Power Potential webinar

Thank you for joining our webinar.

The call will begin at 2pm. You are on mute and will remain muted until we open the session for Q+A. If you have any questions please send them to box.powerpotential1@nationalgrid.com during the call.

Power Potential webinar

Webinar for interested parties

29 January 2018

Hosted by: Kameesh Phillips – Senior Commercial Analyst

Agenda

1. Introductions and objective
2. Project progress
3. Commercial framework
4. Market value
5. Q&A

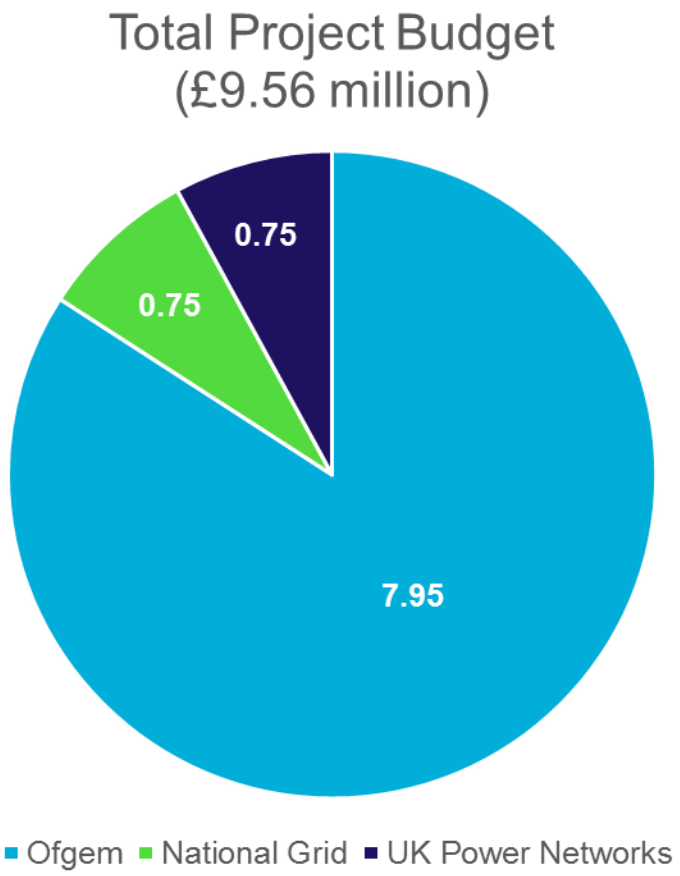
Power Potential - key facts

- Funding mechanism: Ofgem Network Innovation Competition (NIC)
- Project Lead

  nationalgrid

  In partnership with:

