

Annual Summary Report The Power Potential Project

December 2018



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Introduction

The Power Potential project (formerly known as TDI 2.0) is a Network Innovation Competition funded project that aims to create market access for distributed energy resources (DERs) to participate in ancillary service provision to National Grid Electricity System Operator (ESO) via UK Power Networks. It is envisaged that the reactive and active power services provided by DERs will alleviate voltage and thermal voltage transmission constraints.

Capacity to connect more generation at Grid Supply Points (GSPs) in Canterbury North, Sellindge, Ninfield and Bolney, is restricted due to upstream constraints on National Grid's electricity transmission network. The constraints National Grid ESO face in this area are because of previous growth in low carbon technologies connecting to the distribution network and two interconnectors with Continental Europe. The constraints can be summarised as:

- high voltage in periods of low demand
- low voltage under certain fault conditions
- thermal constraints during the outage season.

These constraints have led to the following challenges in the area:

- fewer low carbon technologies can connect to the network
- a high risk of operational issues in the network which could affect customers
- a high cost of managing transmission constraints.

Services procured from DERs through the Power Potential project will be coordinated so that operation of the distribution and transmission networks are kept within operational limits and constraints are not breached. When deployed into BAU after the Trial, Power Potential is expected to deliver:

- 3,720 MW of additional generation in the area by 2050
- savings of £412m for Great Britain's consumers by 2050.

Executive Summary

This report provides a summary of progress across all project workstreams from January 2018 – December 2018.

Substantial progress has been made on the commercial workstream this year. After finalising the commercial incentives, in August the *DER Framework Agreement*¹ and *DER Market Procedures*² documents were published in the DER Trial Participation folder on the project [website](#). They were also emailed directly to those on our project mailing list. The documents provided details of how the Power Potential project trials will run and set out the team's commitment to be transparent with interested participants about project progress.

Key items of progress on the technical workstream were finalising the DERMS (Distributed Energy Resources Management System) design, the DER technical requirements and DER test specification. A test strategy was developed for the overall system, and software build commenced with delivery of: the service mode and DER user interface of DERMS to a UK Power Networks test environment, the Power Potential element of National Grid ESO's Platform for Ancillary services (PAS) and a proof of communications between PAS and DERMS.

As the Power Potential project progressed, the team continued to learn and overcome the challenges involved in developing a more active interface between transmission and distribution networks, and in integrating a complex IS system into complex existing systems and business processes where high volumes of data exchange is required.

An update on the development of the DERMS was shared in October at the Power Potential industry event. The project team provided a commercial and technical update, and ZIV (the DERMS developer) also presented at the conference, and were on hand to answer any questions about DERMS and its progress. All presentation material has been uploaded to the Conference Archive folder on the project [website](#). Updates included key stages of the platform's build and test programme, as well as communicating early decisions to revise the market calendar in relation to the trials.

Since agreement of the detailed design and build programme at the beginning of 2018, the technical workstream progressed rapidly to the end of June 2018. However technical problems led to delivery delays by the main contractor ZIV in July (due to assumptions regarding level of progress by GE on inputs to ZIV by this stage). This affected planned completion of the SDRC 9.4 testing requirements by the end of 2018, contributing to the decision to reschedule future SDRCs (a non-material change).

These challenges resulted in a decision to phase the delivery of the DERMS solution, with an Interim Solution proving infrastructure, communications and despatch, followed by a DERMS Full Solution proving the commercial functionality and network modelling by DERMS. This allows the functionality of each trial wave to be delivered as early as possible. It also allows learning to be taken from the project trial as soon as possible, without compromising on quality. This will maximise the value delivered by the project to the end consumer.

The indicative market calendar was revised and target dates were reviewed aligned to the key development stages of the DERMS. These details are included below, and can be found in the [DER Market Procedures](#) document:

- Wave 1 mandatory technical trials: 13 May 2019
- Wave 1 optional technical trials: 23 May 2019
- Start of Wave 2 commercial trials: 30 September 2019

¹ [DER Framework Agreement](#)

² [DER Market Procedures](#)

In parallel, the project team has hosted four meetings with the Regional Market Advisory Panel. Minutes from these meetings can be found on the project's website³ in the documents section. The panel includes representation from a wide range of bodies including distributed energy resources (DERs), aggregators, representative trade bodies, policy and regulatory stakeholders. This provided the team with an understanding of what information they should provide to DERs to help them to develop their commercial proposition to take part in the trials. This was especially useful during the team's decision to revise the market calendar dates.

Careful planning shows that the project is now on track to begin the trial phase beginning in May 2019. However, the changes in approach to project delivery (staged delivery of the DERMS solution and change from year-ahead to day-ahead procurement) led the project to submit a non-material change request to Ofgem in November 2018 to revised the project end-date and to delay the remaining SDRCs.

Throughout the year, DERs and those outside of the project trial region have been kept up to date on documents that have been published, key dates/decisions made and other important messages. We continue to engage with DERs via the project email, keeping our website up to date, through one-to-ones and exhibiting and presenting at various industry events, both in the UK and abroad. Evidence of this can be found in the learning outcomes section of this report.

To summarise, key milestones completed this year include:

- development of the Power Potential technical solution, the DERMS, has begun
- Inter-Operator Agreement signed between National Grid ESO and UK Power Networks for delivery of the Power Potential service during the project trials
- continued engagement with DERs to consult on the commercial framework and encourage participation ahead of contract signing
- presentation of the planned commercial framework for the trials to DERs and the project's Regional Market Advisory panel, securing valuable feedback to refine the final approach
- release of the Framework Agreement and [Market Procedures](#) documents for DERs, after consulting with them on the trial design
- receipt of the academic research from Cambridge University and Imperial College which supports the commercial workstream
- engagement with electricity system value chain stakeholders through conference presentations and exhibitions
- successful delivery of the first project dissemination event, on 30 October in London, which was supported by various key industry representatives who presented alongside the project team. Positive feedback from the delegates highlights this success.

³ [Meeting minutes](#)

Project Manager's Report

The technical workstream (WS1), commercial workstream (WS2) and the business processes workstream (WS3) are progressing to a detailed project plan, consistent with the non-material change request submitted to Ofgem in November 2018. The fourth workstream (WS4) is the project trials, which are due to start in May 2019.

Power Potential is an example of collaboration between two network companies with different technical systems, and commercial perspectives. Hidden complexities are identified and can be resolved by working together e.g. to understand what data is available and can be exchanged. Best practice, experience and knowledge, for instance, on generator compliance, settlement, testing and grid operation is shared. In the next phase of work, the project team are re-emphasising a focus on a single joint integrated project plan with interdependencies mapped between workstreams.

Progress in project delivery workstreams is described in the following sections.

Workstream 1 (WS1): Technical

The technical workstream (WS1) is progressing to its revised plan. Table 1 shows the activity within this workstream during this reporting period.

Table 1: Overview of the current reporting period achievements for WS1

What we set out to do	What we have achieved to date
Reflect the functional and non-functional requirements in a detailed design for the DERMS solution	Delivered. The DERMS detailed design was agreed between ZIV (the DERMS developer), UK Power Networks and National Grid ESO, with a further process created to open items and technical questions so that further design decisions and queries are documented.
Agree the IS Infrastructure	Delivered. The <i>Logical Architecture Design Document</i> for test and live systems was approved by UK Power Networks' Architecture Review Board, followed later by approval of the Proof-of-concept for the PAS-Azure interface and scoping of the pre-production test infrastructure.
Identify Test Strategy	Delivered. Developed an agile staged build and test strategy covering FAT/SAT on an Azure cloud-environment, then pre-production on premise, before moving live environment. Mapped all functional and non-functional requirements to test groups to plan test scenarios.
Create detailed plan of DERMS build and test	Initial version agreed in January 2018. The plan was amended with further testing detail in July 2018 after the initial build had been successfully completed and once integration/data risks were better understood. The plan was re-baselined in November 2018 following the decision to move to staged delivery.

