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The road to net zero electricity markets

ZERO CARBON MARKETS LAUNCH

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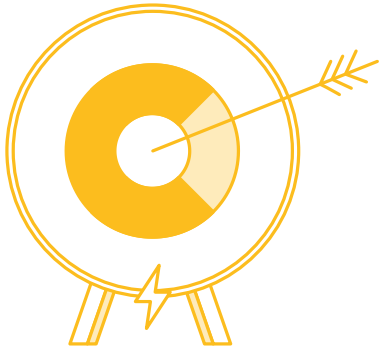
The Road to Net Zero Markets

On the journey to net zero ESO markets play a central role in ensuring safe reliable electricity, at efficient cost to all consumers

We have set a clear ambition:

- to be able to operate the system carbon free by 2025
- competition everywhere
- ESO as a trusted partner



ZERO-CARBON OPERATION 2025

The Week Ahead

- journey

- ambitions / principles

- join the dots

- explore interactions

- challenge our thinking

- feedback

Sign up to our series of interactive events

Market reform insights (23 Mar - 1pm)

Join our experts as they answer questions on how we are developing and delivering our market initiatives to meet future operability challenges.

Code change roadmap to 2025 (24 Mar - 10am)

Discuss and contribute to the view of how net zero will drive reform in network codes and charging, and how the ESO will facilitate this.

Capacity Market and Contracts for Difference (24 Mar 2021 - 1pm)

An overview of potential medium term developments in policy and the market and how the ESO will respond and deliver.

Net Zero Market Design (25 Mar - 10am)

An interactive discussion of the challenges in redesigning GB electricity markets for net zero.

DSO Markets (25 Mar - 1pm)

A deep dive into the ESO strategy for facilitating DSO markets across the whole electricity system.

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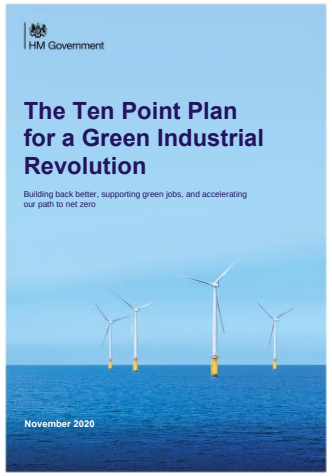
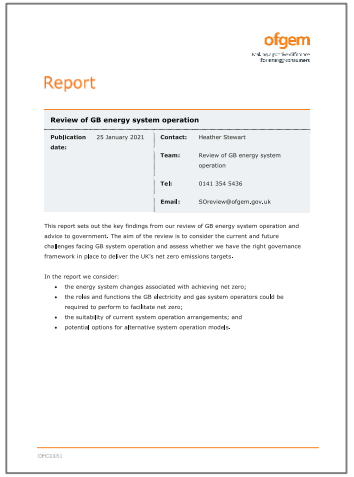
The path to Net Zero requires a reimagining across all dimensions of the energy system





The energy mix in 2025…

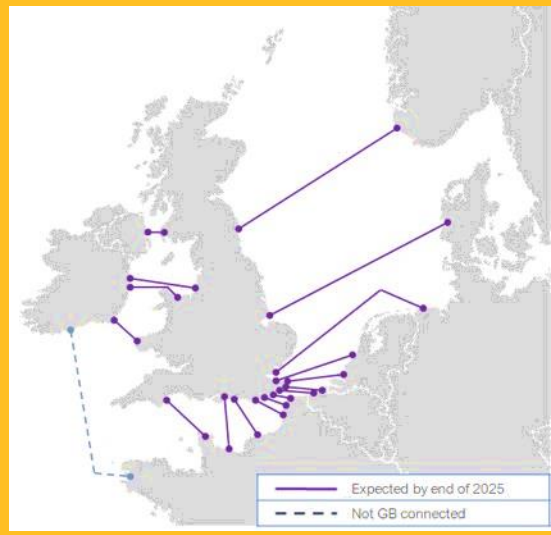
Market reform will:

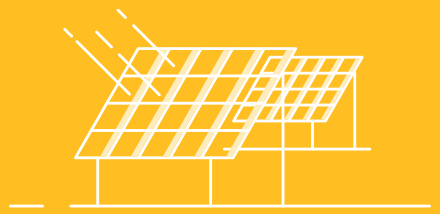
- Deliver consumer savings through efficient open markets
- Enable renewables growth for net zero
- Meet system operability needs

24GW of offshore wind

9% of vehicles will be electric

18GW of inter connectivity capacity





19GW of solar PV capacity

We have a central role to play in enabling the transition to 2025 and beyond

Capacity Market

We are the EMR Delivery Body. We advise on capacity requirements in order to meet the published reliability standard and administer key elements of the Capacity Market and CfD regimes.

