

Power Potential webinar

Thank you for joining our webinar. Please ensure you join the call via a phone.

The call will begin at 11:30. 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

16 May 2018

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Hosted by: Amy Boast & Tatiana Ustinova

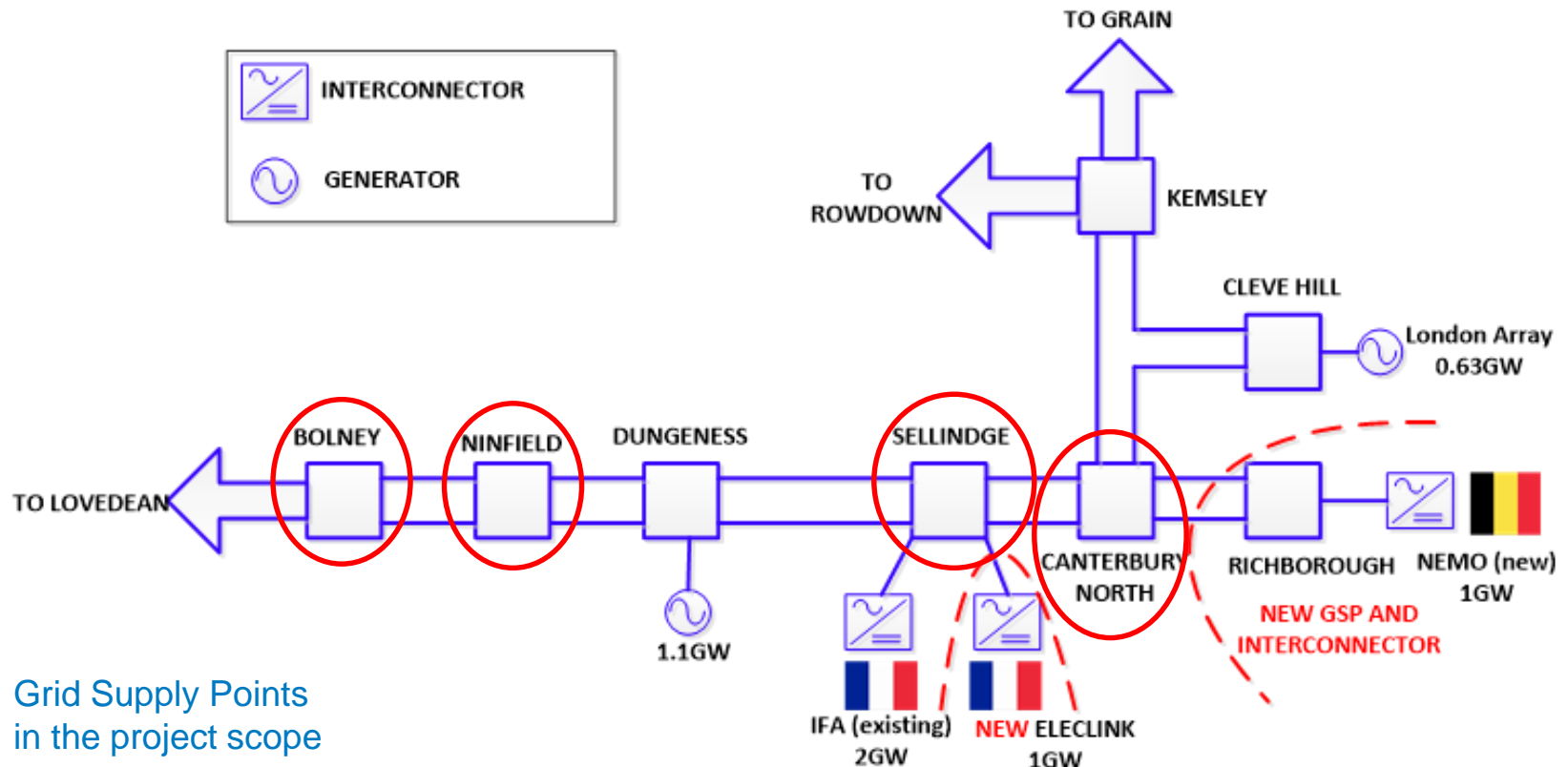
Agenda

1. Introductions and objective
2. Update on the commercial proposition
3. Update on common queries
