Power Potential – Webinar on commercial proposition (21st September 2017)

Summary document

Purpose of this document

This document is intended to support the webinar material published on the Power Potential website, summarising the content of the webinar and the Q&A session.

Webinar

General

The purpose of the webinar was to provide interested parties with an overview of the latest developments from the Power Potential project as we prepare for the 2019 trial – where Distributed Energy Resources (DERs) within the South East coast study area will be able to compete and be compensated for providing reactive power and active power services to the power system – and provide an opportunity to raise questions and seek feedback on the service proposition.

The webinar covered an introduction to the Distributed Energy Resource Management System (DERMS) – the ground-breaking new platform that Power Potential is creating – enabling communication between DERs, UK Power Networks and National Grid – and a deeper dive into the commercial arrangements being proposed for the project.

Overview of the project

The Power Potential project is funded through Ofgem's Network Innovation Competition (NIC) mechanism – receiving £8 million of funding. National Grid as System Operator (SO) is the project lead, in partnership with UK Power Networks. The project commenced in January 2017 and will complete at the end of December 2019, following a 12 month trial.

The purpose of the project is to develop technical and commercial solutions to maximise the use of DER to resolve transmission voltage and thermal constraints and explore a Distribution System Operator (DSO) route to market.

The project area is the South-East of England, as:

- This area has a high penetration of distributed energy resources (DERs) with connection volumes growing rapidly in recent years
- The transmission network has high interconnection with continental Europe, with HVDC links of 2GW at present, increasing to 5GW with future projects
- The network provides electricity to London via the East and West of the demand centre
- The voltage and thermal constrains at transmission network has made it complex for the SO to balance the system for varying network scenarios and conditions

There are four Grid Supply Points (GSP) in scope for the project – Bolney, Ninfield, Sellindge and Canterbury North.

It is anticipated that the Power Potential project will deliver the following benefits to customers and stakeholders:

- deferring the need for network reinforcement;
- enabling DER to participate to deliver market services;
- 3720 MW of additional generation in the area by 2050;

- savings of £412m for UK consumers by 2050.

Project Timeline

In the first year of the project – 2017 – the team are designing the interactions between all parties and the DERMS, as well working with interested parties to seek feedback and encourage participation. In 2018 will mark the build phase, ensuring the right systems, processes and equipment are in place. It will then be necessary to test the processes and participants capabilities, and the trial will run for the duration of 2019.

Technical update

During the webinar, participants were introduced to platform – Distributed Energy Resources Management System (DERMS) – which will facilitate communication between DER, UK Power Networks and National Grid. This platform is currently under development to ensure it meets technical and commercial requirements.

To provide clarity on the technical requirements of the Power Potential project, a 'Guide to Participating' will be made available via the Power Potential website. This will provide further information to interested parties on:

The services procured through the project –
- Active power generation or curtailment.
- Reactive power generated or absorbed.

How the services will be instructed –
- Instructions for active and reactive power services will be sent from UK Power Networks to the generator via the DERMS platform in order to provide transmission services to National Grid.
- DER will be instructed to a voltage droop control for the reactive power service and to an active power MW set-point.

How DER can establish if their plant is suitable –
- A suitable control system is required to provide voltage droop control at the connection point
- Technical specifications on generator capabilities can be discussed and, where possible, accommodated within the trial

Commercial framework

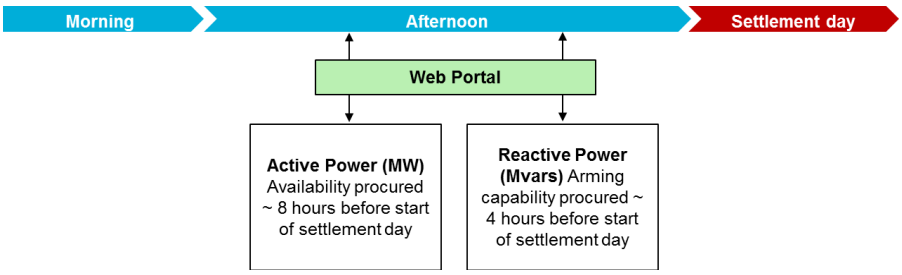
During the webinar, the Power Potential team's 'minded to' position was presented. Feedback on this position is welcome and will be combined with system requirements to shape the commercial arrangements.