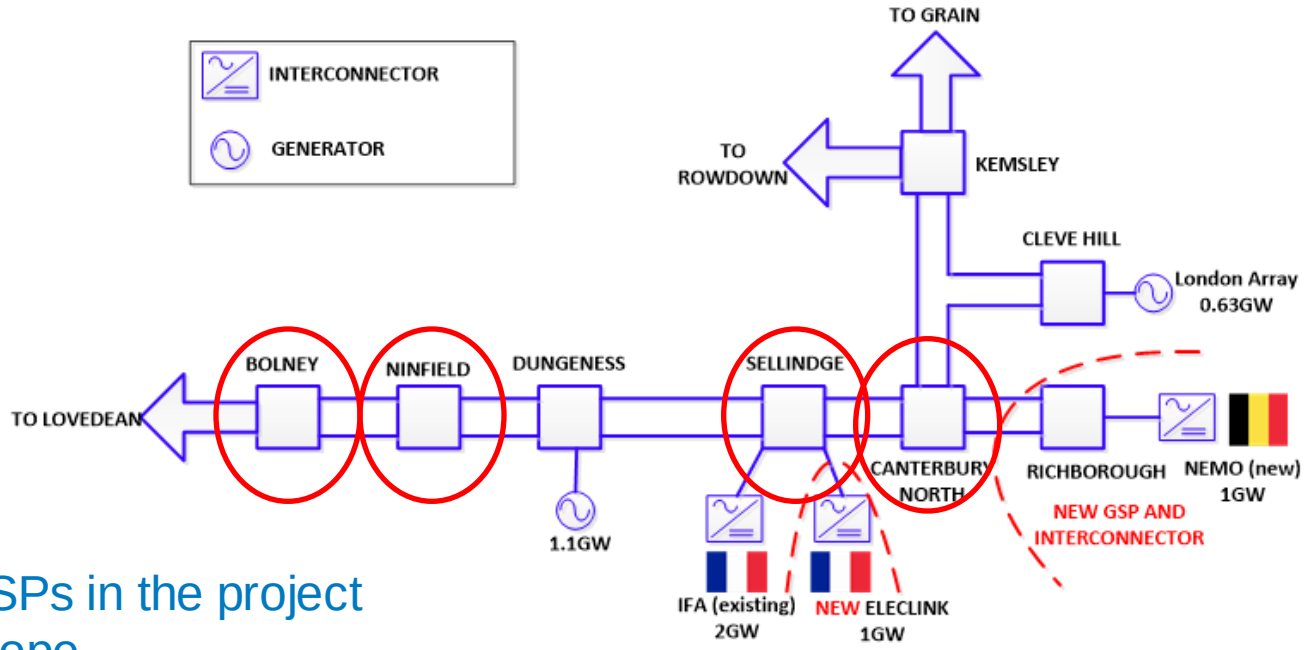
  UK Power Networks Delivering your electricity
- Start Date: Jan 2017
- End Date: Dec 2019



Power Potential in a nutshell

The project will focus on the creation of a regional market for DER connected to the distribution network to provide the following services to the System Operator:

1. Dynamic Voltage Support (MVAr for low and high volts)
2. Active Power Support for constraint management and system balancing



GSPs in the project scope

The Trial Area

Customers and stakeholder benefits

- The project will help enable more customers to connect in the South East and for new and existing customers with the possibility of providing services to National Grid and accessing additional revenue streams
