Thank you for joining our webinar.

The call will begin at 1 pm. 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
Power Potential webinar

Webinar for interested parties
26 March 2018
box.PowerPotential1@nationalgrid.com
Hosted by: Amy Boast & Tatiana Ustinova
## Agenda

1. Introductions and objective
2. Update on project progress
3. Addressing technical queries
4. Addressing commercial queries
5. Next steps
Power Potential in a nutshell

The project will create a regional market for Distributed Energy Resources (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
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Update on Project Progress

- **Design** • Jan 17 – Dec 17
- **Build** • Jan 18 – Jun 18
- **Test** • Jul 18 – Dec 18
- **Trial** • Jan 19 – Dec 19

- DER trial requirements
- Trial recruitment
- Testing of the solution
- Commercial arrangements
- Trial participation
## Update on Project Progress

<table>
<thead>
<tr>
<th>Power Potential Project Team</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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<tbody>
<tr>
<td>Draft HoTs</td>
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<td>Design trials</td>
<td>Refine trial design &amp; HoTs</td>
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<tr>
<th>Market Advisory Panel</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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<tbody>
<tr>
<td>22nd Feb Panel meeting to provide views on initial commercial proposition</td>
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<tr>
<td>9th Mar Panel meeting to provide views on trial design &amp; refined commercial proposition</td>
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<thead>
<tr>
<th>Interested Project Participants</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
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<th>May</th>
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<tbody>
<tr>
<td>29th Jan: webinar</td>
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<tr>
<td>Review HoTs &amp; technical requirements</td>
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<tr>
<td>26th Feb: submit technical requirements &amp; feedback on HoTs</td>
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<tr>
<td>W/C 26th Mar Webinar to share initial trial design &amp; impact on commercial proposition</td>
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<td>6th Apr surgery</td>
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<td>11th Apr surgery</td>
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<tr>
<td>Mid May webinar to share final trial designs and terms of framework agreement</td>
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### Heads of Terms (HoTs)
### Technical Characteristics Submission Spreadsheet (TCSS)
Update on Project Progress

- 13 submissions, representing 18 sites, from varying technology
- Confidence in reactive volumes at DER level of 79.3 MVar (lead) and 69.3 MVar (lag)

We continue to welcome submissions of technical characteristics from sites within the trial region looking to participate in Power Potential
You Said…

- “We welcome day ahead procurement”
- We need further clarity on **technical** aspects of the project:
  - Prequalification and testing requirements
  - Metering requirements
  - How often instructions will be sent?
- We need further clarity on **commercial** aspects of the project:
  - Interaction with the provision of other balancing services
  - Need to recover costs related to the participation – to avoid incurring losses in the trial
<table>
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Reactive Power: example

Reactive Power service process:

1. Afternoon
   DER bids into web portal its MVAr capability and price

2. Web Portal
   DER receives notification that it will be armed for MVAr at (e.g.) 3am until 7am

3. Settlement day
   At 3am – Power Potential system (DERMS) sends arming signal with target voltage

4. Between 3am – 7am, DER provides MVAr to support voltage management

5. At 7am – Power Potential system (DERMS) disarms DER
Reactive Power service: expected payments

- Reactive Power service process:

  - For the contracted period (Window from 3 am to 7 am):
    - **Secured availability payment (£/Mvar/h)**
    - **Potential utilisation payment (£/Mvarh)**

**Example:**
- Availability payment: 20 Mvar available for 4hr @£1/Mvar/hr = £80
- Utilisation payment: 5 Mvar used for 30 mins @£2/Mvarh = £5
- **Total payment:** \(20 \times 1 \times 4 + 5 \times 0.5 \times 2 = £80 + £5 = £85\)
Reactive Power service: DERMS instructions

- DERMS instruction to DER for availability:
  - DER armed in voltage droop control mode for the contracted window: *droop slope (4%) and voltage set-point.*
  - DER is kept operating at nominal level (DERMS adjust set-points if needed).

- DER Utilisation scenarios:
  - **NG instruction via DERMS:** *change in DER voltage set-point to achieve a NG request.*
  - **Dynamic response to system event:** *DER automatic response to voltage change followed by change in DER voltage set-point to maintain support.*
Technical feedback from 1:1 meetings

- UK Power Networks-DER interface
- Testing
DER interface requirements specification

- Scope of document
  - System architecture and responsibilities
  - Functional requirements
    - E.g. active power and voltage set point
  - Non-Functional requirements for DER substation interface
    - E.g. interface to DER substation / communications protocol