The commercial framework has been designed to be simple, transparent and consistent with other services and market developments. The framework intends to encourage participation from existing and new participants, and provide a means to deliver operational efficiency to network operators.

Procurement process

Consideration has been given to the potential options, and strengths and limitations, of procurement timelines.

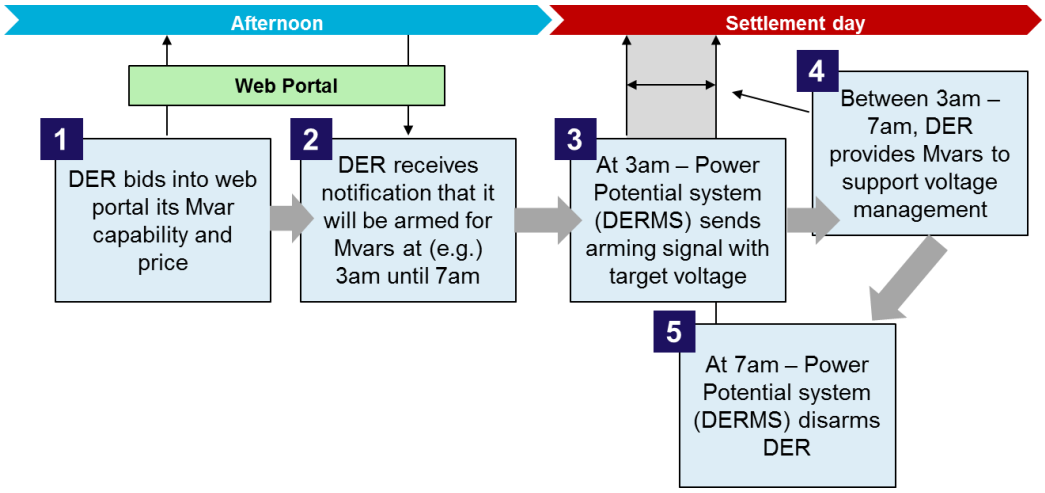
During the webinar, it was proposed that Power Potential services are procured at the day-ahead stage. Close to real-time, a participant holding a Power Potential contract would submit their price and availability for a reactive power or an active power service. The diagram presented (below) provides an indicative example.



Due to the time scales over which system requirements emerge, it is envisaged that active power will be procured approximately 8 hours ahead of time and reactive power approximately 4 hours ahead of time. At this point there would be firm commitment on both the parties delivering and procuring the service – to be available and to pay for availability, respectively.

Closer to real time procurement means that National Grid has a more accurate picture of requirements and providers should have a more accurate view of their availability.

The diagram below expands on this procurement process. At stage 1, a participant would submit its capability and price into the web portal. This would be assessed against National Grid's requirement for reactive power and the cost of alternative actions. If economic, the participant would then receive a notification that they will be armed for a certain target voltage between two time periods (approximately 4 hours ahead of time) – stage 2. When the start time arrives (stage 3) the Power Potential DERMS will send an arming signal, the service is delivered (stage 4) and at the end time, the service is disarmed (stage 5).



Contract design

For the pricing arrangements, two payments for the service are initially proposed – availability/arming payments and utilisation payments.

Contract aspect	Reactive Power (Mvars)	Active Power (MWs)
Arming or availability payments	Where arming capability is procured from DERs, arming payments will start from the beginning of the contracted block of hours, i.e. £/Mvar capability armed/hour	Where availability is procured from DERs, availability payments will start from the beginning of the contracted block of hours, i.e. £/MW/hour
Utilisation payment	Payments to be based on £/Mvarh instructed and delivered	Payments to be based on £/MWh instructed and delivered
Penalties	Our minded-to position is for more lenient penalties/performance factors while the trial is introduced – to be reviewed regularly once market is established	

A fundamental principle of the project is that the service will be market-based, and as such prices paid will be a reflection of the competition in the market and the cost of alternative actions that could be taken to solve voltage issues. The intention is that this will support a smooth transition from trial to 'business as usual'.

