

# Future operability challenges

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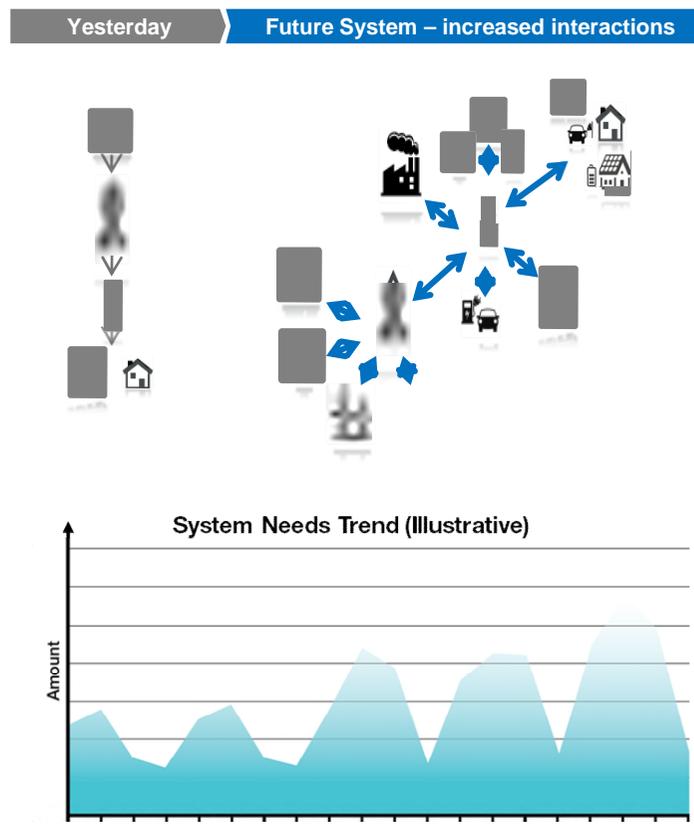


# Themes

The system is **increasingly more complex to operate** due to the growth in:

- Interconnectors,
- Solar panels,
- Electricity storage,
- Electric vehicles,
- Smart/Micro grids

**Balancing service needs are increasing** as a result with greater extremes and more volatility in requirement.



# Operability strategy report

In November we released our first **Operability Strategy Report**.

It outlines the operability challenges, what we have done so far and what we need to do. Its seeks to find the most efficient route to solve these challenges for the end consumer.

## 5 key operability challenges:

- Frequency control
- Voltage control
- Restoration
- Stability
- Thermal

## 3 types of solution (rules, tools and assets):

- Codes and regulation
- Commercial and operational tools
- Network

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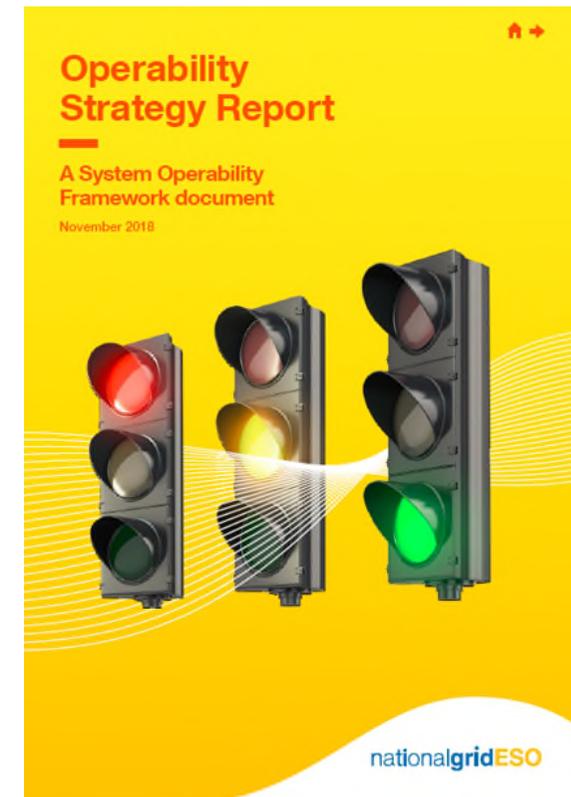
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# Operability strategy report update