- Services procured from DER will be coordinated such that operation of the distribution and transmission networks are kept within operational limits and constraints are not breached
- Defer network reinforcement needs in the transmission system
- When deployed, Power Potential can deliver:

3720 MW of additional generation in the area by 2050

Savings of £412m for UK consumers by 2050

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Technical update

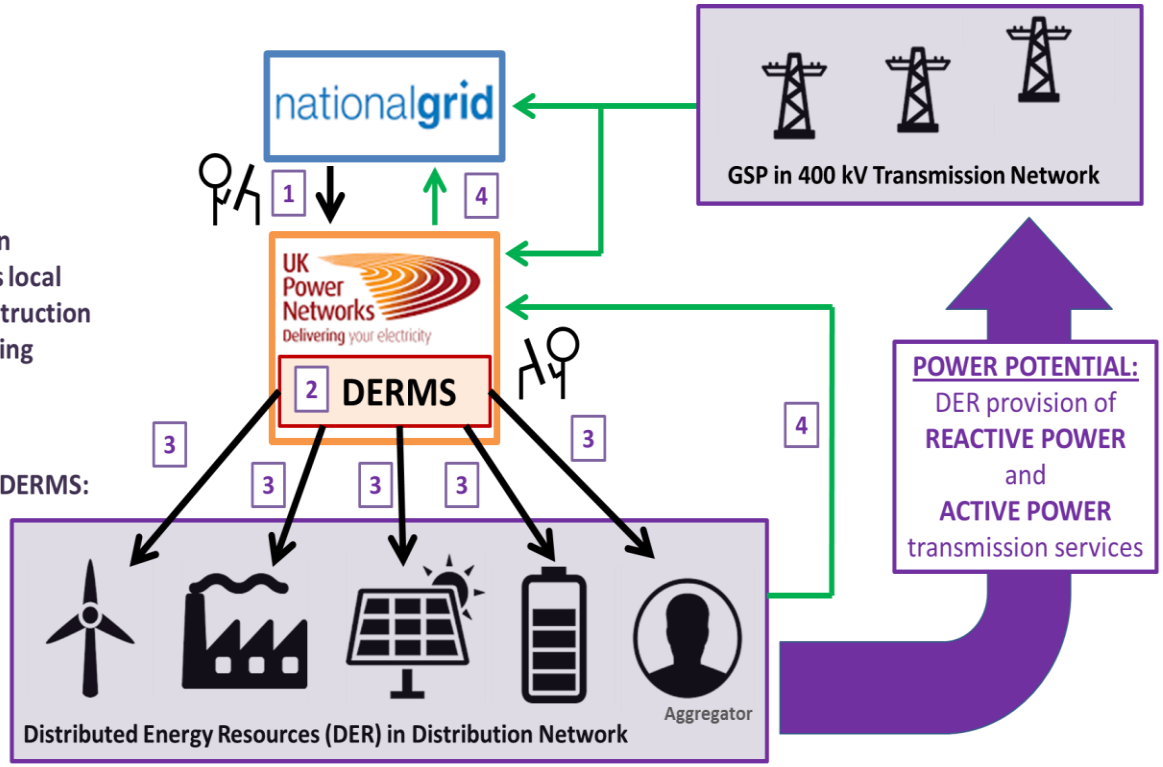
Technical solution - DERMS (Distributed Energy Resources Management System)