Wholesale Market

We are a participant in the wholesale market, typically trading 4-5 TWh annually. We do not have a role in in administrating arrangements in the wholesale market.

Balancing Mechanism

We use the Balancing Mechanism (BM) to keep supply and demand in balance by accepting offers to increase or bids to decrease energy. The mechanism is pay as bid and the actions taken are used to set the System Imbalance Price.

Ancillary Services

We procure services to balance demand and supply and to ensure the security and quality of electricity supply. Those services address operability needs including thermal, voltage, stability, frequency response and reserve.

Electricity System Operator

Market Roadmap to 2025

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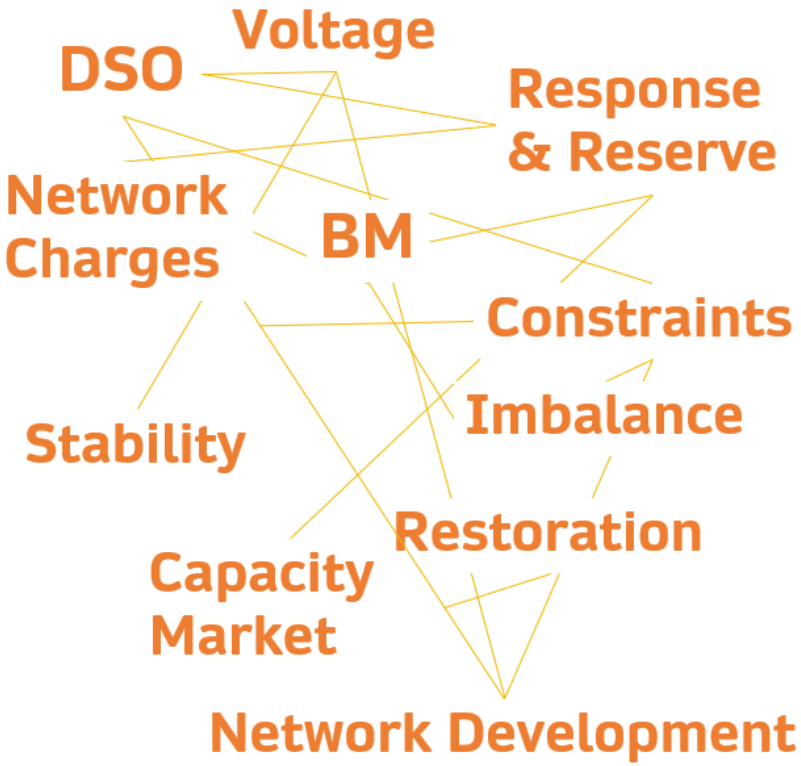
Joining the dots!

We recognise the scale and complexity of reform required across the industry

- Our Market Roadmap to 2025 provides transparency for our plans to deliver change for 2025
- Sets out our design principles for how we will shape future market arrangements
- Communicates our vision for what 2025 could looks like across these markets, and our plans that move us towards this vision
- Focuses on the interactions that we see as being important to deliver coordinated change



Our Market Ambition & Principles

Our ambition is to design market arrangements that facilitate security of supply at the lowest sustainable cost for customers, while enabling the transition to Net Zero.

We will design Markets that are:

- Competitive
- Accessible
- Transparent
- Fair
- Coherent

Headlines

Our strategy and plans to 2025 remain robust; co-creation will ensure effective design and delivery

- Market design and development must minimise barriers to entry, to drive competition and liquidity in all markets; this is best achieved through working together
- There are immediate areas of focus for co-creation and collaboration
    - Reserve & reactive market development
    - Response markets and inertia market strategy
    - Designing in ‘stackability’
- Our strategy priorities will establish markets across all of our core operational needs ahead of time and will return the ESO to be a residual balancer for energy
- Key interactions exist between our plans and other strategically important reforms across the industry. Close coordination will ensure efficient whole system outcomes for consumers.