Lots of working going on:

- **Frequency** –new response product update and how they will be phased into the markets.
- **Frequency/Thermal** –improving wider access to the balancing mechanism update.
- **Voltage** – voltage services tendered in South Wales and Mersey to solve the upcoming operability challenge.
- **Restoration** – innovation funding bid accepted by Ofgem to investigate how to deliver black start services from distributed energy resources.
- **Stability** – two documents published describing the short circuit level challenges and a potential way forward.
- **Stability** – proposal to Ofgem setting out a way forward to update existing loss of mains protection settings and resolve the inertia operability issues.

I'll give an overview of the above. Dave will then deep dive into voltage



# Frequency update

## Auction trial

- Four standardised versions of frequency response product to be procured via weekly auction trial in two phases.

## New frequency response products

- New frequency response products described in February industry update.
- Modelling & assessment continues. Not to be procured via weekly auction trial.

## Wider access

- Virtual Lead Parties can now register secondary BMUs
- Facilitates participation in both TERRE and the BM

### Auction products

Low frequency static response – Phases 1 & 2

High frequency static response – Phase 2

Low frequency dynamic response – Phase 2

High frequency dynamic response – Phase 2

### Interaction with new frequency response products

New products will not be procured through the weekly auction trial as changing two variables – the products and the market – would prevent us from drawing clear conclusions on the impact.

# Restoration update

## Black Start Capabilities from Non-traditional Technologies

- Project started, due to be completed in summer 2019

## Black Start from Distributed Energy Resources

- Project started, to be completed 2022
- Case study selection [Webinar 29<sup>th</sup> March](#)

## Expressions of Interest – South West and Midlands

- Deadline for submission 29<sup>th</sup> March

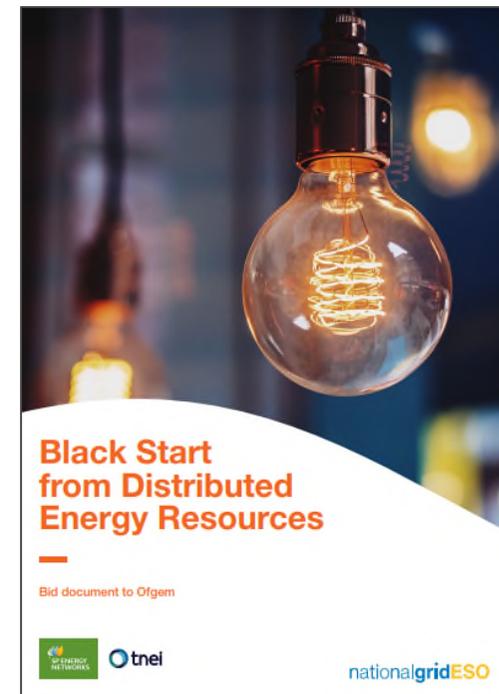
## European Emergency and Restoration Code

- Mapping requirements into GB code
- Black Start standard development – working through obligations on providers