1 NG instruction to DERMS:
REACTIVE: V set-point at GSP
ACTIVE: MW set-point at GSP

2 DERMS calculates free capacity in distribution network and adjusts local DER set-points to achieve NG instruction at the lowest cost without violating distribution network constraints

3 DER receive local instruction by DERMS:
REACTIVE: V set-point at DER
ACTIVE: MW set-point at DER

4 DERMS monitors the service delivered by DER



Requirements for participating

Services procured through Power Potential

- Reactive Power service
- Active Power service

General conditions for participation

- Conditions for participation defined in the new technical documentation (**DER Technical Characteristics Submission Spreadsheet** and **DER Technical Guidance**).
- Minimum requirements defined for synchronous and non-synchronous DER to participate in one or both services, e.g.:
- **Reactive Power** participants expected to be armed in droop mode to automatically deliver changes in reactive power in response to voltage changes.
- **Active Power** participants expected to deliver and manage a change in their active power output.

What's next? Indicate interest in providing one/both services

- Complete the **DER Technical Characteristics Submission Spreadsheet** using the **DER Technical Guidance.**
- Submit this information by **26th of February** to participate in Power Potential.

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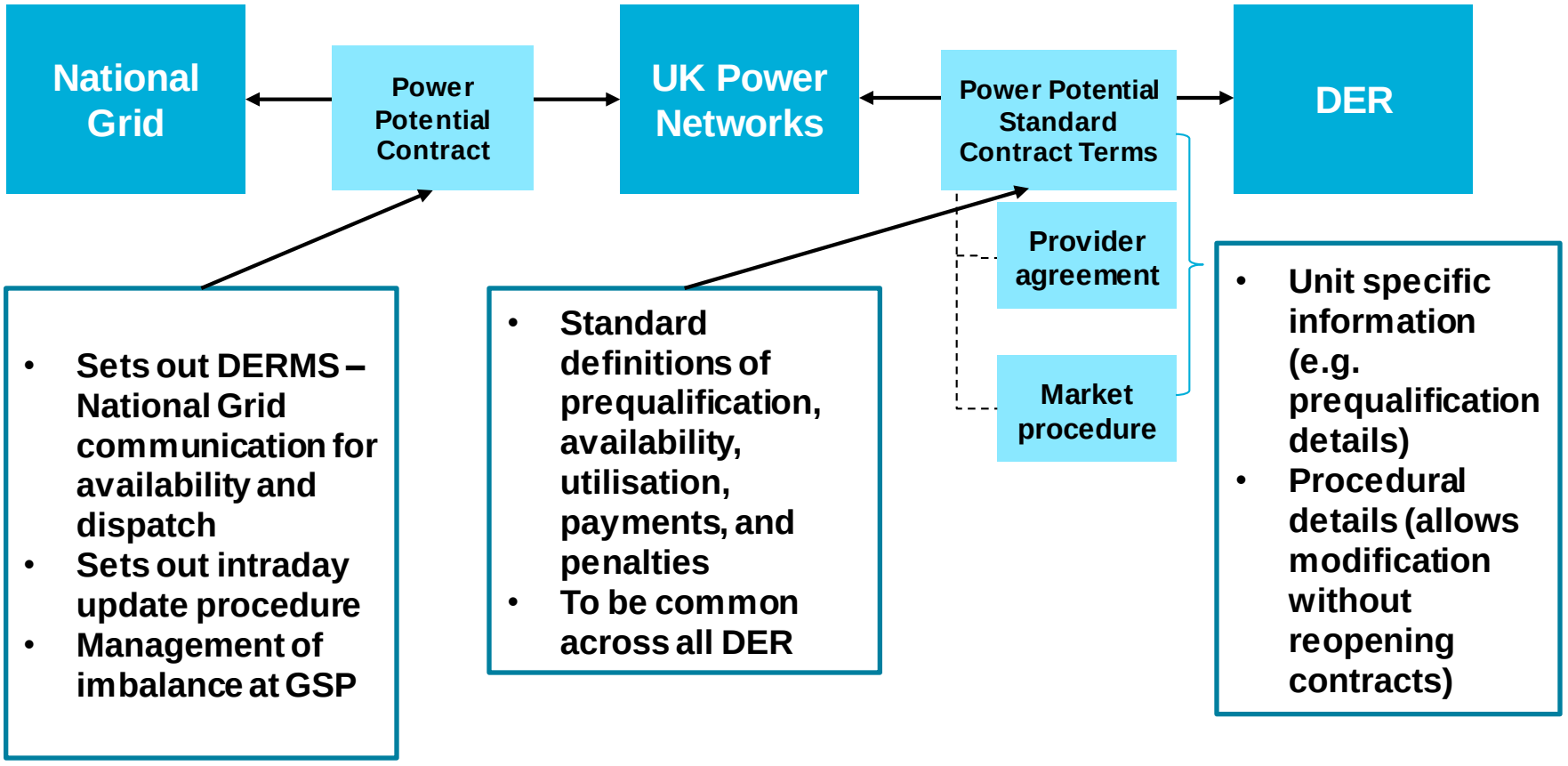
Current status of the Commercial Framework

- The framework has been designed to:
  - Be **simple**, **transparent**, and **consistent** with the design of other flexibility products
  - **Encourage recruitment of existing and new entrant DER** into Power Potential
  - Provide the means to **deliver operational efficiency to network operators** over the longer term
- Draft Heads of Terms have been published and capture the detail of the commercial framework.

Contractual Framework



Trial Design

- The trial design will be in line with the following principles:
  - Maximise opportunities to demonstrate the technical solution
  - Aligned to real time operational requirements*
  - Balance the need to explore innovative models with the desire to design a commercial framework which is simple, transparent and consistent with the design of other flexibility products
- The commercial framework outlined in our draft Heads of Terms document will be the primary model explored during 2019