Frequency Response

To operate a zero-carbon system we need fast-acting dynamic response products. These products will be procured through deep, liquid and close to real time markets.

Key Projects

Enhance Dynamic Containment

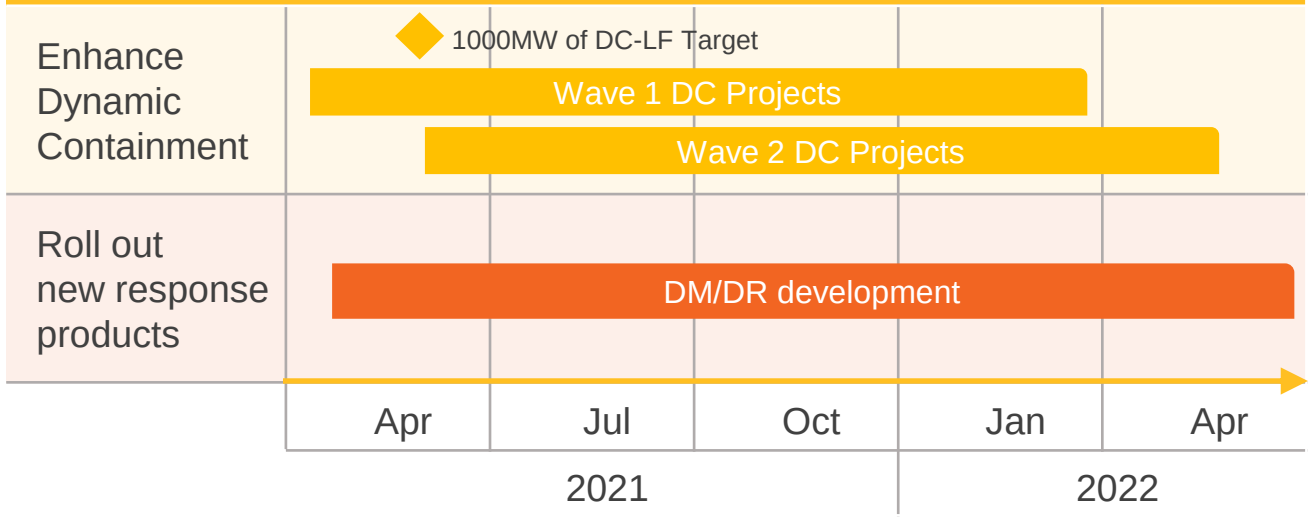
- We have planned a number of enhancements to DC as part of our soft launch development programme.

Roll out new response products

- Dynamic Moderation (DM) will assist the ESO in frequency management following large imbalances containing frequency within +/- 0.2Hz.
- Dynamic Regulation (DR) will slowly correct small continuous deviations in frequency, continually regulating frequency around 50Hz.

The 2025 Landscape	
Operational Requirements	**Market Participants**
• Guided by the Frequency Risk and Control Report (FRCR). • Requirement will change daily based on system conditions and security obligations.	• Greater volumes of DER and aggregated capacity. • Markets opened up to renewables like wind and solar.

Our next 12 months



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Reserve

Our reserve products need to adapt to be fit for the future electricity system and to complement our new response product suite.