We will publish this specification via our website after Easter
Substation DER interface
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will I be metered?</td>
<td>UK Power Networks Remote Terminal Unit at the DER Point of Connection (POC)</td>
</tr>
<tr>
<td>Who is paying for the RTU?</td>
<td>Power Potential project covers costs such as Remote Terminal Unit (RTU) installation or upgrade</td>
</tr>
</tbody>
</table>
| Which communications protocol is used to communicate with the UK Power Networks RTU? | **New installations:** DNP3 over TCP/IP.  
**Existing installations:** Agreement for different approaches subject to approval.                                             |
| What type of cable is used to communicate with the RTU?                | CAT5e or optical fibre cable depending on the distance or cable routings. This falls under customer’s responsibility.               |
| How can I enter my bids?                                               | Via web-portal (designed as webpage or mobile app) provided by the project. Internet connection is sufficient                         |
| Does web-portal affect my control system?                              | DER web-portal is not related to and does not affect DER control system.                                                               |
Testing

• Testing will be carried out in the 2nd half of 2018 and take 2-3 days.

• Dates will be agreed between UK Power Networks and the Customer to avoid/minimise disruption

• The tests will include, for example:
  o DER speed of response
  o Technical capability
  o Communications

We intend to publish our Testing Guidance Document over the next few weeks
Agenda

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## Provision of multiple services

<table>
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<tr>
<th>Other service</th>
<th>Reactive Power (MVAr)</th>
<th>Active Power (MWs)</th>
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</thead>
<tbody>
<tr>
<td>National Grid's Balancing Services (MWs)</td>
<td></td>
<td>Provision of both services simultaneously is not possible as the services would counteract each other. Conditional provision i.e. outside of any period where the plant is contracted to provide National Grid Balancing Services is possible.</td>
</tr>
</tbody>
</table>

### Can I Participate?

<table>
<thead>
<tr>
<th>Service</th>
<th>Can Participate?</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Frequency Response</td>
<td>Yes</td>
<td>Yes – Conditional outside of any period where the plant is contracted to provide FFR</td>
</tr>
<tr>
<td>Short Term Operating Reserve</td>
<td>Yes</td>
<td>Yes – Conditional outside of any period where the plant is contracted to provide STOR</td>
</tr>
<tr>
<td>Demand Turn Up</td>
<td>Yes</td>
<td>Yes – Conditional outside of any period where the plant is contracted to provide the DTU service</td>
</tr>
<tr>
<td>Capacity Market Contract</td>
<td>Yes</td>
<td>Tbc – the service is not classed as a relevant balancing service and penalties could apply under CM rules</td>
</tr>
<tr>
<td>Flexibility services to UKPN</td>
<td>Yes – Conditional if Q reduces by change in active power</td>
<td>Yes – Conditional if there is conflict of simultaneous signals regarding active power output</td>
</tr>
<tr>
<td>Non-Firm Connections</td>
<td></td>
<td>Non–firm embedded providers will be allowed to participate in the Power Potential trial. Under the active service the project is likely to be requesting a reduction in active power which is in line with services under ANM.</td>
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</table>
The objectives of the Power Potential trials are to:

- Demonstrate proof of concept
- Establish the commercial viability of this approach

Our principles are:

1. **Market efficiency**
   i. Level of stimulus to DER – promote participation
   ii. Efficient allocation of budget & in line with project budget

2. **Operational**
   i. Maintain system security by not utilising trial volume to secure system
   ii. Trials to follow operational profile requirements for reactive power

3. **Continuous review of applicability to business as usual** – to provide projections for future use
Designing trials for 2019: current thinking

A) Fixed fee for fixed number of hours

Objective: Demonstrate proof of concept by:
1) Simulating and measuring voltage response following a rapid change/drop of the voltage on transmission system
2) Measuring effectiveness of DER delivery at GSP

DER will receive a fixed fee for a fixed number of hours for this wave.

B) Price discovery

Objective: Establish the commercial viability of this approach by:
1) Fixing the number of hours we run daily auctions for
2) Applying learning from phase A by assessing bids in line with DER effectiveness

DER will compete with each other in day ahead auctions.

C) Transition to BAU

Objective: Prepare DER to transition to current business as usual operations by:
1) Fixing the number of hours we run daily auctions for
2) Applying a cap to the bids we accept in line with the mandatory price, with consideration of DER effectiveness

DER will compete with each other and the mandatory market in day ahead auctions.
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Ongoing work

We continue to finalise several details and will share these with you as soon as possible. These include:

- Power factor studies to investigate the potential for greater service delivery and the impact this might have on connection agreements
- How to resolve any impact that delivering reactive power services may have on Distribution Use of System (DUoS) charges
- DER interface requirements specification
- Testing Guidance Document
- Specific details on trials design (number of hours and fixed fees)
# Next Steps

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<td><strong>11(^{th}) Apr surgery</strong></td>
<td><strong>Invitation for DER to sign onto Power Potential framework agreement</strong></td>
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**Heads of Terms (HoTs)**
**Technical Characteristics Submission Spreadsheet (TCSS)**
Thank you for listening

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www.nationalgrid.com/powerpotential
The project team

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