What we set out to do	What we have achieved to date
ZIV Progress solution build	<p>The 'Service Mode' for the full solution has been delivered and work begun on building the DERMS interim solution. DER User Interface has also been developed for review by the project team.</p> <p>The remaining strands of the full solution are progressing e.g. the link between DERMS and PowerOn network model, Future Availability and Forecaster.</p> <p>Complete exports of a PowerOn Network model in Common Information Model (CIM) format were supplied by General Electric (GE).</p>
UK Power Networks Progress solution build	<p>UK Power Networks development of PowerOn screens and Settlement solution is in progress.</p> <p>Pre-production and Production hardware is delivered and installation in progress.</p> <p>DER P/Q envelope defined by simulation.</p>
Define the system communication interfaces	<p>Issued <i>DER Technical Requirements</i> including interface signals with a UK Power Networks RTU</p> <p>Defined the PAS-DERMS Interface</p> <p>400kV voltage select per GSP being implemented over ICCP.</p>
Agree the commercial requirements for the technology solution	<p>Commercial requirements mapped and added to the detailed design requirements in May 2018. Further work was undertaken to review in August 2018.</p>
Development of the Platform for Ancillary Services (PAS) and interface with DERMS	<p>Interfaces between PAS and DERMS have been defined. Communication handshake demonstrated between systems.</p> <p>Definition of processes for Power Potential active power service and Power Potential reactive power service to allow integration with PAS.</p>
Identify PQ envelope per DER	<p>Detailed network studies defined new range of allowed reactive power import and export at different active power levels, to feed into framework agreement, connection agreement variation and the safe operation of DERMS.</p> <p>Combined with effectiveness values, this indicated ~100 Mvar of lead/ lag capability at the GSP for all DER engaged with the project, or around 80 Mvar of lead/lag capability at the GSP for those given a green/amber status by the commercial team. This is well above the 40 Mvar threshold set by Steering Group as a trial go-criteria.</p>

Worksteam 2 (WS2): Commercial

The commercial workstream is responsible for the design and development of a route to market for DERs to deliver reactive power and constraint management to National Grid Electricity System Operator.

This phase of the project focuses on contracting with interested DERs and continuing to recruit additional DER participants to ensure that the trials contain sufficient volume to maximise learnings from this innovative service, whilst preparing participants for the trial to ensure readiness.

Substantial progress has been made during this period and full details of deliverables are provided within the SDRC 9.3⁴ report that was published on 2 July 2018. A summary of the progress made is covered in this section and includes:

- finalising the commercial proposition
- recruitment and DER engagement to date
- publishing final contract and market procedure
- customer readiness.

The final commercial proposition

During this reporting period, the project finalised the commercial proposition taking into consideration feedback from DERs in a consultation and views from the Regional Market Advisory Panel. These comments and feedback led to the project team making key changes for the final commercial proposition to ensure participation from DERs. These key changes include:

- changes to the level of total participation payments increasing from £20,000 to £45,000 per site (increased to ensure sufficient participation in the project given updated information received from DER on their upgrade and communications costs)
- adjustments to the performance thresholds in wave 1 participation
- in the event of a no-go trial decision, guaranteeing full participation payment to providers who have successfully demonstrated or are in the process of demonstrating their ability to deliver a service.
- including termination rights, within the framework agreement for DERs.

Details of the final commercial proposition are now embedded within the [DER Framework Agreement](#) available on the project [website](#).

During this reporting period, the project team has also agreed a process to ensure that the project budget allocated for participation payments is being actively managed. This is to manage the risk that there could be more DER participation than can be covered by the existing participation payment budget.

The first 11 DERs to sign a framework agreement (and connection agreement variation) will be included on a primary list and guaranteed access to the participation payment once they have successfully completed the commissioning process. Other DERs to sign will then be included on a reserve/secondary list and will only have access to the participation payment, should a DER on the primary list is unable to demonstrate and ability to deliver the service.

Recruitment process and engagement to date

The project team continues to engage with key stakeholders ahead of the trials in 2019. The project's engagement strategy provides confidence that the Power Potential service will make a material contribution to voltage control and constraint management on the transmission system.

⁴ [SDRC 9.3](#)

The engagement process has ensured that potential trial participants are kept up to date and are involved/consulted on the progress of developing the trial. The engagement process is led jointly by UK Power Networks and National Grid ESO. Both parties have utilised existing relationships with providers within the trial region, through the Business Development and Contracts and Settlements team within National Grid ESO, and the project's Stakeholder Engagement team at UK Power Networks.

Table 2 outlines the engagement activities that the team has undertaken to keep DERs informed of project progress, captured their views and established their interest in participating in the project's trials.

Table 2: Engagement activities for potential trial participants

Theme	Engagement activities
Identify target audience	<ul style="list-style-type: none"> • Direct contact with potential trial participants • Project explained and DERs' interest gauged • Inclusion on mailing list for regular project updates
Consultation on Commercial Framework	<ul style="list-style-type: none"> • Providers given the opportunity to provide feedback on the <i>Power Potential DER Framework Agreement</i> and ⁵<i>Market Procedure</i> documents • <i>Power Potential DER Framework Agreement</i> published in August, then updated in December • <i>Market Procedure</i> along with ⁶<i>Participation letter</i> published, then updated in December • Email summarising responses to the consultation with document outlining key changes to the commercial proposition and commercial framework published on the project website
One-to-ones	<ul style="list-style-type: none"> • Follow up one-to-one sessions held with DERs as requested • One-to-one sessions covered DER's communications requirements, testing and commercial issues
Regional Market Advisory Panel	<ul style="list-style-type: none"> • Ongoing sessions with the Regional Market Advisory Panel providing discussion and challenges on key commercial themes within the project including the development of the trial design, payment structures and contractual framework
Ongoing engagement	<ul style="list-style-type: none"> • Ongoing targeted engagement with DERs up to signing a contract • <i>Frequently Asked Questions</i> document published as a single source of reference for potential provider queries • Ongoing engagement with DERs, post contract signature to support: <ul style="list-style-type: none"> • any upgrade works • commissioning tests • communications installation • readiness for trial • settlements

⁵ [Market Procedure](#)

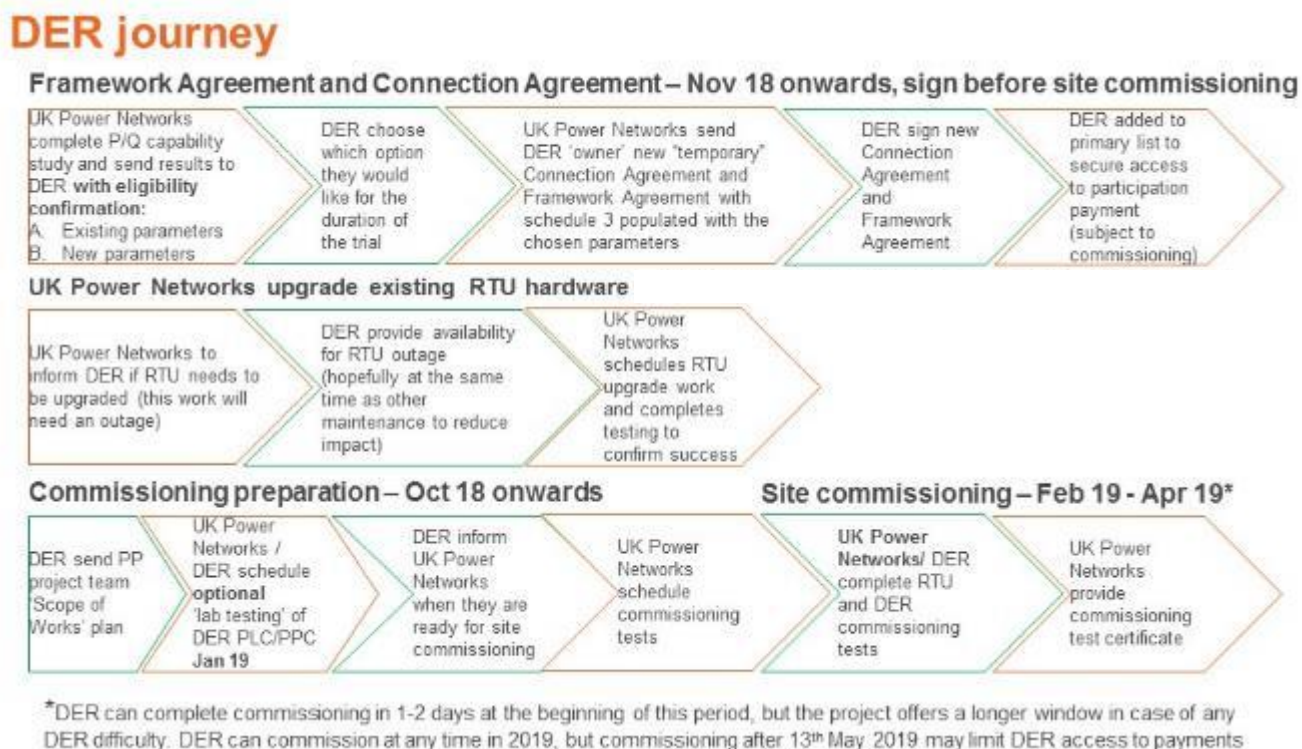
⁶ [Participation letter](#)

Theme	Engagement activities
	<ul style="list-style-type: none"> inform DERs of key dates.