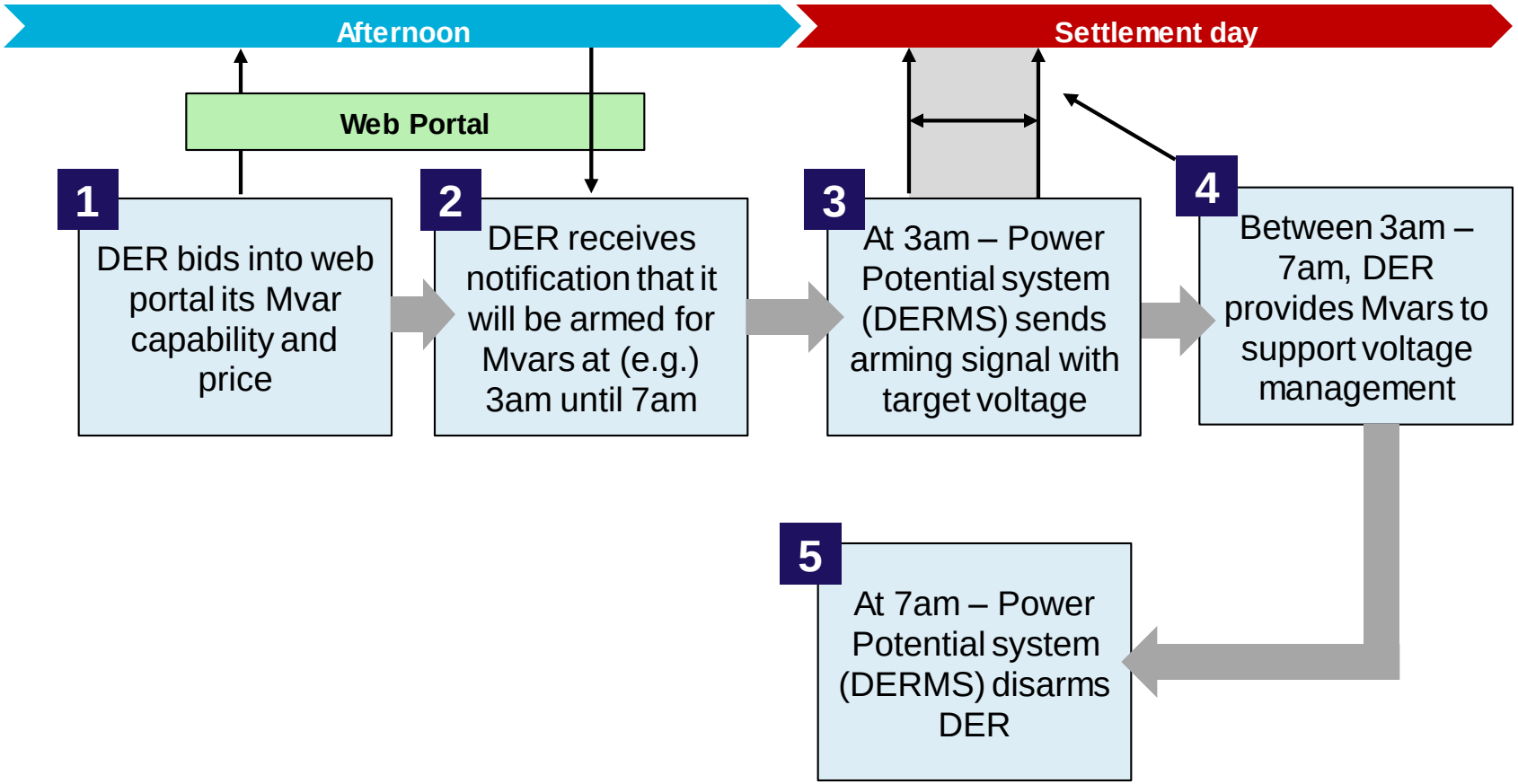
* Mvar's procured under Power Potential will not be used to secure the system during 2019 until the technical solution is proven. The project will seek to procure in line with genuine operational requirements

Heads of Terms - Contract design

Contract aspect	Reactive Power (Mvars)	Active Power (MWs)
Availability payments	Where a service is procured from DER, availability payments will start from the beginning of the contracted period, i.e. £/Mvar/h	No availability payment for the active power service.
Utilisation payment	Payments to be based on £/Mvarh instructed and delivered	Payments to be based on £/MWh instructed and delivered
Prequalification & testing	Interested parties must complete and submit the Technical Req. document UK Power Networks will outline any testing and monitoring requirements as a condition of participation in the trial Reactive service providers should be able to automatically deliver changes in reactive power capability in response to system voltage changes Active power service providers must be able to provide the service for a minimum of 30 minutes	
Penalties	During the trial, availability payments will be scaled back in any given month if delivery is less than 80% against the service instructed. The availability payment will be scaled back by the proportional percentage of service undelivered	

Process in practice

- Using Reactive Power as an example



Provision of multiple services

Other service	Reactive Power (Mvars)	Active Power (MWs)
National Grid's Balancing Services (MWs)	Provision of both Balancing Service and a reactive power service is possible, provided the performance of the existing Balancing Service is not compromised, e.g. by curtailing MW availability to provide Mvars	Provision of both services simultaneously is not possible as the services would counteract each other e.g. increasing MW output to deliver STOR/FFR, whilst curtailing MW output for constraint management

