilise a competitor's system) will play a significant role and continue to be an active partner in the TRANSITION project.

It should be noted that the original TRANSITION submission was based on significant, meaningful engagement with the Open Networks project and use of the outputs from that project (such as DSO functions and SGAM models); as such, any "savings" associated with use of these outputs were already incorporated into the original TRANSITION budget.

5.3 Potential Future Savings

TRANSITION has identified areas where further savings may be possible after the Stage Gate through effective collaboration with the EFFS and FUSION projects. As discussed throughout the original submission and during Expert Panel sessions, the TRANSITION project is closely aligned to the Open Networks project and aims to demonstrate, inform and validate the outcomes from Open Networks. As such, the

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exact project scope beyond the Stage Gate is not fully defined as this will be informed by the development work undertaken in the first 18 months.

Due to TRANSITION taking the risk to commit to only trialling within a single licence ahead of the Stage Gate, the potential for savings later in the project has notably reduced. The areas offering potential future savings and benefits have a current non-firm spend value of £268k, resulting in expected savings at Stage Gate being a percentage of this figure. The areas identified are discussed below and fit into the process outlined in Section 3.2.

Procurement of Forecasting Module

Included in Ofgem's feedback on the draft of this document on 12 April, a specific query was raised around the sharing of forecasting software, specifically, "...we would like to see ambitious aims for using learning in EFFS to remove deliverables on short term forecasting in FUSION and TRANSITION to demonstrate that learning in each project represents value for money." T.E.F. undertook a detailed workshop with forecasting specialists to understand the potential for collaboration in this area. TRANSITION planned to procure market-ready forecast software for the purposes of the trials; our pre-engagement with suppliers indicates that there is a high likelihood that existing software will be sufficient for the needs of the project, or would require minimal additional development. However, should the forecast software from the EFFS project meet the requirements of the TRANSITION project, this could be utilised. Subject to negotiation and agreement with the EFFS project and their chosen delivery partner AMT Sybex; this may be at lower cost than that budgeted and potentially offer up to £225k of savings to be realised at Stage Gate.

T.E.F. have agreed to ongoing joint requirements review meetings for forecasting which will align requirements and improve the likelihood that the EFFS software can be used.

Joint Procurement/ Supplier Engagement

Both FUSION and TRANSITION will undertake procurement exercises after the Stage Gate. Through ongoing discussion, we have identified potential opportunities for sharing the procurement administration to help deliver benefits for the T.E.F. projects. At a minimum, the projects will align timing as far as possible and use consistent language to avoid supplier confusion; subject to further discussion with procurement experts, and once the requirements of both projects are better defined, it may be possible to undertake a joint exercise which would not only save on administrative costs, but may attract a better deal from suppliers who value the opportunity to work with two projects across three DNOs. This will be clarified during the first phase of the project and confirmed at the Stage Gate.



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6. EFFS Financial Summary

The collaborative work with TRANSITION and FUSION has allowed for a greater understanding of the points of commonality and difference between the projects. While the projects will all contribute to develop and test the functions and processes required by a DSO, detailed comparison has found that the unique aspects of the projects call for unique development and testing in a number of areas. This means that collaboration during the project is more likely to improve and enhance the outputs of the project rather than reduce the costs. The EFFS project as submitted in 2017 was already designed so as to keep costs low by leveraging elements from previous projects and keeping the trial element of the project as short as possible. Using the market platform that has been developed by the Cornwall Local Energy Market as a means to test the interaction with market platforms within EFFS, means that EFFS does not include the costs associated with developing a market platform or recruiting the customers to test the market platform. This is one of the reasons why the EFFS project has a considerably smaller budget and shorter duration.