4. Next steps

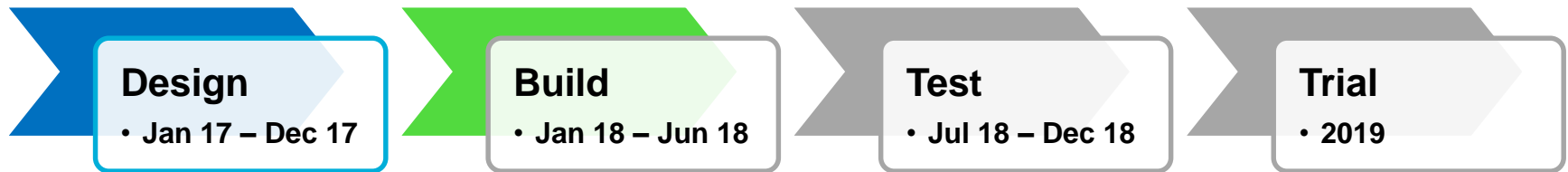
Power Potential in a nutshell

Creating a regional market for Distributed Energy Resources (DER) connected to the distribution network to provide the following services to the System Operator:

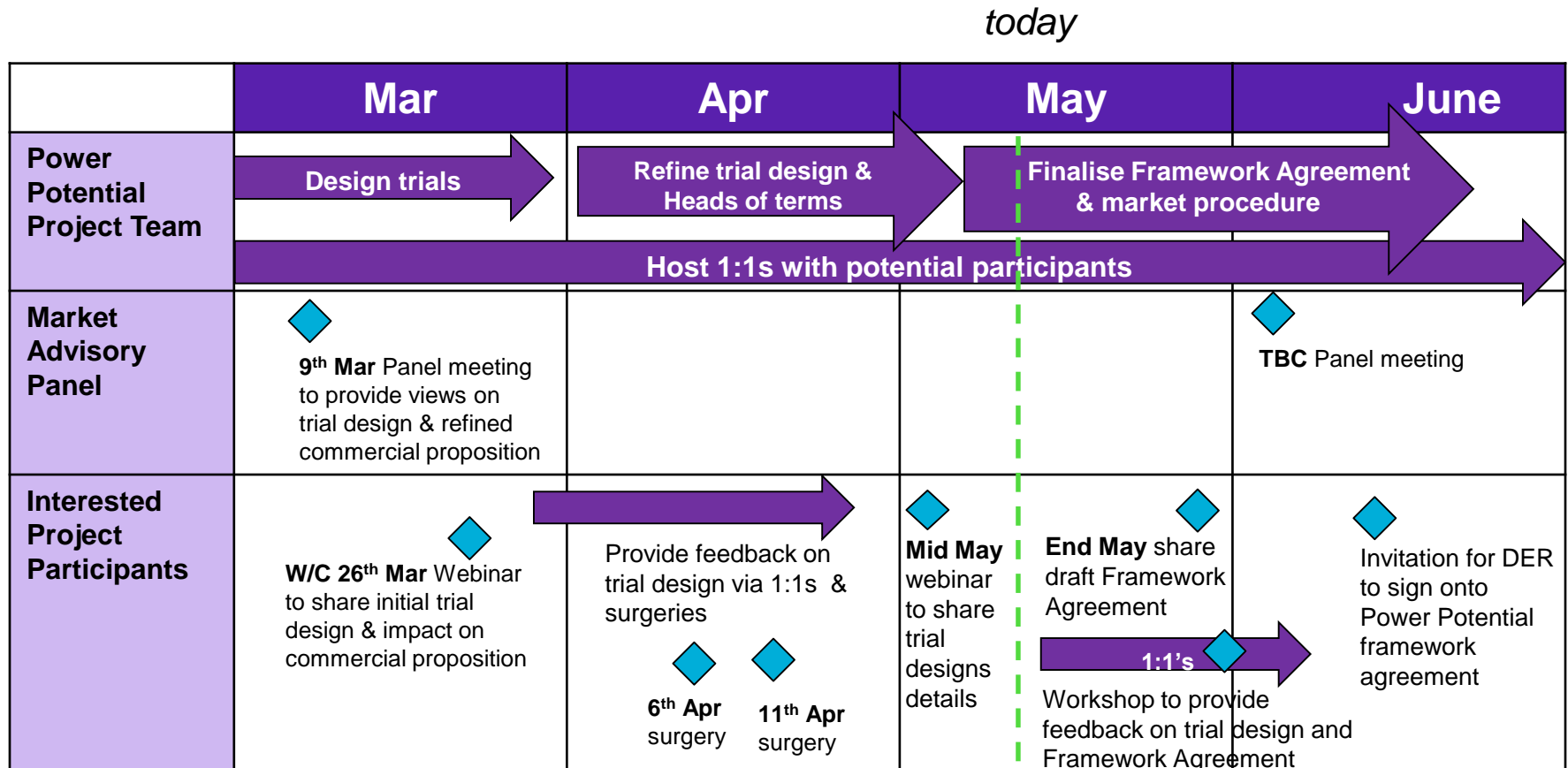
1. Dynamic voltage support (MVAR for low and high volts)
2. Active power support for constraint management and system balancing