Customer readiness

The project team has set out the *DER journey* to ensure DERs who sign on to a Power Potential [DER Framework Agreement](#) are clear on the process leading up to participation in the trial. A high level DER journey is detailed in image 1.

Image 1: DER journey



Draft Heads of Terms and Technical Characteristic Submission Spreadsheet

Ensuring the team have a consultative approach when designing the project trials is essential. In March, we asked DERs to submit a *Technical Characteristics Submission Spreadsheet (TCSS)*, available to download on the project website⁷. The spreadsheet was produced by the project team and was accompanied by a guidance document to help complete it. The information submitted by DERs in their TCSS has been processed to determine the capabilities of the generators to provide services under Power Potential and to identify any possible technical limitations. We also asked DERs to provide feedback on the *Heads of Terms*⁸ document. In our March webinar, we addressed the feedback given on the *Heads of Terms*. To address queries relating to prequalification, testing and metering requirements we published the *DER Technical Requirements*⁹ document.

⁷ [Project website](#)

⁸ [Heads of Terms Document](#)

⁹ [DER Technical Requirements](#)

The University of Cambridge and Imperial College London

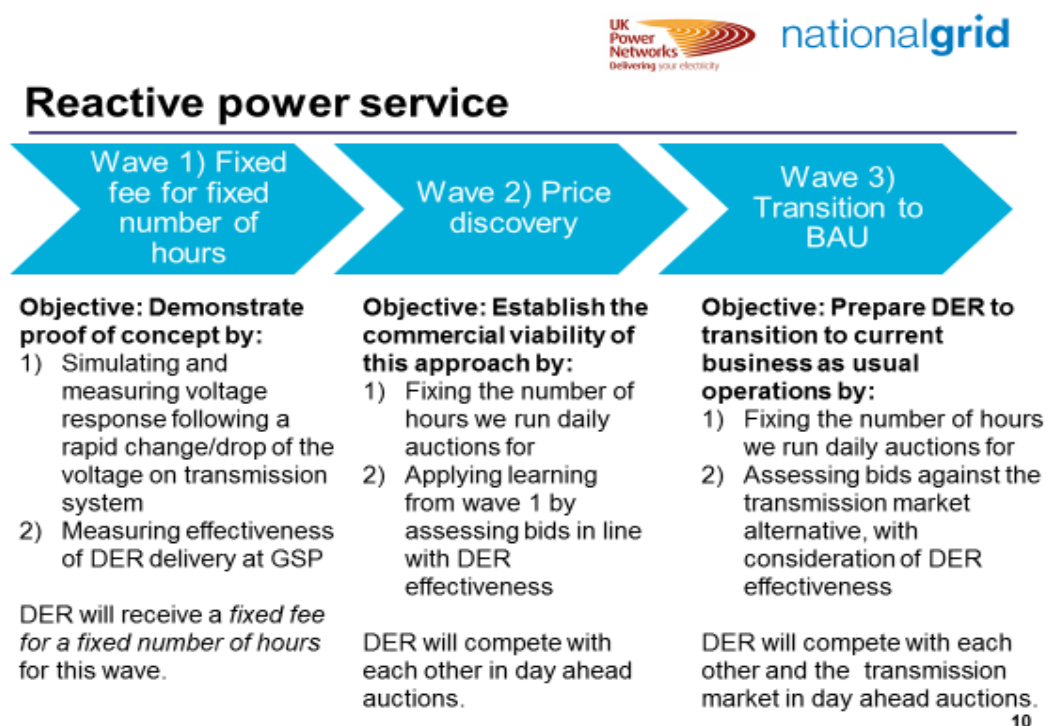
The University of Cambridge and Imperial College London have undertaken academic research to support the commercial workstream. Cambridge University published a report titled *Reactive Power Management and Procurement Mechanisms: Lessons for the Power Potential Project*¹⁰. It looks at the international experience in the management and procurement of reactive power to identify specific lessons for the project. Two specific case studies discussed in the report relate to the use of competitive mechanisms for the procurement of reactive power in Australia (business as usual, Network Support and Control Ancillary Services - NSCAS) and demand response services in California (a pilot project, Demand Response Auction Mechanism - DRAM).

Imperial College's research was conducted to inform the development of market arrangements and the commercial framework both at transmission and distribution levels. This considered selecting the most cost-effective portfolio of contracts for the provision of reactive power support based on offers from different service providers (range of virtual power plants and conventional sources). Imperial College's research to date demonstrates that the project's approach has potential to add value to the end consumer. The *Market Framework for Distributed Energy Resources based Network Services* report¹¹ from Imperial College London can be accessed on the project's website.

Reactive power service trial design

The initial trial design developed by the project team was shared with the Regional Market Advisory Panel and with interested DERs via a webinar on 26 March 2018 and is summarised in Image 2.

Image 2: Initial trial design shared with RMAP and DERs at webinar



¹⁰ [University of Cambridge report](#)

¹¹ [Imperial College London report](#)

To demonstrate both the technical and commercial solution, the high-level trial design splits 2019 into three trial periods (waves) each with a different objective and approach. The panel were asked to provide feedback on several questions regarding the trial design and their discussion is summarised below. There was broad support for the waves, with most of the panel suggesting that wave 1 should cover CAPEX costs incurred by DERs to upgrade their hardware and/or communications equipment for the trial, as understood by the DERs in early 2018. A discussion as to how this payment could be made explored several options and the pros and cons to each option were debated amongst the panel with no clear agreement for one option.

As a result of this feedback from the Regional Market Advisory Panel, the broad principles applied to the service payment budget used for the design of the trials are:

- Wave 1 is intended to cover most upfront costs for most participants (i.e. partially de-risk through offering some certainty of revenue).
- The budget aims to be split equally between wave 1 and wave 2.

Draft DER Framework Agreement (FA) and DER Market Procedures (MP) and consultation

Alongside the publication of the [DER Framework Agreement](#) and the [DER Market Procedures](#), we asked DERs their views on:

- contractual terms
- payment structures
- appropriate £/MWh payment for the mandatory technical trials for the active power service.

During the consultation, we received four formal responses and continued commercial proposition discussions with several interested parties. Four questions were asked in the consultation. They were:

1. What are your views on the contractual terms required to participate in the project?
2. What are your views on the proposed payment structure?
3. What would an appropriate £/MWh payment be for the mandatory technical trials for the active power service?
4. Any further comments you would like to express?

This exercise was used to inform the final commercial proposition, together with feedback received in DER meetings and via the Regional Market Advisory Panel. A consultation report was drafted and published on the project webpage which included all responses from the consultation on 2 July 2018. An email was also issued notifying DERs on our mailing list that this was available and where to access it. Further details on the amendments to the commercial proposition were incorporated into the final [DER Framework Agreement](#) and [DER Market Procedures](#). These were published on our website and emailed to DER on Thursday, 2 August 2018.

Minor clarifications were made to the Agreement at the beginning of December 2018 before DER were invited to sign.

Finalise the trial design

The focus is now on contracting with interested DERs and continuing to recruit additional DER participants to ensure that the trials contain sufficient volume to maximise learnings from this innovative service, whilst preparing participants for the trial to ensure readiness. The project has set a minimum of seven DER trial participants, and at least 40 Mvar at the GSP. All feedback, learning and responses from the activities included in this report will be

included in the shaping of the trial design. The Project Steering Committee will be required to provide confirmation that it is satisfied that the technical, business – readiness and customer participation criteria have been met to a sufficient extent to enable the trial to proceed to investigate how the service could contribute to the operation of the transmission system.

Workstream 3 (WS3): Business Change

Following the initial business mapping exercise in 2017 and engagement with key business units to raise awareness about the project the project team is now engaged in detailed preparatory work for the project's trials in 2019.

National Grid ESO

Following the process mapping and engagement activity with the teams to be affected by Power Potential's active and reactive service in 2017, further work has progressed to establish the business processes and responsibilities for each wave of the project trials. This has included identifying and engaging subject matter experts for each stage of the business processes for the new reactive power service and active power service from the following teams: Network Access Planning, Trading, Electricity Network Control Centre and Settlement.