## Black Start Strategy and Procurement Methodology

- Update to be submitted to Ofgem in April

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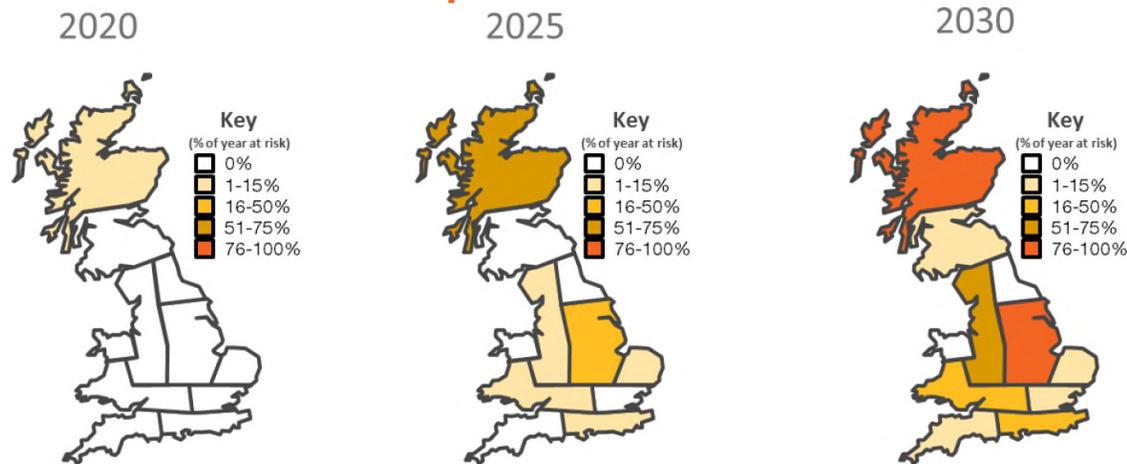
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## Stability update – Short circuit levels

NG has just published two documents which explain the impact of changing short circuit levels and what we are doing about it:

- Impact of declining short circuit levels
- Whole System short circuit levels

The diagram below forecasts the impact and where/when it will be an issue



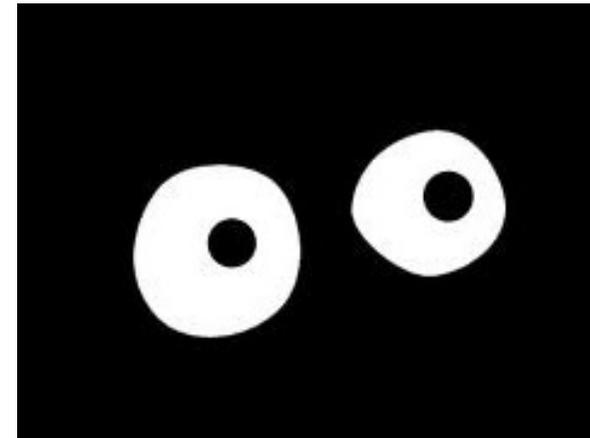
# Stability update - Loss of mains protection recap

**2017/18 operational spend:** £59.2m

**2017/18 operational spend:** ~£130m

- Loss of mains (LoM) protection ensures that distributed generation (~50,000 sites) disconnects during a black out.
- However risk of 'false positives' as they are too sensitive for current system conditions.
- Operational costs to resolve are rising.
- Cheaper for end consumers to change the relay settings than manage through operational actions.
- The issue is permanently solved by desensitising the LoM relays.
- >5MW generators have already had their settings changed.
- New generators <5MW will have the right settings.

**Existing generators <5MW need to have their settings changed. => DCode change**



# Stability update - Loss of mains protection next steps

- **DC0079 Working Group Report and Implementation Plan** with Ofgem for decision
- **Proposed approach** – ESO and DNOs working together to deliver implementation plan
- **Procurement Methodology** - Feedback will be requested on the proposed procurement methodology for payment for accelerated settings changes
- **Application process** - Generators will need to apply via a portal to be verified and assessed and receive payment for settings changes



Stakeholder Engagement Events will take place in London and Glasgow on 4<sup>th</sup> and 5<sup>th</sup> April