Project timeline



Project timeline

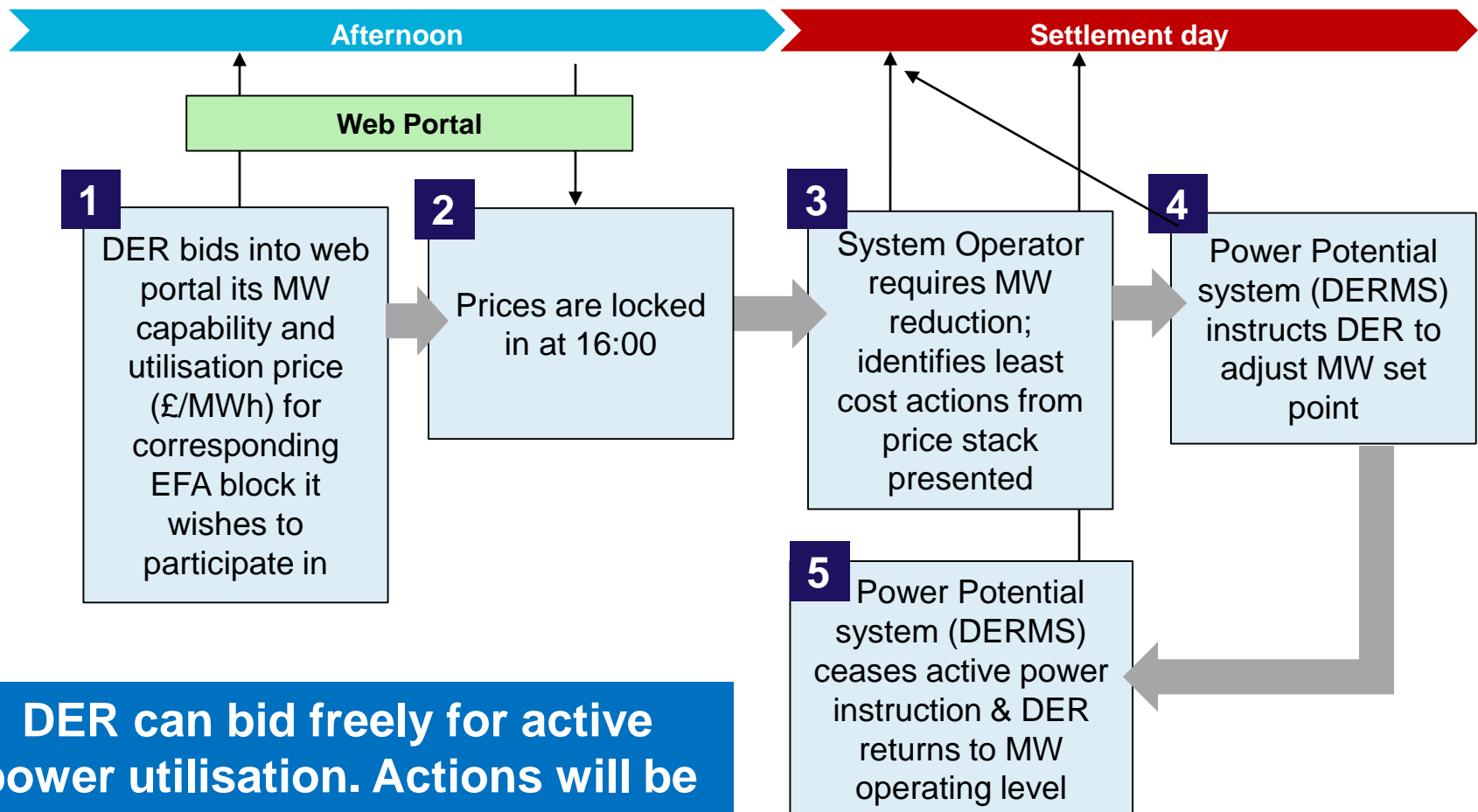


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Active power service

- Example of active power service process:



Reactive power service – design principles

- 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 (~£700k available for service payment)
 - 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**

Reactive power service

Wave 1) 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.

Wave 2) 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 wave 1 by assessing bids in line with DER effectiveness

DER will compete with each other in day ahead auctions.

Wave 3) 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) Assessing bids against the transmission market alternative, with consideration of DER effectiveness

DER will compete with each other and the transmission market in day ahead auctions.

Wave 1) Fixed fee for fixed number of hours

- A maximum of **£335,000** will be available for payments in wave 1 of the trials