The final trial design developed by the commercial workstream identifies a series of waves, each of which will necessitate different business processes and work instructions to be developed and agreed with training for the affected business functions. The business processes and work instructions are in development for completion in 2018, with training scheduled in 2019 for the colleagues who will deliver the service during the trials.

Detailed work has been completed to define the requirements for the interface between the DERMS and National Grid ESO's Platform for Ancillary Services (PAS). This has been delivered through engagement between National Grid ESO's PAS team, ZIV Automation (the vendor for the DERMS solution), UK Power Networks and National Grid ESO team's responsible for key stages of the end-to-end processes for the project's reactive power service and active power service. Resources have been committed and work is progressing to build the interface in 2018, complete testing and be ready for the 2019 trials.

Next steps

All training is planned to take place in 2019, before each wave of the trials to ensure that colleagues in key business units are ready to deliver the Power Potential services.

Further details of key business processes and stakeholders impacted by the project are provided within the ¹²SDRC 9.2 report and a detailed business readiness to trials overview will be provided in the forthcoming SDRC 9.4 report.

UK Power Networks

In the first half of 2018, the WS3 Lead in collaboration with the project team identified the relevant business units whose operation would be affected by the project solution, and arranged a series of meetings to raise awareness about the project, introduce the scope, key milestones and next steps.

Throughout the year, the WS3 Lead has worked closely with WS1 and WS2 Leads as well as NG WS3 Lead to understand the DERMS solution, assess their impact on UK Power Networks' systems, and capture new business processes for all business units involved.

¹² [SDRC 9.2](#)

The project team is working across the business with several teams including Outage Planning, Infrastructure Planning, Control Systems, Smart Grid Development and Income Pricing.

The WS3 Lead wrote a newsletter for internal distribution to disseminate high level project updates and maintain the dialogue with the stakeholders identified.

Detailed work has been started in terms of setting up business processes and assigning responsibilities to different teams (e.g. Settlements, revised Connections Agreements). Further work and details of key processes will be provided as part of the business readiness to trials overview in the forthcoming SDRC 9.4 report.

Image 3: A snapshot of the internal newsletter within UK Power Networks discussing Power Potential



Power Potential: a world's first collaboration with National Grid

What is Power Potential?

The Power Potential project, a joint partnership between UK Power Networks and National Grid, is a world first whole-system innovation project, examining the future of dynamic voltage control by Distributed Energy Resources (DERs).

The Power Potential project is being delivered by the Innovation team and we are working across the business with a number of different teams including Outage Planning, Infrastructure Planning, Control Systems, Smart Grid Development and Income Pricing.

The project is looking at the technical and commercial aspects of procuring and absorbing reactive power from DERs connected to the distribution network to help manage voltage constraints on the transmission network.

Power Potential will procure the following services:

1. Dynamic voltage support (Mvar for low and high volts)
2. Active power support for constraint management and system balancing

If successful and transitioned to BAU, the project will deliver the following benefits:

1. An additional 3.7GW of renewable generation could connect to the South East by 2050
2. The solution could be rolled out to 59 other transmission – distribution interface points saving €412m for UK consumers by 2050

Funding for this innovation project comes from Ofgem's Network Innovation Competition fund.

The trial region and criteria for participation

There are four Grid Supply Points (GSPs) in SPN in scope for the project – Boiney, Ninfield, Sellindge and Canterbury North. The project area is the South-East of England, as:

- This area has a high penetration of DERs with connection volumes growing rapidly in recent years
- The transmission network has high interconnection with continental Europe, with HVDC links of 2 GW at present, increasing to 5 GW with future projects
- The network provides electricity to London via the East and West of the demand centre
- The voltage and thermal constraints at transmission have made it complex for the System Operator to

Business Case Update

The robust business case that was described during the Network Innovation Competition bid process has not changed. The 2017/18 Network Options Assessment report triggered the requirement for capacity on the south coast of England, however the timing of investment in 2027 will not affect Power Potential.

Progress Against Plan

The project has made substantial progress in preparing for the Power Potential trials in 2019. Key areas of delivery in 2018 have included:

- completing the detailed design and substantial progress in building the technology solution
- preparing business processes within both project partners for delivery of each wave of the project's trials and for active and reactive power services.
- Finalising the commercial proposition for DERs in the trials (with full details published in the SDRC 9.3 report in July 2018).
- Publishing the *DER Framework Agreement*¹³, *DER Market Procedures*¹⁴, *DER Technical Requirements*¹⁵ and *DER Test Specification*¹⁶ documents for participation and the trials calendar at least nine months ahead of the trials commencing to enable DER to evaluate the benefits of participation, plan and implement site works in readiness for the trials.

The project's technology solution is highly innovative with multiple complex inter-dependencies with new and existing systems, infrastructure and communications. Given this complexity the project has adopted an agile approach to identify, learn from and resolve challenges that have arisen throughout delivery.

The plan for building, testing and deploying the technology solution has been adapted during 2018 to incorporate learning and address issues that have arisen to minimise disruption to both the project trials beginning in 2019 and the commercial proposition that has been presented to the market. A challenge to the timing of delivery has been in relation to integrating the CIM Export model. This has resulted in changing the approach to deploying the DERMS technology solution to a staged implementation model. This has ensured that the functionality required for each wave of trials is available when needed. Some of the commercial functionality within DERMS that is not necessary for the initial wave of technical trials, has been rescheduled to enable the technical trials to proceed in parallel to the full commercial functionality being completed and tested for implementation in later waves of the trials.

Engagement continues with prospective trial participants to develop and implement plans to quantify reactive and active power volumes each participant could contribute for inclusion with the project's Framework Agreement; any necessary amendments to current connection agreements; site works to provide the necessary technical and communications capabilities and commissioning tests to confirm readiness to trial. The project team aim to sign a minimum of seven contracts, with a total minimum of 40 Mvar capability effective at the GSP, in order ensure the project objectives are met.

¹³ [DER Framework Agreement](#)

¹⁴ [DER Market Procedures](#)

¹⁵ [DER Technical Requirements](#)

¹⁶ [DER Test Specification](#)

A detailed schedule for the trials has been developed and was published in the Market Procedures document in August. It was then updated in December 2018. The first wave of trials with a technical focus will begin in May 2019 with commercial trials beginning in September 2019. The schedule for trials can be found in Image 3.

Image 4: Detailed schedule for the project trials

Key		2		16		10.71428571		0	
		Reactive Power Service		Active Power Service					
Week Commencing	Week number	Mandatory trial	Wave 1	Wave 2	Wave 3	Mandatory trial	Wave 3		
		specific times to be agreed with DCR	24/7 hours of opportunity across 2520 hours	commit to run market for a minimum of 1800 hours	pending decision to run wave 3	specific times to be agreed with DCR	Wave 3		
31/12/2018	53								
07/01/2019	2								
14/01/2019	3								
21/01/2019	4								
28/01/2019	5								
04/02/2019	6								
11/02/2019	7								
18/02/2019	8								
25/02/2019	9								
04/03/2019	10								
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14/10/2019	42								
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28/10/2019	44								
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11/11/2019	46								
18/11/2019	47								
25/11/2019	48								
02/12/2019	49								
09/12/2019	50								
16/12/2019	51								
23/12/2019	52								
30/12/2019	1								
06/01/2020	2								
13/01/2020	3								
20/01/2020	4								
27/01/2020	5								
03/02/2020	6								
10/02/2020	7								
17/02/2020	8								
24/02/2020	9								
02/03/2020	10								

A non-material change request letter has been submitted to Ofgem setting out the timing of the remaining Successful Delivery Rewards Criteria (SDRC) reports. These have been revised to reflect the updated project delivery plan and the revised delivery dates are summarised in Table 3 below.

Table 3: Revised schedule for the remaining SDRC reports

	SDRC 9.4	SDRC 9.5	SDRC 9.6	SDRC 9.7
Title	Customer Readiness Report and Performance of the Technical Solution in a Controlled Environment	Cost Benefit Analysis	Trial Phase Report	DSO risk-reward framework for providing wider system services
Original submission date	31 December 2018	31 December 2018	31 December 2019	31 December 2019
Revised submission date	30 September 2019	31 March 2019 (confidential for Ofgem only to prevent distorting the trials) 30 April 2020 (published date)	30 April 2020	31 March 2020

Progress Against Budget

Progress against budget is presented in a confidential annex to this report.