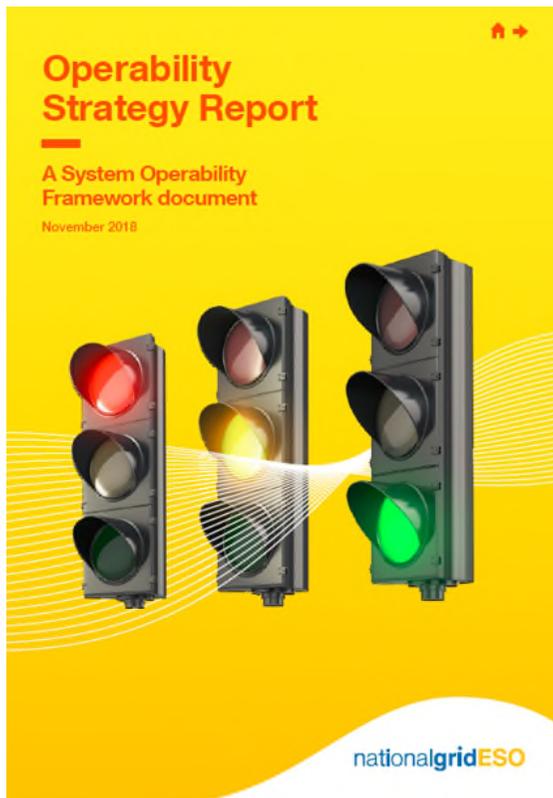
# Reactive Power Update

David Preston

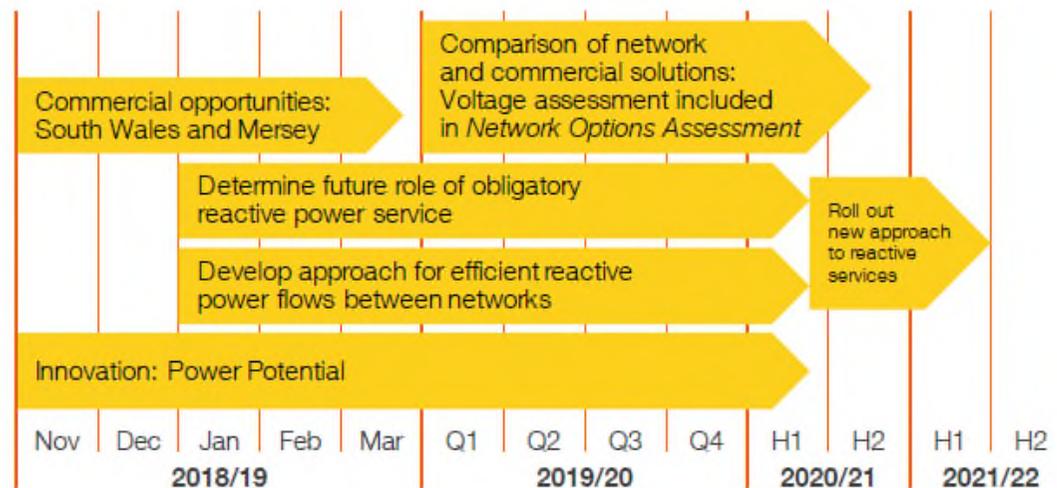
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Electricity



# Context – Operability Strategy Report



**Figure 3.4**  
Voltage control timeline



- ESO Forward Plan and Reactive Roadmap are consistent with above but also commit to greater levels of transparency and ERPS / ORPS reviews

## Reactive Power / Voltage – an interesting space

Reactive Power is a product that has been largely untouched for ~20 years and is subject to very different challenges and realities compared to active power.

**Very Locational**

**Low and falling levels  
of liquidity**

**Driven by mandated  
capability within codes**

**Default Payment  
Mechanism (DPM) for  
utilisation**

No matter location, fuel type / technology,  
time of day / week / month / year

**Requirements subject to  
short notice change**

Based on the state of the network

**Dispatched differently to  
Active Power**

## Reactive Power / Voltage – an “active” space

During this time the system needs and service utilisation have changed meaning that there is a clear need to deliver change to Reactive / Voltage with a number of strategic projects being undertaken in this space.