- Payments will be made on a site specific basis, for **availability only**
- As effectiveness of service delivery will be deduced during wave 1, no utilisation fee will be paid during wave 1
- Maximum payment available per site during wave 1 is £18,000 - £20,000, subject to total number of trial participants
- Payments will be made proportionately to the number of hours each site is made available (up to 1850 hours across winter & summer):

% of £18,000 - £20,000 recoverable	Availability thresholds
0%	0%
60%	25%
70%	50%
80%	60%
100%	80%

Payments for wave 1 will be made to sites who demonstrate their capability until late 2018, or this budget is exhausted

Wave 2) Price discovery

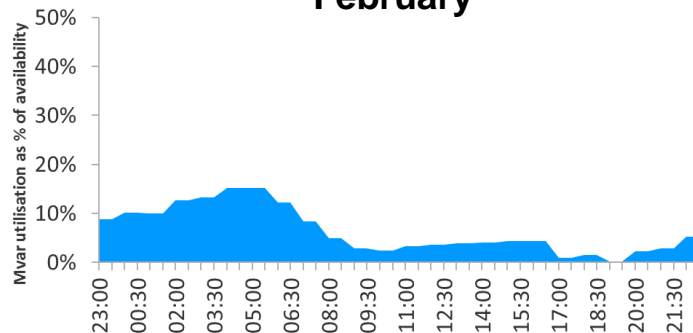
- Competitive auctions will run for a minimum of **1800 ‘market hours’**
- Availability volumes will be between **10 – 50 Mvar** to be held across the Grid Supply Points during market windows
- Participants can bid freely for utilisation and availability. Bids will be assessed on a least cost basis, and in line with DER effectiveness.