As with other Balancing Services provided to the transmission system, penalties are applied in situations where delivered services do not meet the procured levels to help ensure the power system stays within stable operating parameters. However, to maximise learning from the trial, it is possible that more lenient performance factors could be put in place, to be reviewed once the market is established. These 'penalties' entail a reduction in availability and/or utilisation payments made to providers, as established in each service contract, rather than a fine or charge being paid by the provider.

Next steps for the project include establishing a baseline methodology and monitoring approach to measure delivery of the service.

Provision of multiple services

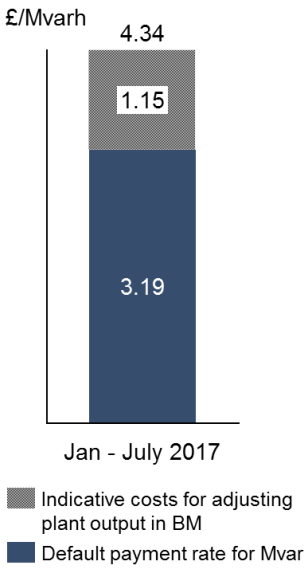
Where possible, participants are encouraged to deliver both the reactive and active powerservices. With regards to compatibility of Power Potential services and other energy balancing services, analysis suggests that National Grid's Balancing Services are broadly compatible with reactive power services, as Mvars can be delivered without impacting MW output in most circumstances.

For Power Potential's active power service (which may be used for transmission constraint management), there is an increased potential for conflict. For example, Short Term Operating Reserve (STOR) may require a participant to increase MW output for national energy balancing, while there is a local need to curtail generation in the project area. Due to potential nullifying actions, if a participant is already available to deliver a National Grid Balancing Service, it may be necessary to restrict the provision of active power service for Power Potential during the trial.

Market value

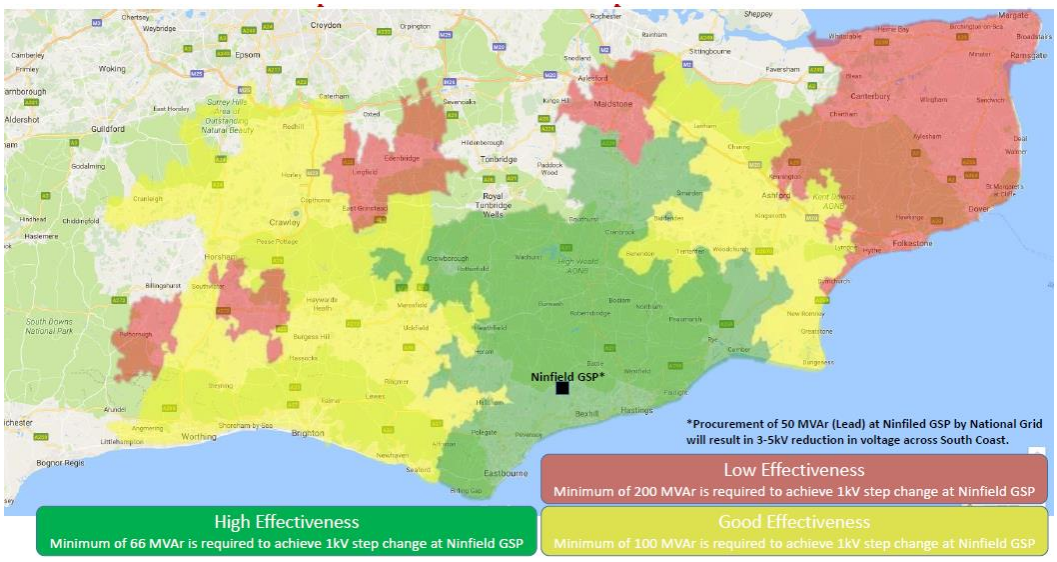
At present reactive power requirements are met by transmission connected generators through the mandatory reactive power market, with little to no participation in the commercial reactive power market. The cost of procuring reactive power through this route comprises of the default payment – standard across all generators – and possibly a positioning cost, if a generator's output needs to be

adjusted in order for them to deliver the service. The average price paid for this service between January and July 2017 is shown the in chart below, as an indication of the historic price of reactive power in the project area.



These figures should not be interpreted as guaranteed prices for the Power Potential trial, or possible maximum or minimum payments – they are presented as an illustration of historic value, to be used as a starting point for cost-benefit analysis.