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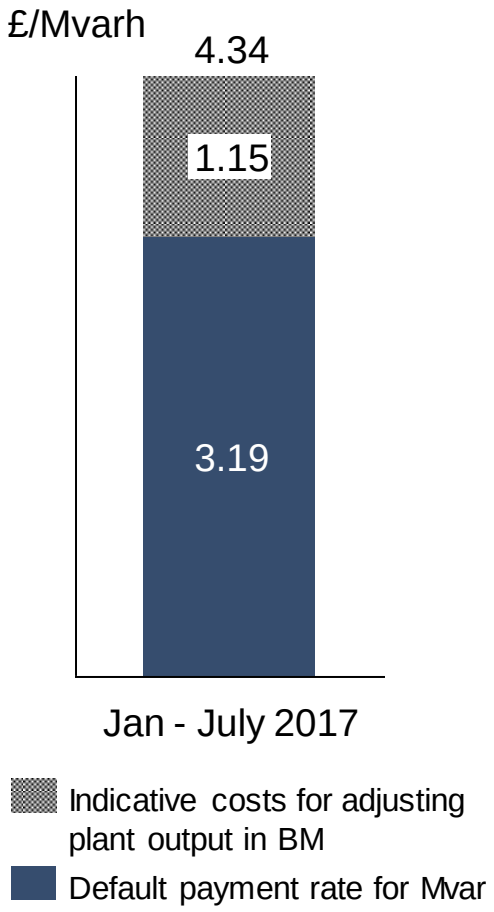
Typical availability & utilisation expected

Scenario 1	Reactive power service to manage Transmission High Voltage.	• Utilisation of 100Mvar absorbing at BOLN4 and 50Mvar absorbing at Ninfield 4 • Service instructed 80% of nights all year round, and 75% of weekends between 11:00 and15:00 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 Bolney 4, 10Mvar producing at Ninfield 4, 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 Bolney 4 GSP when export levels on the South coast exceed transmission asset short term ratings • **Frequency of instruction: infrequent**

Historic value of reactive power

- The current cost to National Grid of procuring reactive power, comprises:
  - The default payment rate (i.e. £/Mvarh)
  - Costs incurred in the Balancing Mechanism in order to access Mvars, including
    - Positioning cost (i.e. £/MWh)
    - Negative reserve creation cost (i.e. £/MWh)
- The default payment rate usually represents the minimum cost to National Grid, while the other costs are additional and sometimes incurred
- Note that this is intended to give an indicative range of the current value of 1 Mvarh. Power Potential will be a competitive procurement mechanism where achieved prices could differ from this value.

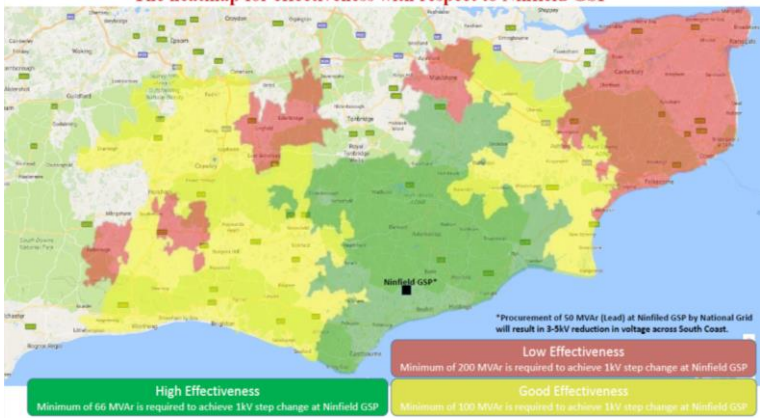


Reactive power heatmaps

- These heat maps are used to represent how effective certain sites will be at meeting Reactive power requirements in different areas
- The value function used to create these heat maps will also be used in the assessment of DERs' bids