Actual availability volumes will be determined at day ahead in line with system needs

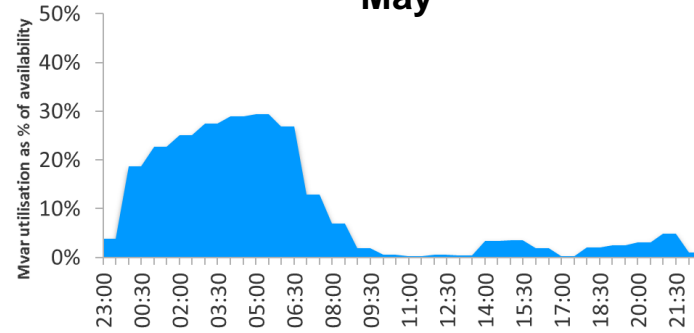
Indicative utilisation profile at transmission level

- Whilst availability may be flat across the day, utilisation volumes will fluctuate
- To support DER in assessing their participation in the trial, historic utilisation profiles will be published on our website
- The graphs below show daily utilisation volumes on 1Mvar of availability (averaged data collected April 2016 – April 2018)

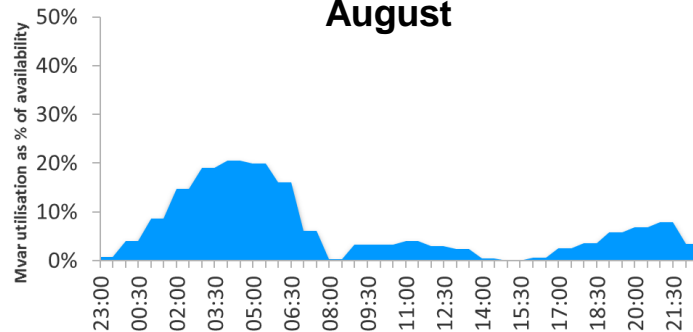
February



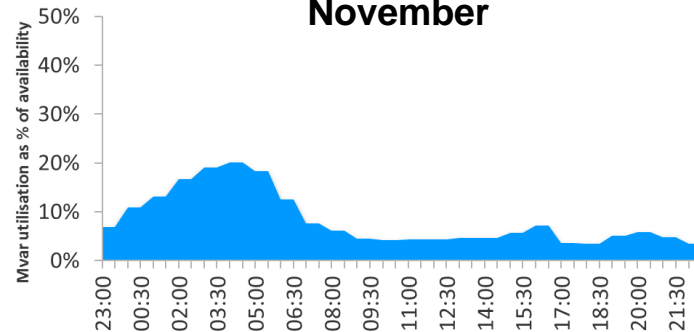
May



August



November



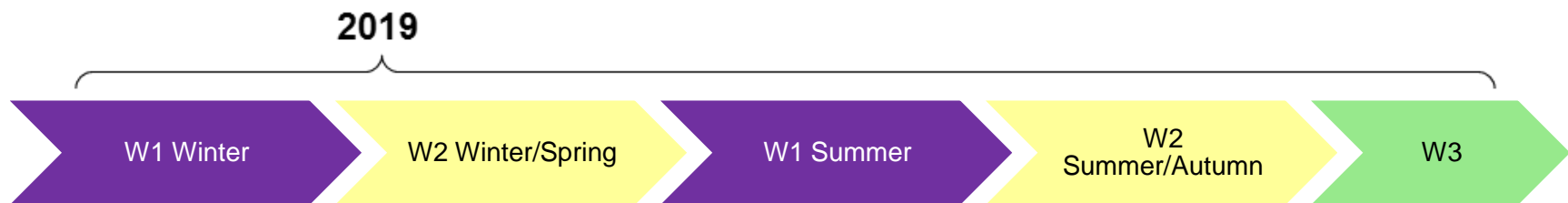
Actual utilisation will be in line with real time operational requirements

Wave 3) Transition to business as usual

- Subject to the success of wave 1 demonstrating the technical value of the Power Potential reactive power service, wave 3 acts as a decision point to use Power Potential volumes to secure the system
- Bids will be assessed against the transmission alternative considering effectiveness of distributed energy resources