Project Bank Account

The status of the project bank account is presented in a confidential annex to this report.

Successful Delivery Reward Criteria

SDRC	Progress
<p>SDRC 9.1: Technical High Level Design</p> <p>The high-level design of the technical solution and high level business processes which will operate the solution.</p> <p>Evidence:</p> <ul style="list-style-type: none"> • Alternative design options considered and selection criteria • High level design specification • Functional design document • High level business processes • Review of anticipated synergies and conflicts. 	<p>Completed and submitted on time</p>
<p>SDRC 9.2: Commercial and Detailed Technical Design</p> <p>Stage Gate 1 – The agreed detailed technical design (Partner/s, National Grid ESO, UK Power Networks, Customers) and Commercial Framework for the trial.</p> <p>Evidence:</p> <ul style="list-style-type: none"> • Stakeholder consultation findings • Functional Specification Documents • Finalised Commercial Framework • Detailed Business Processes 	<p>Completed and submitted on time.</p>

SDRC	Progress
<p>SDRC 9.3 Commercial Tendering Process Report and Finalised Trials Approach</p> <p>Stage Gate 2 – Outline the learnings from the tendering rounds for the reactive power services and the engagement on the active power services. Based on this process and the trials approach, to advise which customers will be utilised during each trial phase and the forecasted effectiveness.</p> <p>Evidence:</p> <ul style="list-style-type: none"> • Report on tendering approach, including technical and contractual requirements for participation, barriers to entry and measures to alleviate these • Proposed commercial framework and interaction with SO and DNO incentives • Review of technologies and volumes under contract • Initial forecasts of availability and utilisation volumes • Signed commercial contracts • Trials Approach and Methodology 	<p>This SDRC was delivered as planned by National Grid ESO, interpreting ‘signed commercial contracts’ as requiring signing of the inter-operator agreement between National Grid ESO and UK Power Networks and as described in the SDRC.</p> <p>The agreed inter-operator contract was further revised after the SDRC was submitted, in line with final format of the framework agreement with DER providers.</p>
<p>SDRC 9.4: Customer Readiness Report and Performance of the Technical Solution in a Controlled Environment</p> <p>Stage Gate 3 – Update on the effort required to ready customers to take part in the trial (technical, business processes, etc.) and the performance of the technical solution in a controlled environment and expected performances in the live environment.</p> <p>Evidence:</p> <ul style="list-style-type: none"> • Test Report – End to End Testing • Business Change Implementation Report • Customer Readiness Assessment • Technical Solution – GO / NO-GO Criteria Results • Customer and Business – GO / NO-GO Criteria Results 	<p>This SDRC delivery date has been revised to 30 September 2019.</p> <p>This will allow for full testing of a very complex integrated software solution in accordance with a detailed test strategy, and allowing for a delay in readiness of an upgrade in UK Power Networks’ PowerOn network management system.</p> <p>During the current period, DER engagement, the development of framework, development of the commercial proposition/contractual framework are all contributing to customer readiness.</p>
<p>SDRC 9.5: Cost Benefit Analysis</p> <p>Analysis assessing the financial case for the trial to date and for extending the approach into the future.</p> <p>Evidence:</p> <p>Detailed assessment of the costs and benefits of Power Potential to include:</p>	<p>This SDRC delivery date has been revised to 31 March 2019 when a confidential version will be submitted to Ofgem to avoid the risk of distorting the trials</p> <p>Analysis of historic requirements for reactive power within the study area have been undertaken in the area to inform the scale, frequency and value of provision of</p>

SDRC	Progress
<ul style="list-style-type: none"> • analysis of the net benefit of extending the trial into the future (using Ofgem’s CBA framework), replication study assessing the viability of, and case for, extending Power Potential to other DNOs and for providing a wider set of services 	<p>this services, which will contribute to the overall CBA.</p> <p>An updated version of the report will be published by the end of April 2020.</p>
<p>SDRC 9.6: Trial Phase Reports</p> <p>Stage Gate 6 – Trials Report The completion of the trials in line with customer agreements and review of the performance of the trial; the closure of the project (potentially moving into BAU) in line with customer agreements.</p> <p>Evidence:</p> <ul style="list-style-type: none"> • Trials Phase Report including adequacy of contracted volumes to meet requirement, availability/reliability of DER and control system, accuracy of sensitivity and accuracy forecasting, evidence of competitive bidding, evidence of conflicts • Report summarising the financials of each party (subject to DER commercial confidentiality), an the costs incurred by the DNO, the uplift applied to DER bids, and hence the net revenue that the DNO receives • Assessment of scheme design and operation to cover how well it worked, where conflicts arose, and how the governance arrangements performed • Plan for transitioning trial participants into enduring solution 	<p>This SDRC report has been rescheduled to 30 April 2020.</p>
<p>SDRC 9.7: DSO risk-reward framework for providing wider system services</p> <p>A paper describing the incentive framework used for the project and recommendations for an enduring incentive framework for an active DSO.</p> <p>Evidence:</p> <ul style="list-style-type: none"> • Analysis of the costs, risks and revenues for the services included in the trial • Assessment of mechanism used within the trial and comparison against alternative incentive mechanisms • Assessment of the applicability of these incentive schemes to a DSO providing a broader set of system services and interaction with the wider SO incentives 	<p>This SDRC has been rescheduled to 31 March 2020.</p> <p>Early discussions are underway to review the potential options and how the pros and cons of these can be further developed through the learning generated by the project trials.</p>

Data Access Details

Interested parties can access any network and consumption data gathered because of this project in accordance with National Grid ESO's published policy. UK Power Networks similarly follows a published innovation data-sharing policy.

Learning outcomes

Dissemination from the project during this reporting period has focussed on internal dissemination within National Grid ESO and UK Power Networks, externally with potential customers, and disseminating to raise awareness widely within the energy industry. Dissemination activities carried out include the following:

Industry events and conferences during 2018

- Power Responsive Flexibility Forum, 11 January, 26 June, 23 October. Exhibition stand and networking.

Image 5: A photo of the exhibition stand and networking at Power Responsive Flexibility Forum on 26 June.



- Bilateral meeting with TSO RTE, 12-13 February Paris. Exchange experience on reactive power (also meeting with WN CIGRE France).
- IDC Conference 19-20 March, Brussel Belgium. Pan European Executive summit; 'Mastering the Art of Utilities Transformation Think Big, Start Small, and Scale Fast'.

- Future Networks Conference, 18 April, Birmingham UK. A project advert included in the exhibition brochure, exhibition stand and presentation.

Image 6: Exhibiting at the Future Networks Conference, 18 April



Image 7: Ali Ahmadi, UKPN and Biljana Stojkovska presenting at the Future Networks Conference, 18 April



- All Energy Conference, 15 May, Glasgow UK. Project Presentation.

Image 8: Inma Martinez, Power Systems Engineer presenting at the All Energy Conference 15 May



- 15th International European Energy Market Conference, 28 June Poland. A presentation and a commercial paper was accepted; 'The Power Potential Project: trialling the procurement of reactive power services from distribution-connected assets'.

- USEA Programme, invited Speaker, "Technical issues in the integration of renewable generation Experience from Great Britain" 17 July, Podgorica, Montenegro

- USAEE Conference Washington DC USA, 24 September. 'Reactive Power Procurement: Lessons from Around the World' presentation.

- 7th IET Renewable Power Generation, 26-27 September, Copenhagen, Denmark. Oral presentation and a paper was accepted.

- Low Carbon Networks and Innovation (LCNI) Conference, 16-17 October. Exhibition and team members delivered a presentation sharing details on the commercial and technical workstreams.

- First Power Potential project conference, 30 October, The Crystal building, London.

Image 9: Biljana Stojkovska, Project Lead, National Grid ESO, presenting at the Power Potential project conference, 30 October.



- External coverage in POWERful Women newsletter.
<https://mailchi.mp/6bb3fae24245/latest-news-from-powerful-women?e=008154df89>
- CIGRE UK Webinar, 7 November. 'Power Potential: energising reactive power for a changing power grid'.
- USEA Vienna, 7 – 8 November. 'Power Potential – reactive power market from DERs' presentation.
- CIRED 2019 – abstract accepted 'UK Power Networks Providing Power Services from Distributed Energy Resources to Transmission System Operator via a Centralised DERMS platform'.

Papers

- Working paper – Energy Policy Research Group (Cambridge) EPRG website (revision in progress at the time of writing).
- Paper for the 'Renewable and Sustainable Energy Reviews Journal' (revision in progress at the time of writing).