### Power Potential (NIC)

Understanding how resources on the distribution system could provide Dynamic Voltage support to the transmission system

### NOA Pathfinders

Development of medium to long term commercial solutions to potentially offset a network asset build option

### Project Phoenix (NIC)

Sync Comp / Statcom hybrid in Scotland to provide voltage support and system inertia

### Open Networks

Develop improved processes between Transmission and Distribution

### Other

- DNO / TO network boundary transfer discussions for Voltage
- Regional Reactive RFIs and tenders

# So what's been happening more recently?

## Progress to Date

- Increased transparency within MBSS by identifying voltage spend (BM activity and trades)
- Expressions of interest for Reactive Power service in South Wales and Mersey published and followed by commercial tender in Jan '19
- Tender for Scotland to access capability when active power <20%
- CUSC modifications issued on Enhanced Reactive Power Service (CMP304 and 305). CMP305 returned by Ofgem in lieu of CMP304
- Issues with Obligatory Reactive Power Service presented to the CUSC Issues Standing Group

## Next Steps

- Additional transparency on voltage spend at a regional level
- Review of timelines and interdependencies of strategic projects within the Reactive Power / Voltage space (Power Potential, Project Phoenix, NOA pathfinders, DSO / TSO etc)
- Subsequent engagement with industry through workshops on the future direction and options for Reactive Power
- Discussions with Distribution Network Owners on efficient Reactive Power boundary transfers

## Future state drivers

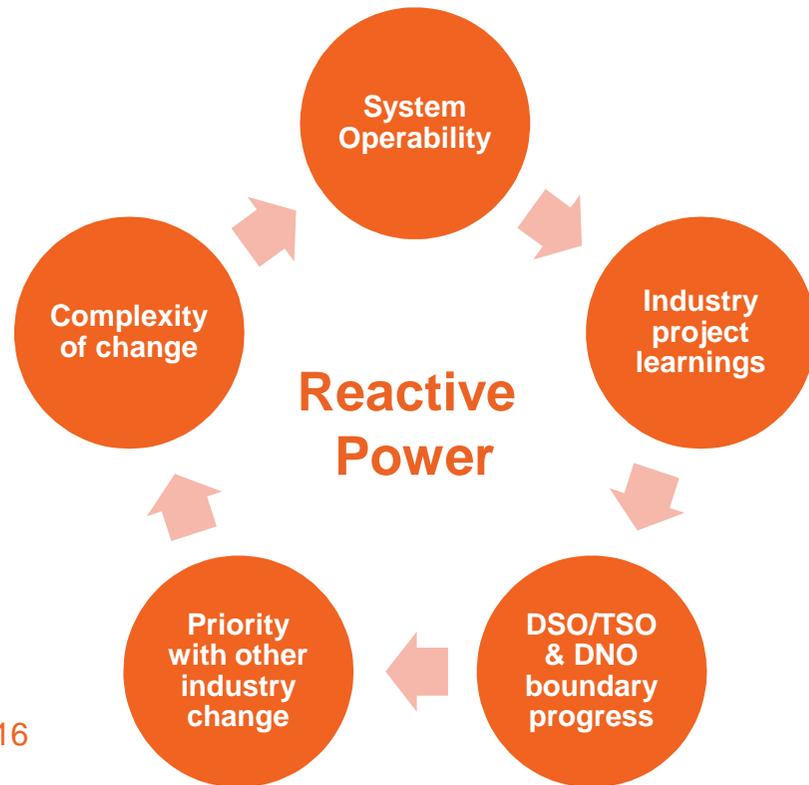
Our vision is for a more flexible electricity system which makes the most economic and effective use of all available resources to meet the needs of the network.

Our principles will be to design a market:

- With **transparent** procurement decisions, with methodology and **needs clear** to the market ahead of time
- That **increases competition** to release value to the end consumer
- Which balances **operational requirements** with the **technical ability** of provider assets while maintaining system security

## Scoping considerations

Nothing is considered to be “off the table”, however we need to be conscious of the following when setting an appropriate scope across delivery timescales:-



To inform the way forward, and accounting for what strategic projects are happening in this space, we will develop an “operability” led strategy for a wider Reactive Review that will take account of our core challenges and appropriately prioritise the next steps.