Summary of the payment models

	Overview	Utilisation and availability prices	Volume requirements
Wave 1	<ul style="list-style-type: none"> Technical Trials. Two windows to take place across 2019 (summer/winter) 	<ul style="list-style-type: none"> No payments for utilisation Up to £18k-£20k – to be linked to levels of availability during Wave 1 	<ul style="list-style-type: none"> Up to 1800 hours across the two windows Approx. 90:10 split availability hours utilisation hours
Wave 2	<ul style="list-style-type: none"> Price Discovery. Two windows to take place across 2019 (following Wave 1 windows). 	<ul style="list-style-type: none"> Prices based on participant bidding 	<ul style="list-style-type: none"> Minimum 1800 market hours Note that the assessment of bids will need to account for the limited budget
Wave 3	<ul style="list-style-type: none"> Using DERMS and DERs to help to secure the system, following decision point taken by National Grid 	<ul style="list-style-type: none"> Utilisation and availability prices will be assessed against the cost of alternative actions from transmission assets. 	<ul style="list-style-type: none"> Dependent on system needs and an assessment of bids compared to transmission alternative actions.



Exact start and end dates of each wave will be shared in summer 2018

We welcome your views....

- We are looking to arrange a workshop and or 1:1s with interested parties to provide feedback on trial design. We will communicate these dates shortly.

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Common queries

- Can my power factor range be extended beyond that prescribed in my connection agreement, to enable me to offer larger volumes of reactive power?
- How will participating in the Power Potential project impact on my Distribution Use of Service (DUoS) charges?
- Can you share more information regarding testing?

Power Factor (PF) studies

- PF studies completed for each site that submitted TCSS
- **Objective:** to understand if DER PF range can be expanded for them to offer more reactive power service
- Methodology and calculation results will be shared with each DER
- If DER accepts new offered PF range => amend PF in connection agreement (~1 week)
- This PF range will be active for the trial period

Distribution Use of System charges

Methodology and rates available at :

<https://www.ukpowernetworks.co.uk/internet/en/about-us/duos/operating-in.html>

Charges potentially affected by participating in Power Potential reactive service:

- Exceeded capacity charges
- Reactive power charges

Decision:

The above charges will not be applied during trials

DER technical requirements specification

Scope of the document

- UK Power Networks-DER communications specification
- System architecture and responsibilities
- Functional requirements. For example, active power and voltage set point
- Non-Functional requirements for DER substation interface. For example, interface to DER substation / communications protocol
- Testing procedure

Testing

- Testing will be carried out in the second 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:
 - Initial desktop assessment
 - DER commissioning tests
 - Laboratory based pre-commissioning testing (strongly advised)
 - Site-based DER commissioning testing (mandatory)
 - DER performance testing

DER testing procedure

Initial Desktop Assessment

Confirming that the DER is:

- Within the Trial area.
- Is already connected to the UK Power Networks distribution system or will be connected early in the Trial period.

Evaluating:

- The DER's Technical Characteristics Spreadsheet
- The DER's confirmation of having a control system capable of changing mode of operation from PF to voltage control mode and vice versa.
- Operation of DER in voltage control mode does not violate the Recommendation P28 voltage step change limits and statutory distribution network voltage limits.
- By desktop simulation, evaluating whether power factor limits in the DER's connection agreement may be relaxed for the Trial.

DER Commissioning Tests

Laboratory Based Pre-commissioning Testing (strongly advised):

- Interface between the DNO RTU and the DER control system.
- System integration between DERMS↔PowerOn↔RTU↔DER.
- The capability of DER's control system to change mode of operation from PF to voltage control mode and vice versa.