National Grid ESO Internal Engagement

- Company Chairman's Awards submission – Fit for the future category (unsuccessful – results announced in September)
- Exhibited at 'Innovation Week', 11 – 15 June, Warwick UK.
- Project activity included in the SO Management Calendar – a calendar of key events/activity released fortnightly.
- We continue to use the NG social media account to highlight and promote our key messages and activities
- Highlighting diversity in the project on NG's website:
<http://ournationalgrid.com/uk/celebrating-women-in-innovation/>
- SO Soundbites – The Electricity System Operator's internal newsletter; we continue to raise project highlights and news using this channel.

UK Power Networks Internal Engagement

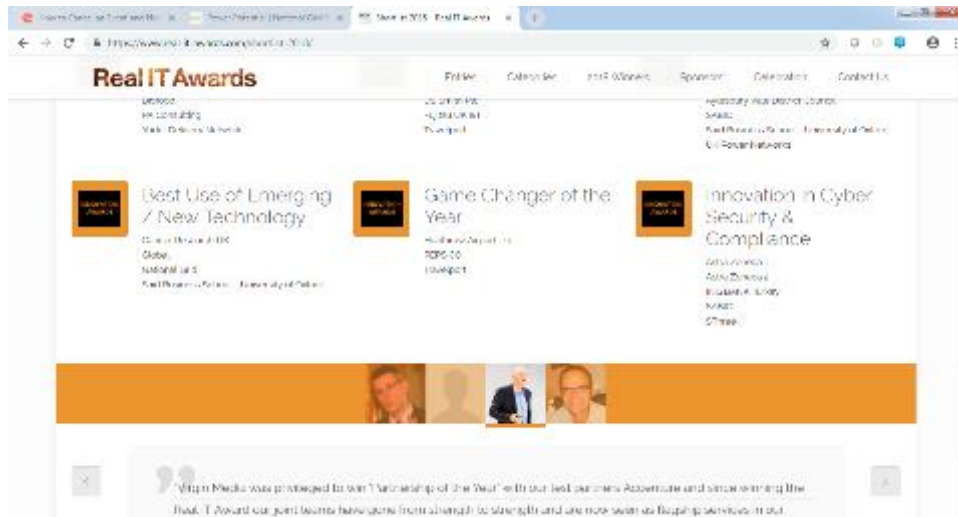
- 22 March – SPN Major Connections team
- 23 March – SPN Infrastructure Planning team
- 16 & 19 April – Leadership forum
- 26 April – Control room team
- 26 April – Information system delivery team
- 26 April – Outage Planning team
- 1 June – SPN Capital Programme roadshow
- 12 & 13 June – Connections roadshow
- 15 June – London Capital Programme roadshow
- 21 June – Information Systems roadshow
- 12 July – Finance roadshow
- 13 July – Eastern Capital Programme roadshow

- 3 December – UKPN Internal newsletter

Industry Awards

- The REAL IT Awards, 'Best use of emerging technology' Innovation Category, 17 May London UK. Submission shortlisted as a finalist.

Image 10: Screenshot of shortlist awards list from REAL IT Awards



- The 13th British Renewable Energy Awards, 'Smart Energy Systems' Award, 14 June London UK. Submission shortlisted as a finalist.

Image 11: Signage for the British Renewable Awards



- Utility Week Awards 2018, 'Transformation and Innovation' category. Not successful.

Other:

- Meeting with EirGrid (Irish TSO) to discuss the project, 19 April Warwick, UK.
- Project website, www.nationalgrid.com/powerpotential. Maintaining a good website is one of the best ways to promote an activity. To ensure the project is connecting with its stakeholders, the website is regularly updated and documents are available to download from here.
- Project email. A dedicated project email address has been created allowing two-way communication between our customers and the team.
- We have a mailing list which we ensure is kept up to date, in line with GDPR laws.
- Network Magazine online, article published, 27 March: <https://networks.online/gphsn/comment/1000953/power-potential-unlocking-hidden-potential>

- Write up of Power Potential’s first dissemination event on National Grid’s external website: <http://ournationalgrid.com/uk/power-potentials-first-industry-event-is-a-success/>

Project webinars

- Webinar 2. 29 January. 166 registered. 65 joined.
- Webinar 3. 26 March. 83 registered. 37 joined.

Image 12: Image of the project team taking part in the webinar on 26 March, Warwick.



- Webinar 4. 16 May. 49 registered. 16 joined.

One-to-one meetings and emails with distributed energy resources

	January	February	March	April	May	June
One-to-one meetings	3	7	6	6	5	10
Emails received	1	33	18	33	40	37
Emails sent	0	27	25	46	45	61

Emails issued from the project email to show the level of engagement from DERs

	Emails received	Emails sent	Surgeries
Jan-18	1	0	3
Feb-18	33	27	7
Mar-18	18	25	6
Apr-18	33	46	6
May-18	40	45	5
Jun-18	38	62	10
Jul-18	26	38	1
Aug-18	19	32	2
Sep-18	24	16	8
Oct-18	13	11	0
Nov-18	1	1	0
Dec-18	0	0	0
YTD	246	303	48

The Power Potential project has a responsibility to share learning and experiences gained throughout the project lifecycle by its core team. During the next reporting period, we will continue to engage with trial participants, the wider industry and our internal businesses to continue sharing learning, best practice and information about the project.

IPR

To meet the requirements to publish Intellectual Property (IP) developed within this project, National Grid ESO and UK Power Networks notify the project manager promptly after identifying any joint result that it believes to be patentable or capable of protection by any other similar registered IPR.

National Grid ESO or UK Power Networks may apply for any number of patents or other protection in the respect of the joint results. Such applications may be filed in the name of National Grid ESO and UK Power Networks and their employees may be named as inventors or co-inventors in any such patent application. Up to 30 November 2018, the following IPR has been generated:

Table 4: IPR up to 30 November 2018

Workstream	IP description	IPR Owner
WS1	TDI 2.0 solution requirement specification document	National Grid ESO and UK Power Networks
WS1/2	DER Operating Characteristics document	National Grid ESO and UK Power Networks
Project	Project Handbook	National Grid ESO and UK Power Networks
WS1/2	Use cases Definition	National Grid ESO and UK Power Networks
WS2	Communication and DER Engagement Plan	National Grid ESO and UK Power Networks
WS1/2/3	SDRC 9.1 report	National Grid ESO and UK Power Networks
WS1/2	Functional and non-functional requirements for TDI 2.0 technology solution	National Grid ESO and UK Power Networks
WS1/2/3	SDRC 9.2 report	National Grid ESO and UK Power Networks
WS1/2/3	SDRC 9.3 – Commercial Tendering Process Report and Finalised Trials Approach	National Grid ESO and UK Power Networks
WS1	Detailed Design for the DERMS Solution	ZIV, UK Power Networks and National Grid ESO
WS1	DER Technical Requirements	UK Power Networks
WS1	DER Test Specification	UK Power Networks

The following IP is forecast to be generated in the next reporting period:

Table 5: IP forecasted to be generated in the next reporting period

Workstream	IP description	IPR Owner
WS1	Power Potential Test Strategy	National Grid ESO and UK Power Networks
WS1/2/3	SDRC 9.4 Customer Readiness Report and Performance of the Technical Solution in a Controlled Environment	National Grid ESO and UK Power Networks
WS1/2/3	SDRC 9.5 Cost Benefit Analysis	National Grid ESO and UK Power Networks

Risk Management

A robust project structure and governance process means that any potential issues or changes that could affect project delivery are identified quickly and actions are put in place to resolve them. The risk register is attached in Appendix A.

Accuracy Assurance Statement

This progress report has been produced in agreement with the entire project hierarchy. The report has been written and reviewed by all project partners. The report has been approved by the Power Potential Steering Committee and by Graham Stein, Network Operability Manager on behalf of Julian Leslie, the project sponsor. Every effort has been made to ensure all information in the report is true and accurate.