To further support decision making, the Power Potential team will be creating 'heat maps' per Grid Supply Point (GSP), illustrating the effectiveness of DER in providing support to the wider Network based on their geographic location. The example of the Ninfield GSP is shown below.



Effectiveness is shown through the use of three colours, ranging from green indicating the most effective area, through yellow, to red as the least effective. The heat maps are intended to be used by DER when considering the price entered into a tender.

Next steps

The following steps are recommended for owners and aggregators of DER:

- With the aid of the effectiveness heatmaps, confirm your assets are located within the project area
- Using the 'Guide to Participating' (published on the Power Potential website) and work with your relevant technical teams to determine the capacity the participant plant would be able to offer and understand if any changes would be required in the generation plant to participate in Power Potential
- Decide which service(s) to pursue – this could be reactive power or active power, and where possible, both
- Work with your commercial teams to understand the cost and potential benefits, in order to determine whether participation in Power Potential would be cost effective
- More generally, contact a member of the Power Potential team with any questions

Next steps for the project include:

- Continued engagement. We want to hear from you – what additional information would help you to participate in the project?
- Further development of the DERMS to ensure the platform facilitates the stakeholder interactions and services required
- Developing and refining the commercial arrangements – further updates will be communicated on contracts, requirements for pre-qualification and testing, and how to establish an appropriate baseline methodology for settlement

Question and Answer session

Q:
How many hours can a typical participant expect to be available and utilised?
A:
The volume of availability and utilisation will depend on both system needs and the cost of alternative actions in the region. However, below are three scenarios, detailing actions at GSP level, to provide an indication of frequency of instruction.

BOLN4 – Bolney GSP
NINF4 – Ninfield GSP

Scenario 1: Reactive power service to manage Transmission High Voltage.

- Utilisation of 100Mvar absorbing at BOLN4 and 50Mvar absorbing at NINF4
- Service instructed 80% of nights all year round, and 75% of weekends between 11:00 and 15:00 when embedded generation suppresses system demand
- Frequency of instruction: frequent

Scenario 2: Reactive service to manage a Transmission Voltage Export Constraint

- Utilisation of 10Mvar producing at BOLN4, 10Mvar producing at NINF4, and service armed to inject producing Mvars following a voltage deviation
- Service driven by outages on the transmission system and by interconnector flows on the South coast

- It is anticipated that the service would be instructed during times of peak system demand when interconnectors are flowing full into the GB system
- Frequency of instruction: infrequent

Scenario 3: Active Power Service to manage a transmission thermal constraint

- Instruction to curtail active power to manage flows on the transmission system so they remain within acceptable asset short term ratings
- Requirement for the service is driven by planned and unplanned transmission outages and existing and future interconnector flows and exports from the DNO network
- One example of an instruction could be to curtail 100MW from BOLN4 GSP when export levels on the South coast exceed transmission asset short term ratings
- Frequency of instruction: infrequent

Q:
Will compensation to cover the cost of upgrading assets be available to participants?
A:
The project team have considered a number of options to support participation in the trial. Compensation towards the cost of investment is unlikely to be available, in the interest of fairness to parties looking to deliver a 'business as usual' service after the trial ends. However, recognising the innovation of the service, the project is minded to more flexible performance factors for the delivery of the service.

We will continue to explore options for increasing the attractiveness of the commercial proposition and communicate further updates over the coming months.

Q:
Will set points for reactive power be fixed or dynamic? This will impact the level of investment required.
A:
The voltage set point will reflect material changes of the voltage on 400kV network. For example, we would envisage change in the following periods: set point 1 for the period 06:00 to 10:00, set point 2 from 10:00 to 13:00, set point 3 from 13:00 to 15:00, set point 4 from 15:00 to 18:00, set point 5 from 18:00 to 23:00, set point 6 from 23:00 to 06:00.

General observations

It was noted that the trial is a year in duration and that confidence is required in the longer term to support investment and participation. The project team recognise this and will investigate whether further information regarding future requirements can be made available to support DER decision making.

A common theme of innovation projects is the time taken to scope and define arrangements. In order to remove barriers to entry and maximise participation, service providers require sufficient time to engage with the market and develop their response/solution. To support this, the Power Potential team will endeavour to provide as long a lead time as possible.