Key Projects

New Reserve Services

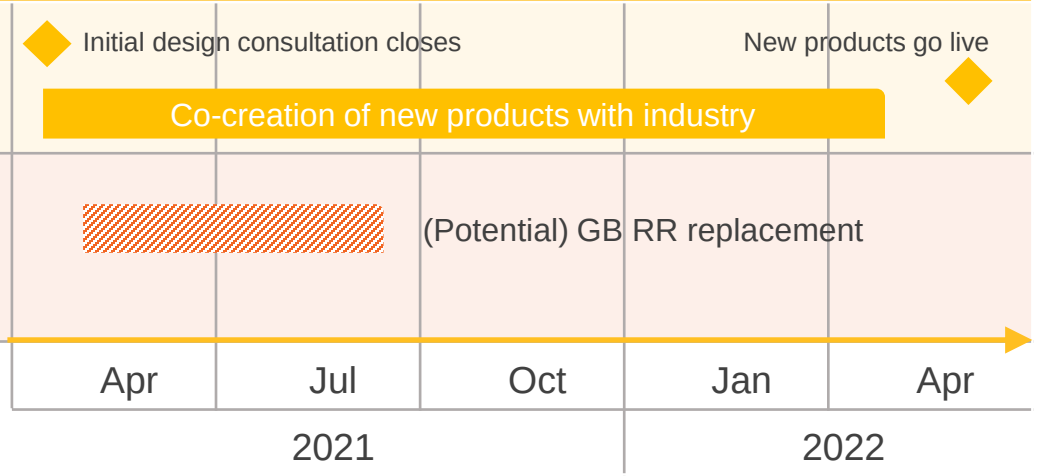
- We are currently consulting on initial designs for new reserve products. The consultation closes on the 2nd April. These products will go live by end of March 2022.

TERRE replacement CBA

- At the end of 2020 the UK and EU agreed a Trade and Cooperation Agreement (TCA) which indicates that the UK is unlikely to be able to access the TERRE platform.
  A TERRE replacement Cost Benefit Analysis needs to be conducted to determine whether a GB standalone version is in the best interest of consumers.

The 2025 Landscape	
Operational Requirements	**Market Participants**
• We will need to secure access to fast, flexible and controllable reserve products for both upwards and downwards energy. • Requirements will be set daily to align with day-ahead procurement.	• New reserve products procured closer to real time will provide opportunities for variable generators like wind and solar. • Markets opened up to smaller providers through standardised products.

Our next 12 months



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Reactive Power

As the energy system evolves to achieve net-zero we face new challenges in managing network voltage levels. Our existing reactive tools need to be enhanced for the changing system needs.

Key Projects

NOA Voltage Pathfinders

- The NOA voltage pathfinders are trialling innovative procurement methods to help meet SQSS compliant voltage limits in specific regions. The first pathfinder focused on voltage solutions for the Mersey region. A procurement round for the Pennines region will commence later this year.

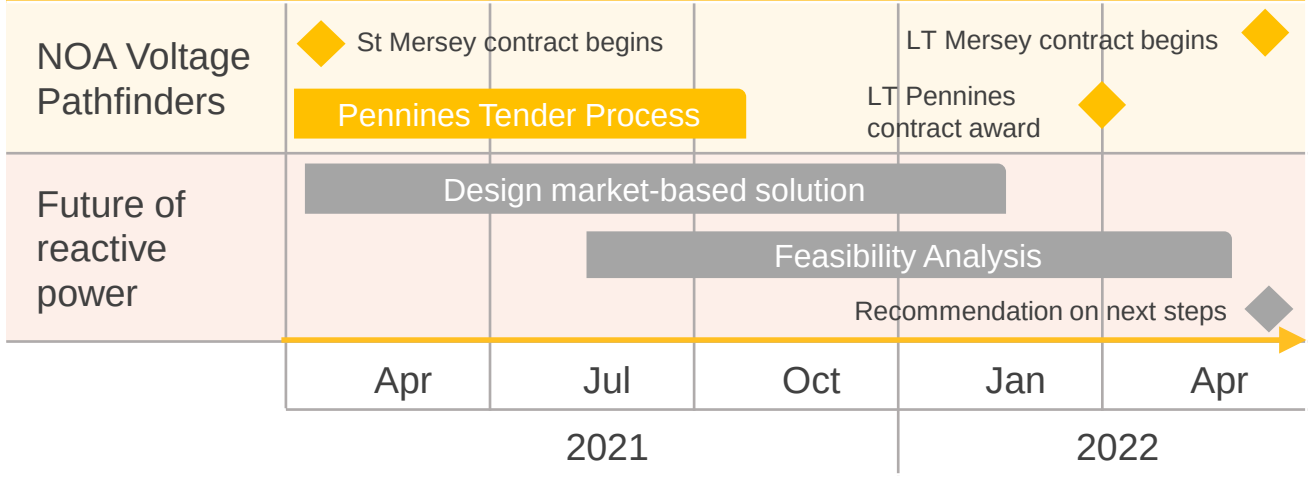
Future on Reactive Power

- The Future of Reactive Power project is exploring potential market-based solutions to meet future system needs. Using a combination of technical, market and commercial analysis the project will recommend a market-based solution and a plan to progress the identified solution.