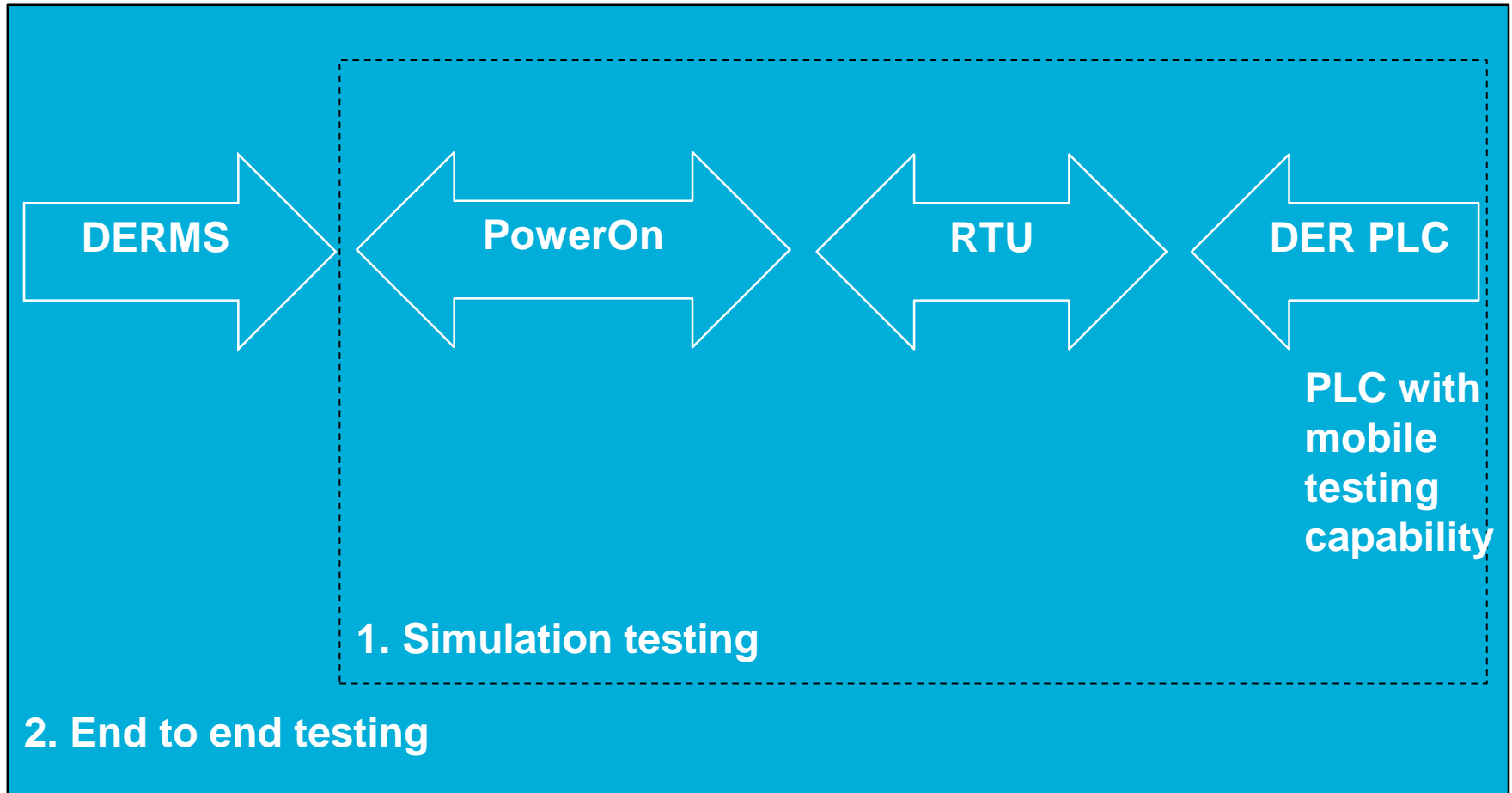
Site-Based DER Commissioning Testing (mandatory):

- Interface between the DNO RTU and the DER control system.
- System integration between DERMS↔PowerOn↔RTU↔DER.
- The capability of DER's control system to change mode of operation from PF to voltage control mode and vice versa.

DER Performance Testing to include (please see Appendices, Section 6.3):

- DER achieving voltage setpoint instructions.
- DER speed of response to real and reactive power instructions.
- DERMS/DER response to voltage step change.