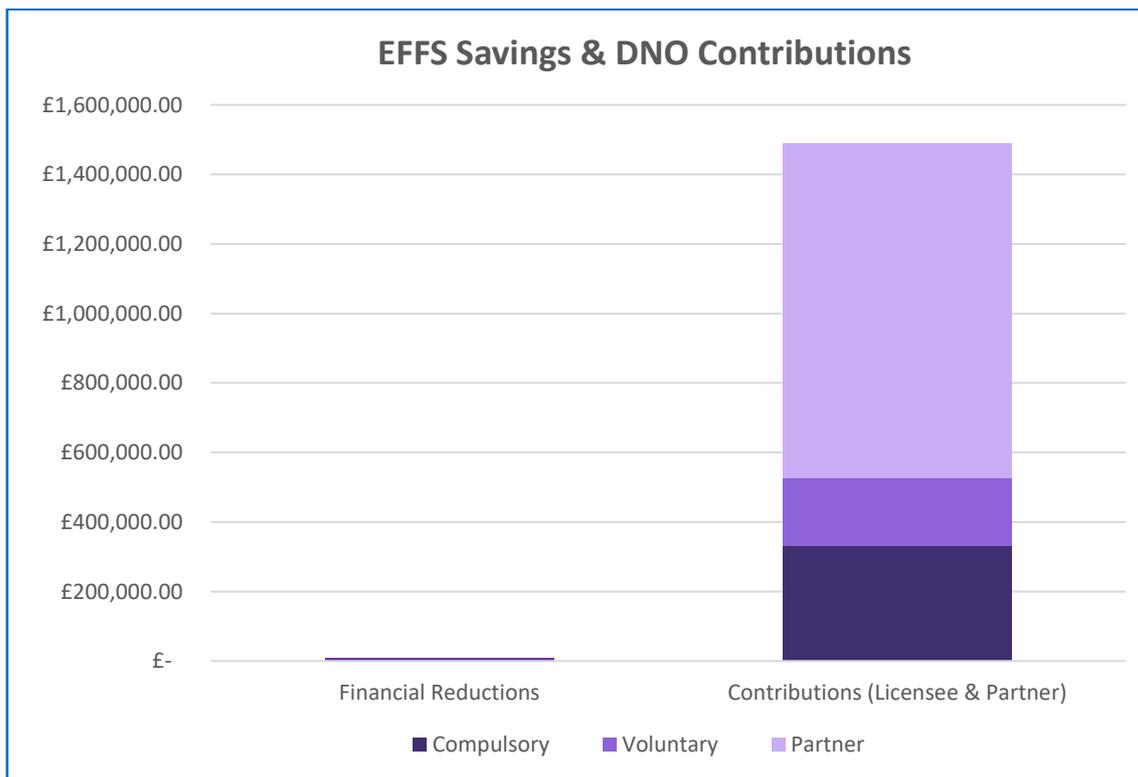


Figure 6.1: EFFS Savings and Contributions

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6.1 Financial Contributions

The original FSP included a voluntary contribution from WPD of £47k and partner contribution from AMT-Sybex of £963k summing to £1 million. While significant contributions over and above the compulsory 10% have already been made, Western Power Distribution will make an additional £150k voluntary contribution, highlighting business support and belief in the importance of its delivery. This results in EFFS being 15.8% funded by WPD and 28.8% funded by partners AMT-Sybex.

6.2 Identified Savings

While it is planned that the forecasting work from EFFS will be available to the other projects, this does not reduce the cost to EFFS, but rather suggests that this element, which was already the majority focus of the work for the academic partner, should be given even more emphasis. Having consulted with the lead for the Open Networks Product on the conflict avoidance work, it has been agreed that the EFFS academic partner should focus entirely on forecasting.

The collaboration on stakeholder events and dissemination has resulted in a reduction to the EFFS budget of £10k, representing the removal of one of the EFFS major dissemination events on the basis that this dissemination will now take place during the increased number of shared events. The collaboration activities during the projects will, inevitably incur time and therefore costs. However, these costs have been absorbed within the EFFS budget as has the cost of this initial collaboration phase and the extension of the overall project timeline by an additional five months to better align with the availability of outputs from the Open Networks project. Therefore, the net change in the EFFS budget following the collaboration work is a reduction of £10k, with other increased costs being absorbed, but collaboration is likely to improve the quality of all three projects and improve the knowledge dissemination to stakeholders considerably.



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7. FUSION Project Financial Summary

Following the clear expectation of the regulator and the expert panel after the first NIC submission in August 2017, SPEN made substantial budget reductions of £1.7m for FUSION as part of the re-submission process. In doing so, SPEN detailed all possible items with potential savings, including valid assumptions for collaboration which have been confirmed by the elaborated exercise between T.E.F. consortium over the past months. This includes the stakeholder engagement savings outlined in the Table 4.1, and additional areas of saving which are outlined below.

These measured and appropriate cost reductions, as recognised by both the Authority and the Expert Panel, fulfil and satisfy the cost reduction expectations and requirements of the FUSION Project Direction, published in January 2018. Accordingly, the budget for FUSION is maintained.

FUSION undertook a thorough budgeting process to develop the most cost-effective and best value costings that will enable SPEN to efficiently undertake and deliver the project. The project costs were reduced from £7.74m to £5.97m in the full submission proposal (FSP) resubmission in October 2017. This reduction is reflective of the collaboration with other DNOs and the wider networks industry, development and deployment level of USEF and alignment of USEF to the ON project.