The 2025 Landscape

Operational Requirements	Market Participants
• Our reactive power requirements will have grown as high voltage conditions become increasingly prevalent on the GB network. • The Future of Reactive project will help meet future challenges.	• We will be procuring reactive power from previously untapped sources – this may include DER, HVDC and third party network solutions.

Our next 12 months



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Thermal

We are facing new challenges in managing transmission network thermal constraints. New markets and operational tools need to be developed to manage network costs whilst still enabling the net-zero ambition at pace.

Key Projects

Constraint Management 5-Point Plan

- We are developing our thinking on how to improve the management of rising constraint costs, especially for some of our more heavily constrained boundaries.
- Constraint Management Pathfinder (CMP): We want to accelerate the process to alleviate the transmission constraints across the B6 boundary, and are exploring an interim solution, ahead of the NOA CMP service in October 2022.

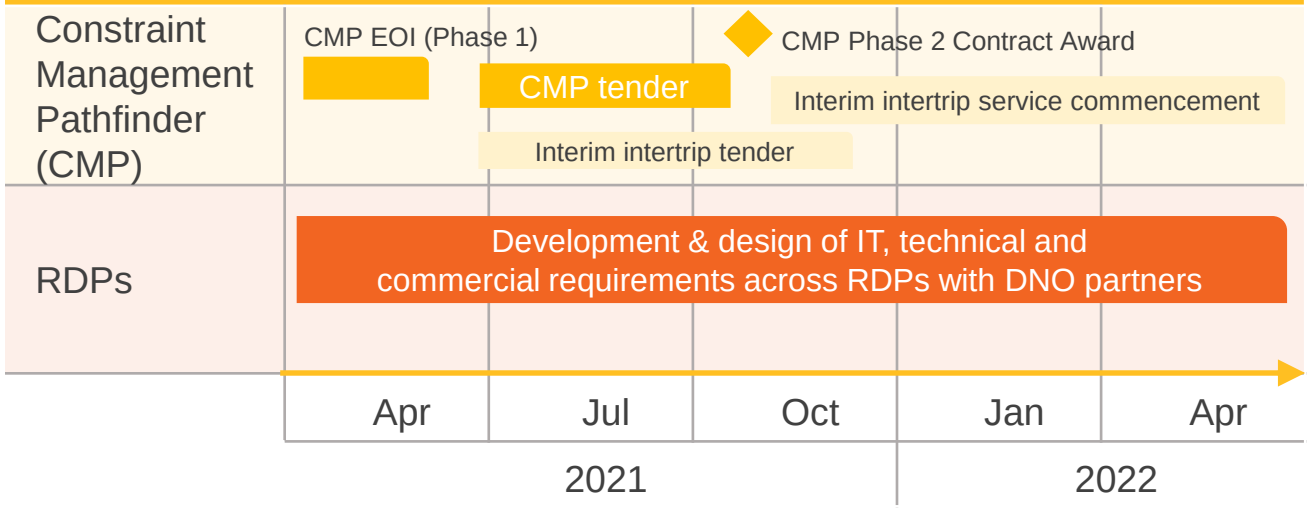
Regional Development Programmes (RDPs)

- We take whole system approach and collaborate with DNOs to develop solutions that enable the connection of DER, whilst ensuring overall whole system operability.

The 2025 Landscape

Operational Requirements	Market Participants
• Rapid growth in renewable energy in specific parts of the network. More embedded generation will be connected to the system. • Need to alleviate constraints over the next 5-10 years and also manage some of the increase in congestion costs ahead of network reinforcements.	• Contract constraint management services from an increased pool of solutions. • Collaborating with DNOs to enable the connection of DER.