Laboratory testing



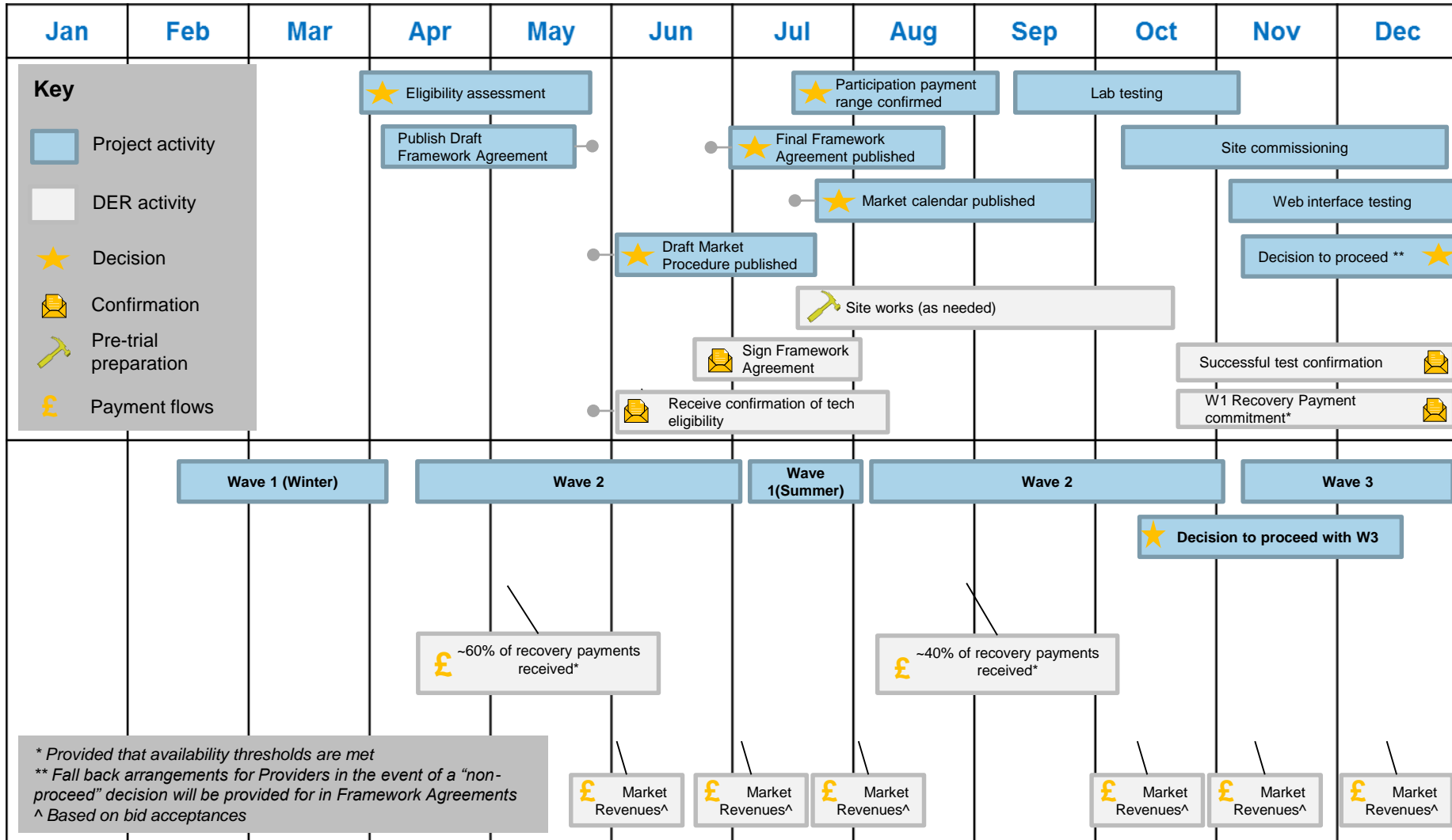
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3. Addressing common queries
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Pathway to participation

2018

2019



Thank you for participating

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We welcome your questions

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