The heatmap for effectiveness with respect to Bolney GSP

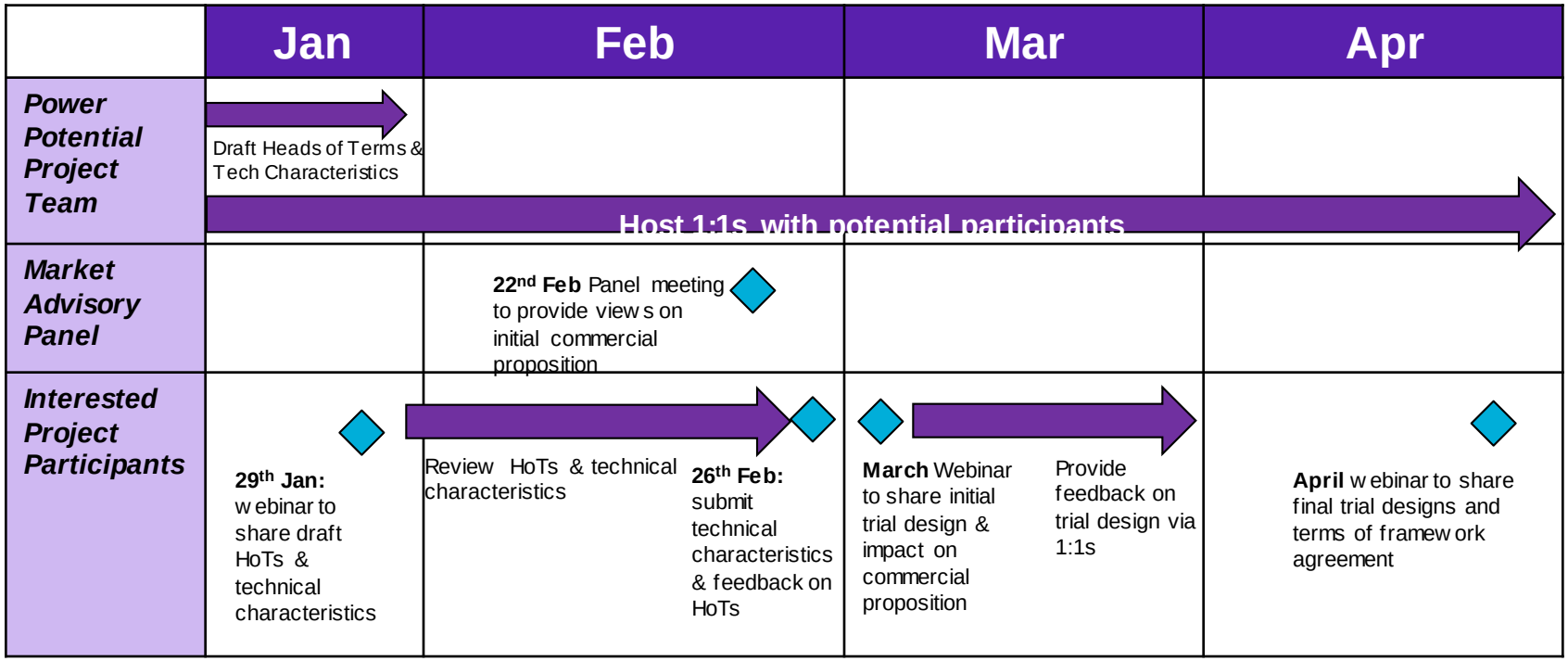
The heatmap for effectiveness with respect to Ninfield GSP



The heatmap for effectiveness with respect to Sellindge GSP

The heatmap for effectiveness with respect to Canterbury GSP

High Level Timeline



Next steps

- Once you're comfortable with the services:
  - Determine the capability and changes (if any) you would need to make to your generation plant
  - With your commercial team, assess if taking part in the trial will be cost effective
  - Complete and submit **DER Technical Characteristics Submissions Spreadsheet** along with any comments on the Heads of Terms by **26th February 2018**.
  - If you have decided you want to participate or have any questions relating to this document or Power Potential in general, then please contact us to discuss

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Thank you for listening

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www.nationalgrid.com/powerpotential