Our next 12 months



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Restoration

Our vision for Restoration is to run fully competitive procurement processes with participation from existing and new providers connected at many different voltage levels.

Key Projects

Regional competitive procurement

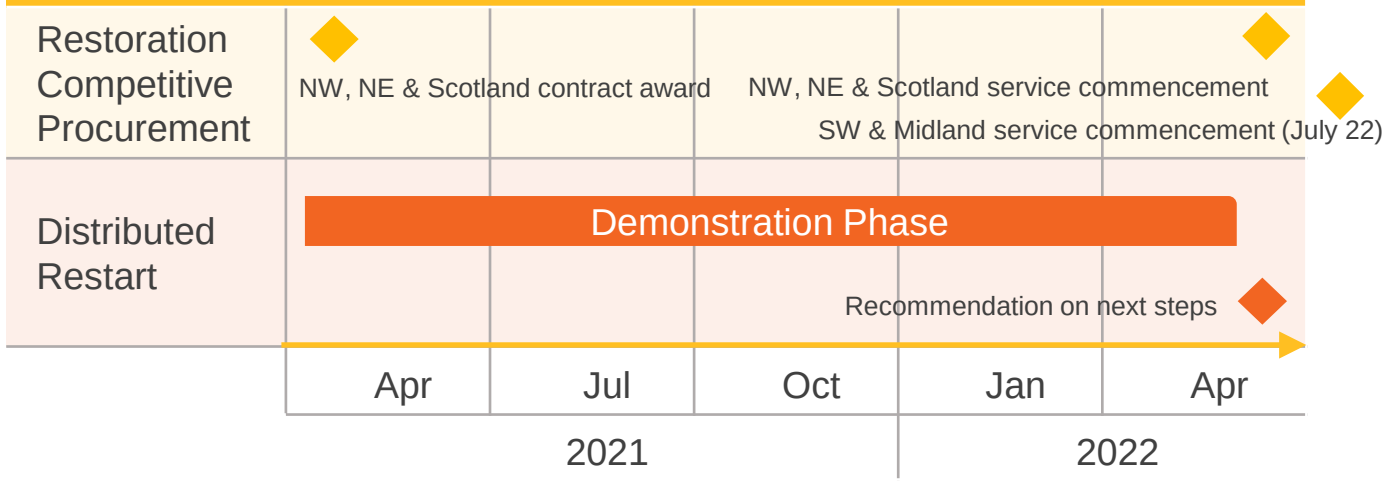
- We have been tendering for multi-year restoration contracts via a regional competitive procurement exercise. Six contracts were awarded in the SW midlands region in November 2020. More procurements rounds are planned for other regions.

Distributed ReStart

- The Distributed ReStart project is a collaboration between the ESO, SPEN and TNEI. It has been designed to re-energise the system from the bottom up using DER. It is intended to reduce our reliance on carbon intensive generators for restoration events.

The 2025 Landscape	
Operational Requirements	**Market Participants**
• We will be guided by the GB Restoration Standard which is currently under development via a BEIS-led project and our existing Restoration Strategy.	• Markets open to a wide range of technologies across Tx and Dx. • Technologies include: wind, battery storage, solar and smart demand.

Our next 12 months



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Stability

We aim to create new markets for stability, to be procured via a combination of long- and short-term mechanisms. Stability markets are still relatively immature therefore many questions remain around their future design.