A

Appendices

Risk Register

Two risk tables are presented below:

1. Status of risks from the original bid document
2. Additional risks identified and managed during project delivery

Status of risks identified in the original bid submission

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
1	General	Final funding not awarded.	Funding secured.	Closed
2	General	Significant changes to South East Coast network make the TDi2.0 solution no longer suitable.	Future developments and scenarios considered and the solution continues to be relevant.	Green
3		Number not used.		
4	General	Insufficient resources allocated to the project.	Project plan developed and actively managed. Partners committed to resourcing delivery of key project milestones. Contingency fund overseen by Steering Committee.	Amber
5	General	Loss of key staff delays delivery.	Ensure project handbook and file sharing systems are in place and ongoing engagement with team managers across both partners.	Green
6	Technical	Technical limitation of ICCP interoperability between National Grid ESO and UK Power Networks cannot deliver required data transfer causing delay.	Detailed analysis undertaken of options and Steering Committee has closed this risk, agreeing use of web services.	Closed
7	Technical	Specification of the technical solution is insufficient to deliver requirements.	Specification developed with subject matter experts from across both project partners to ensure that it is fit for purpose.	Closed
8	Technical	Control system fails to perform leading to unsatisfactory trial results.	Control system to be subject to performance testing using benchmarking or simulations under various operating conditions.	Amber

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
9	Technical	Interoperability issues may delay response and reduce ability to control the system.	Agreed common standards for components and interface protocols.	Amber
10	Commercial	Lack of DER interest prevents trials going ahead.	Ongoing engagement has enhanced the commercial proposition and increased the value of the payments to DER budget for the trials.	Amber
11	Commercial	Volume and price risk associated with each DER's sensitivity to transmission constraint it is being asked to alleviate.	Payments to DER fund in place and value increased to bolster commercial proposition.	Green

Additional risks identified and managed since bid submission

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
12	General	Ways of working at each partner creating silos.	Progress made to develop productive way of working across partners.	Closed
13	General	Project is disjointed.	Project handbook developed, weekly cross-partner workstream meetings and monthly steering committees established.	Closed
14	Finance	Budget not agreed between partners.	Budget split between partners agreed.	Closed
15	Technical	CIM integration takes longer, delaying project	Revised project delivery plan agreed with interim approach to reduce delays to trials.	Amber
16	Commercial	Delay in producing detailed workstream plan risk project delay.	Detailed project plan in place with dependencies mapped to other workstreams.	Closed
17	Technical	Risk that SDRC9.1 scope definition is compromised and not delivered in full.	SDRC9.1 delivered on time.	Closed

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
18	Technical	CIM Export too costly or cannot be delivered.	Budget for costs has been agreed. Delivery plan rescheduled to allow more time for CIM Export delivery without delaying trials.	Closed
19	Technical	SDRC9.1 not delivered on time as regulatory and business review takes longer than anticipated.	Parallel reviews with National Grid ESO and UK Power Networks' management/regulatory teams. Delivered on time.	Closed
20	Commercial	The project does not have a joint communication plan for the projects participants.	National Grid ESO and UK Power Networks carrying out joint engagement and weekly meetings ensure good co-ordination agreed to close this risk, November 2017. Communications and engagement plan produced and the plan has been approved by National Grid ESO and UK Power Networks communication teams.	Closed
20a	Commercial	Risk that aggregators see UKPN as a competitor	Engagement with DERs to clarify roles and responsibilities of partners, including through published documentation. Ongoing consideration of this risk to progress through discussion on migration to business as usual for the SDRC9.6 report.	Green
21	Commercial	Risk of rushed procurement before agreement of proposed solution.	Technical solution requirements and design completed before publication of the Framework Agreement and Market Procedures documents for DER to participate in the trials. Procurement of service is now planned for day ahead, rather than a year in advance, therefore agreed to close this risk.	Closed
22	Commercial	Resourcing delivery of TDI 2.0 and RDP projects at same time.	Resourcing between the two initiatives has been resolved.	Closed

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
23	Commercial	Misalignment of TDI 2.0 and RDP deliverables.	Liaison between the two initiatives is well established. Technical, commercial and PMO linkages in place.	Closed
24	Commercial	Provision of services by DERs to National Grid via UK Power Networks is insufficient to measure impact at GSP	40 Mvar combined volume of DER participating in the trials has been set as a goal by the Steering Committee, to ensure sufficient volume to measure impact.	Amber
25	Commercial	Insufficient recruitment of DER for the project trials.	DER recruitment on going, with positive response to published Framework Agreement and Market Procedure.	Amber
26	Technical	There is a risk that analogue values polled from RTUs may reflect inaccurate values.	UK Power Networks analysis undertaken of bad data and engagement with Asset Management team to agree a way forward. Action to refresh the PowerOn system with correct lines data from planning tool underway. Ongoing risk to keep under review.	Amber
27	Technical	There is a risk that tap changer control in both SGTs and Grid (distribution) transformers is not adequate for the project.	Evidence within available information demonstrates that this is not critical for minimum viable product, but will be considered for next stage.	Green
28	Technical	There is a risk that the time delay in measurements of parameters of the 400kV system to the DERMS is too long.	This issue is being addressed through the detailed design discussions and technology solution specification.	Amber
29	Technical	There is a risk that the time delay in an instruction sent to the DER from DERMS is too long (more than 10 seconds).	This issue is being addressed through the detailed design discussions and technology solution specification.	Amber

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
30	Technical	There is a risk that the intensity of activity proposed within the first draft detailed design phase delivery plan cannot be resourced by the available National Grid ESO's IS and technical team.	Ongoing delivery activity with additional workshops scheduled with ZIV. UK Power Networks and National Grid ESO resourcing in place. Risk of limited National Grid ESO's IS resource availability if this continues beyond current plan.	Amber
31	Commercial	There is a risk that the commercial proposition is not compelling enough to persuade DERs and Aggregators to participate in the project.	Risk closed as adequately covered by Risk 9 Webinar held 21 September and concerns captured. 1-2-1s to be proactively sought. Guidance to be adapted and published online.	Closed
32	Technical	There is a risk that the IS Vendor (ZIV Automation) cannot deliver the detailed design and build of the solution envisioned by the project team.	Risk ongoing and to be reviewed regularly. Walk-through of revised detailed design for the interim solution is complete. Full solution design agreed. Progress is being made, but not fully resolved yet.	Amber
33	Technical and commercial	There is a risk of insufficient sharing of data between the project partners.	To be kept under review and within consideration of regulatory requirements.	Amber
34	Commercial	Adding secondary optimisation may impede delivery of the project's Minimum Viable Product.	Agreed that secondary optimisation is out of scope for the project's MVP, whilst agreeing to explore options for inclusion without detriment to MVP.	Closed
35	Business readiness	There is a risk of delay if workstream 3 leads are not identified and mobilised in time.	Workstream leads confirmed and delivery plans included within project plan.	Closed
36	Robust plan	There is a risk that the project plan is not effectively driving delivery.	Refreshed plan and plan governance approach adopted. Keep under review.	Amber

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
37	Commercial	There is a risk that DER's will be deterred by the uncertainty regarding how trials will work during 2019.	Market Procedure and market calendar for the trials have been published, giving greater visibility of the approach. Engagement ongoing.	Green
38	Commercial	There is a risk that we do not have enough budget to deliver the success criteria for DER recruitment.	Steering Committee approved releasing an additional £133k into the DER payment fund. Publication of the commercial proposition for the trials has been well received.	Green
39	Commercial	There is a risk that the RMAP advocates a different approach to that planned within the trials.	Engage RMAP on developing approach and consider their feedback in finalising the project's approach. Framework Agreement and Market Procedure now published. Closed.	Closed
40	Technical	There is a risk that the IS architecture elements of the detailed design cannot be agreed.	Architecture has been signed off.	Closed
41	Technical	There is a risk that the testing schedule risks delay in delivering SDR9.4 and the start date for trials.	Review testing requirements for SDR9.4 (i.e. testing in controlled environment). Align plan with proposed trial design (start dates).	Amber
42	Technical	There is a risk that the project approach to large embedded generators is not agreed.	Steering Committee agreed to engage Thanet and Shoreham to gauge their interest. MW dispatch to remain under ENCC (NG) control. Mvars dispatch to be considered through DERMS.	Amber
43	Technical	There is a risk of not having proper Transmission and Distribution data to develop DERMS solution.	Detailed plan developed and progress is being tracked through the project's Technical Question governance approach (Reference "TQ8"). The Technical question approach is used to raise and track resolution of outstanding technical design issues.	Closed