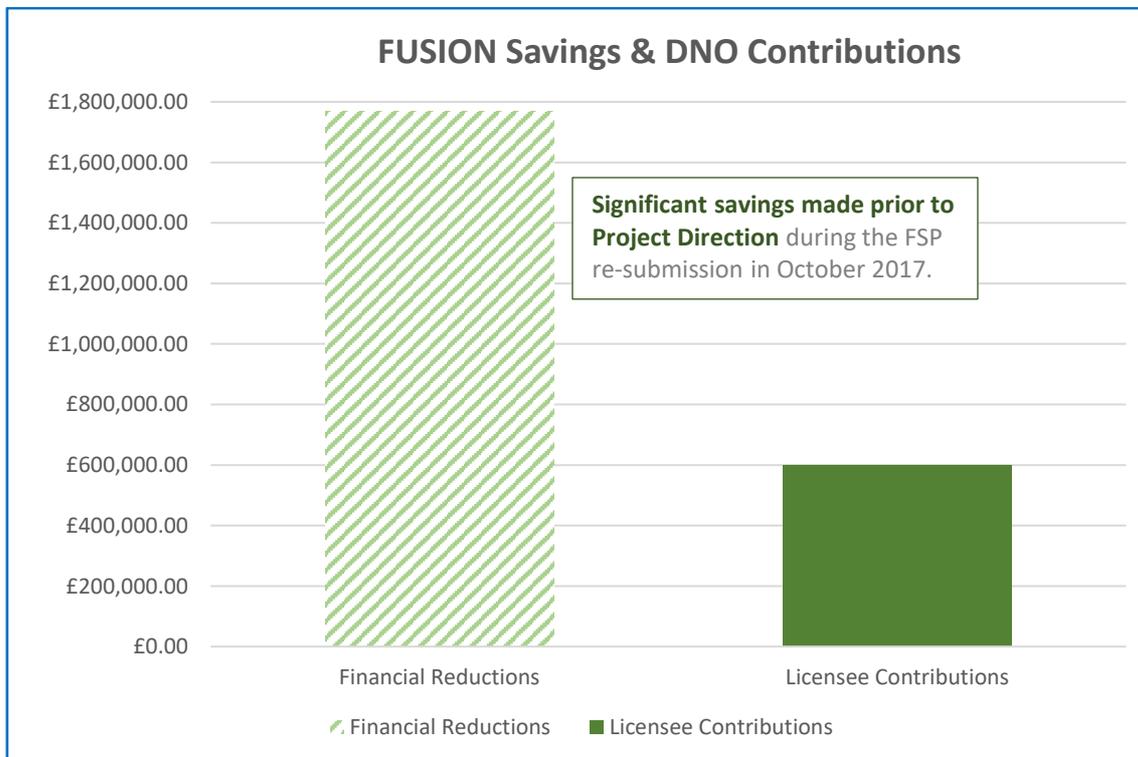
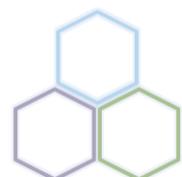


Figure 7.1: FUSION Savings and Contributions

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Specific Cost reductions have come from the following categories within the work packages:

- Stakeholder Engagement
- IT development
- Academic Modelling
- Aggregator Development
- Industry engagement

FUSION Collaboration Definitions

Collaboration is the key element in enabling the FUSION budget to be reduced in the areas listed above. These reductions can be attributed to the following collaboration types; Direct Collaboration; Associated Collaboration; and Cost Efficiency leverage from Innovation and Industry wide forum.

Direct Collaboration - £239,596

Defined as activities from direct collaboration through the T.E.F. consortium, ENA ON project, and the wider UK network industry, including work undertaken that aligns FUSION to the other projects and the ON.

- T.E.F stakeholder engagement and Knowledge dissemination – savings of £48k as identified in the Table 4.1.
- Peer review associated analysis of flexibility, ON, SPD, SSEN & WPD.
- Engagement with the Open Networks, alignment of FUSION to ON, feeding in and drawing out learning as appropriate.
- SGAM modelling, to align USEF to ON models.
- Engagement with European DNOs trialling USEF – IT integration support, trial design support etc.
- Potential savings from IT procurement through either joint procurement or peer review at Stage Gate.

Associated Collaboration - £867,868

This is defined as the associated activities, outwith of direct collaboration. This includes supplementary activities resulting from elements of direct collaboration; as well as additional activities within the remit of broader collaboration not associated to the UK DNOs or the ENA Open Networks, e.g. International engagement with organisations trialling and implementing USEF.

- ENA ON engagement and SGAM modelling comparison between USEF and other DSO models.
- SGAM modelling used to input to USEF redesign and implementation plan to UK market
- Establish working group for aggregators
- Establish a working group with other known DNOs European and International who are at different stages of implementation

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Cost Efficiencies leveraged from Innovation projects - £662,466

Cost efficiency activities include those leveraged from other innovation projects and wider Networks industry. Leveraging outcome from a wide array of work carried out already including; the ON Project, completed innovation projects and internal business departments within Scottish Power. Implementation of these will incur a reduced scope on external partners and thus expenditure cost efficiencies on project FUSION.

- IT specification development
- Academic modelling
- Aggregator processes
- Market structures
- Aggregator workshops

FUSION shall submit a budget reduction justification document alongside the original October 2017 FSP budget at time of formal submission of this compliance document. This highlights the areas of the budget that have been reduced and describes the reasoning to the quantified figures.

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8. Impact of collaboration on learning objectives, project deliverables, and NIC assessment criteria

T.E.F. has undertaken a comprehensive review of the impact of the proposed collaboration on the learning objectives, project deliverables, and NIC assessment criteria. This ensures that all the original aims and elements on which funding was awarded will still be delivered.

In summary, the performance of the projects against Providing value for money to electricity customers has improved as a result of the co-ordination activities. Similarly, greater collaboration between the projects is expected to improve knowledge transfer amongst all relevant Network Licensees, as a greater number of participants will be reached. The impact of the collaboration work on each of the criterion is presented in Appendix 11.

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