Key Projects

ALoMCP

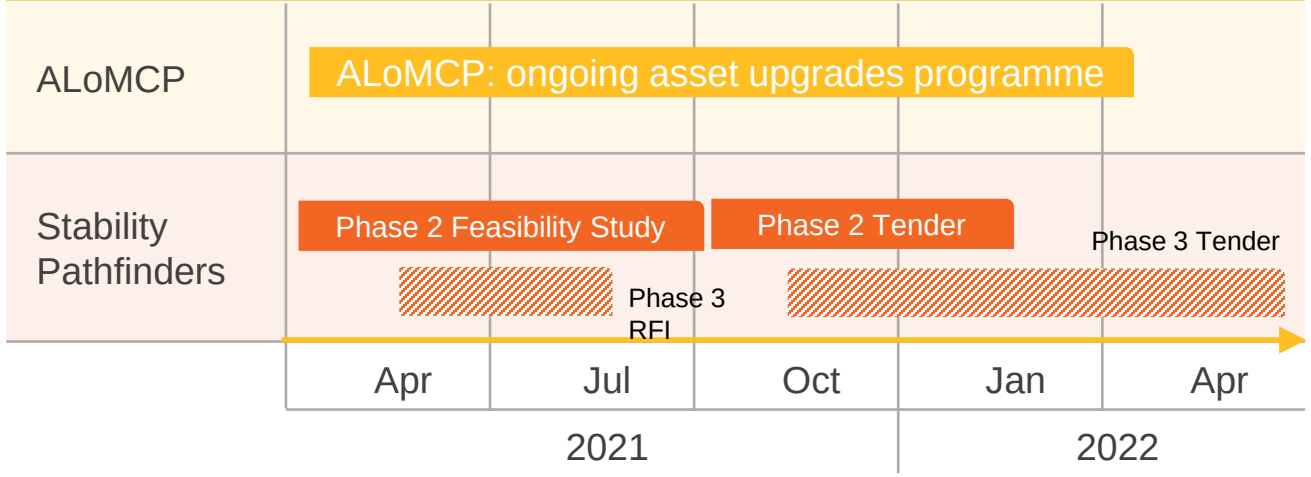
- The Accelerated Loss of Mains Change Programme (ALoMCP) is offering funding to generators connected before 1 February 2018 to update hardware, supporting them to remain connected while frequency is changing rapidly.

Stability Pathfinder

- Phase 1 - The contracts commenced in April 2020 and long duration contracts will run to March 2026.
- Phase 2 - Seeking to fulfil a specific locational requirement in Scotland.
- Phase 3 - Focusing on GB wide long-term tender for stability procurement.

The 2025 Landscape	
Operational Requirements	**Market Participants**
• The annual forecasted average inertia provided by the market will decline. • Short circuit level and dynamic voltage support are expected to drop overall.	• Synchronous generators are expected to still provide stability when running. • Synchronous compensators and GB Grid Forming Capability will be stability providers.

Our next 12 months



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Balancing Mechanism

Our ambition is to simplify access to the Balancing Mechanism (BM) for all technologies and providers and increase the transparency of system actions.

Key Projects

New Dispatch Facility

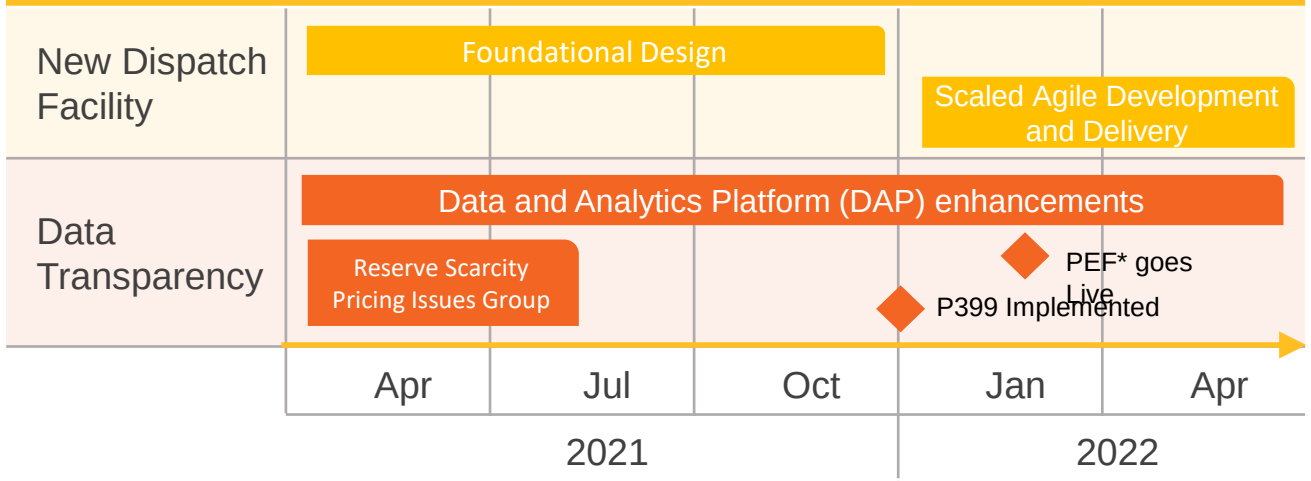
- To accommodate the anticipated increase in the number of participants we plan to update BM software to create a new dispatch facility.
  We will create additional data storage, re-platform our multi-dispatch tool and replace our existing optimiser so that it can solve for more complex scenarios.