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
44	Technical	There is a risk that PAS-DERMS interface delivery increases project costs or risks.	Plan and costs agreed for this activity.	Green
45	Commercial	There is a risk that SDR9.3 is not delivered in full and on time.	Delivered on time.	Closed
46	Commercial	There is a risk of not having clear idea about the interface for Aggregators.	Action underway by UK Power Networks team to clarify approach for aggregators.	Amber
47	Commercial	There is a risk that the project will incur costs without securing trial results data and insight (if the trials are cancelled after DER complete commissioning tests).	Raised at 24 May Steering Committee and risk accepted in order to bolster commercial proposition to DER participants.	Amber
48	Technical	There is a risk that Active Network Management (ANM) in the project area affects performance or on-time delivery of DERMS.	Commitment by ANM project to fund any relevant costs.	Green
49	Technical	There is a risk that the GE CIM export may not be fully tested and may not be compatible with ZIV algorithms/or delay in providing the export.	Project delivery plan rescheduled to minimise delay to the trials caused by delay in CIM Export readiness.	Amber
50	Technical	There is a risk that DERMS produces inaccurate results due to poor quality data.	A solution is being investigated, initial for a local geographic area around Maidstone. Subject to the success of this approach it would then be rolled out across the whole trial area.	Red

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
51	Technical	There is a risk that DERMS produces inaccurate results due to incorrect inputs. (Data quality – transducers).	Data risks currently under review in order to reframe them more effectively.	Red
52	Technical	There is a risk that DERMS produces inaccurate results due to incorrect inputs (data quality – PowerOn).	1) Key aspects of PowerOn operational model have been updated from PowerFactory (planning model) 2) Plan for dealing with missing directional data in PowerOn – being addressed as part of state estimation.	Amber
53	Technical	There is a risk that the intensity of activity proposed during build/test in 2018 cannot be fully resourced by the available team.	Additional UK Power Networks resource secured for testing and integration.	Green
54	General	There is a risk that SDRC9.4 delivery is delayed by technical, commercial and/or business readiness.	Project delivery plan rescheduled and revised SDRC delivery dates agreed and communicated to Ofgem. (letter emailed 26 November 2018).	Green
55	Technical	There is a risk that the PowerOn upgrade (version number POA 6.4.1) will be delayed, including functionality that DERMS requires to get automatic update of the CIM network model.	Priority – liaise with GE and UK Power Networks control room to determine scale of delay, implications of running DERMS before the POA 6.4.1. upgrade to PowerOn. To investigate whether it may be possible to manually update the CIM model on monthly basis.	Amber
56	Technical	There is a risk that no mobile controllers will be available for use in the test lab and this part of the solution will not be used or tested until SIT starts in February 2019.	Mobile controllers purchased, therefore risk is closed.	Closed

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
57	General	There is a risk of SDRC9.5 not being delivered on time and with the required scope and quality.	Project delivery plan rescheduled and revised SDRC delivery dates agreed and communicated to Ofgem (letter emailed 26 November 2018).	Green
58	General	There is a risk of the 12-monthly report not being delivered on time and with the required scope and quality.	Plan for drafting, review and approval agreed.	Green
59	Communication	There is a risk that insufficient planning and focus result in a poor 30 October Showcase event.	Plan agreed and Tracked. Success event delivered.	Closed
60	Commercial	Risk that migration to BAU will be delayed due to the requirement for different commercial arrangements.	Work underway to develop detailed plan for migrating participants to an enduring solution once the trials finish in 2020. This includes mapping what different approaches might be required for BAU (versus those in the trial), to minimise delay. Also acknowledge to all stakeholders that this is an innovation project and there is an underlying risk that the project may not be successful.	Red
61	Technical	There is a risk that implementation of new Volt Select 400kV SCADA points from National Grid ESO into UK Power Networks' systems is not successfully completed.	The design was progressed through the project's Technical Question governance approach (reference to this risk is "TQ4") and is now in delivery by end 2018. The Technical question approach is used to raise and track resolution of outstanding technical design issues.	Amber

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
62	Technical	There is a risk that PAS testing does not meet project objectives on time/in full that ensure nomination, dispatch and settlement functionalities within DERMS.	Discussion held with ZIV and National Grid ESO to agree PAS testing strategy after process definitions are closed (i.e. paper walkthrough meetings).	Green
63	Not in use			
64	Not in use			
65	Technical	There is a risk that in real time the DER technical availability volume of the reactive power service is inaccurate.	Likelihood and impact deemed low given volume in trial. Mitigation include % of plant in service available signal in list of mandatory signals. Need a process to utilise this in future.	Green
66	Business processes	Risk that the workstream 3 plan does not adequately cover the risks associated with the Staged Delivery approach.	National Grid ESO and UK Power Networks teams to revise workstream 3 plans for interim and full solution and migration to BAU and appraise risks for each of these.	Red
67	Trials	There is a risk that the project risks during the trial delivery phase are not fully documented.	To be developed by the Trial manager at each partner before trial delivery.	Amber
68	Business readiness	There is a risk that the new Power Potential service software and displays may not be installed in the Control Room in time for the trials.	To be raised for approval and scheduling within Control Room calendar for 2019.	Amber
69	Business readiness	Risk that the detailed documentation for despatch is not ready on time.	Project lead and despatch lead to walk-through WS3 requirements for interim, full and fall-back manual solutions.	Amber

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
70	Business readiness	Risk that control room personnel are not trained to use the Power Potential service in time.	Control Room rota for February 2019 to February 2020 agreed at end of November 2018. Request to be submitted in time for scheduling.	Amber
71	Business readiness	Risk that the business procedure and detailed documentation for nomination is not ready in time.	To revise plan for WS3 nomination to reflect staged Delivery plan.	Amber
72	Business readiness	Risk that nomination personnel are not trained to use the Power Potential service in time.	To revise plan for WS3 nomination to reflect staged Delivery plan.	Amber
73	Business readiness	Risk that the business procedure and detailed documentation for settlement is not ready in time.	To revise plan for WS3 nomination to reflect staged Delivery plan.	Amber
74	Business readiness	Risk that settlement personnel are not trained to use the Power Potential service in time.	To revise plan for WS3 nomination to reflect staged Delivery plan.	Amber
75	Business readiness	The testing and training manual for PAS are not ready in time.	PAS team at NGESO to schedule time to develop training manual and delivery training for operational teams for the trials.	Amber
76	Commercial	There is a risk that the active power service being trialled under Power Potential will not align with future EU regulation I (TERRE).	Commercial analyst is investigating the commercial requirements for TERRE in order to map against the project approach and establish if there is an issue and how to address.	Red
77	Commercial	There is a risk that the methodology to test DER capability strays beyond the specification currently drafted in DER Technical requirements	Test specification now written. UK Power Networks committed to only test requirements set out in the DER Requirements. NGESO reviewed the test specification.	Closed

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
78	Commercial	There is a risk that DER are deterred from involvement in the project due to inconsistent messages from the project team.	FAQs in place as well as agreeing key messages and approaches in 1-2-1s beforehand.	Amber
79	Trials	There is a risk that the trials do not give enough data to provide an adequate conclusion of trial success.	The duration of trials, the number of DER participants and their reactive power capability have all been carefully considered to ensure sufficient data can be captured during the trials.	Green
80	Trials	There is a risk that generator dispatch impacts trial length or data to determine trial success.	Pre-trial training and monitoring activity during the trials will seek to ensure despatch are fully briefed on the trial service approach and encouraged to deploy the service, where appropriate.	Green
81	Technical	There is a risk that DER effectiveness for prolonged impacts on voltage is nullified by tap changers (identified from customer's test).	<ol style="list-style-type: none"> 1. Share DER list with Outage Planning and request that taps locked for duration of Trial. 2. Discuss design decision with NG and then with customer. 3. Plan to program tap changer optimisation in ZIVs algorithm for BAU. 	Amber
82	Technical	Risk of trial delay when migrating from the interim technical solution to the full solution.	Testing of the full solution before migration has been scheduled during the initial wave of trials (using the interim solution) to reduce risk of delay	Red
83	Technical	There is a risk that the project solution may not be compliant with the Electricity Balancing Guidelines for December 2019.	Commercial Analyst to investigate.	Red
84	Trials	Risk of lack of resource from requirements and nomination to deliver the wave 2 and 3 trials.	To review in November 2018 following the organisation restructure of these teams.	Amber

Risk #	Area / theme	Risk & Impact description	Mitigation / Update	Status
85	Technical	Risk on co-ordination of specific point testing for communications.	Plan to have one test environment for each of the pre-production and production set-up of the technical solution	Amber
86	Technical	Risk of delay if GE fail to deliver RTU Logic on time.	Detailed planning with GE to ensure tracking against key delivery dates	Amber

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