Data Transparency

- We will improve data transparency by publishing more data and making it more accessible. Enhance our forecasting and share our analytics.

The 2025 Landscape	
Operational Requirements	**Market Participants**
• Bids and offers will be used to support real time system operation, we anticipate that our market reform programmes will reduce the range of operational situations in which the BM is used.	• Greater volumes of behind the meter, DER and storage expected. • Market opened to smaller providers through wider access programmes.

Our next 12 months



* PEF = Platform for Energy Forecasting. It will produce more accurate and locationally granular energy forecasts.

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Capacity Market

Our ambition is to build on our role providing strategic advice on the CM rules to BEIS, Ofgem and the Capacity Market Advisory Group (CMAG) while improving user experience and our capacity modelling capabilities.

Key Projects

Capacity Market Advisory Group

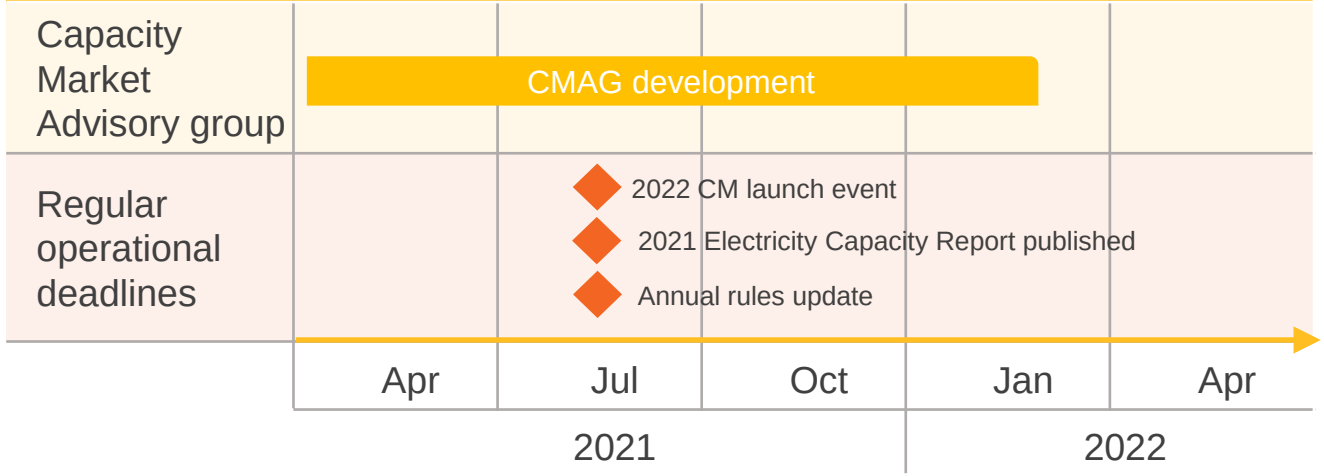
- Ofgem are establishing a Capacity Market Advisory Group (CMAG) to allow the rules change process to become more dynamic, transparent and able to adapt to changing market conditions.

Regular operational deadlines

- Our role as EMR delivery body means that we manage a complex set of annual deliverables for the CM. These **regular operational deadlines** are important to remember for the year ahead and we will continue to challenge ourselves to improve participant experience of CM auctions.

The 2025 Landscape	
Operational Requirements	**Market Participants**
• Peak system demand is expected to rise from the mid-2020s. • Throughout the 2020s there will also be growth in new-build CfD capacity which is not eligible for participation in the CM.	• By 2025 coal and older, inefficient gas and diesel will not be in the CM due to emissions limits regulation. • We expect to see continued growth in 'subsidy-free' renewables, DSR and storage participating in the auctions.

Our next 12 months



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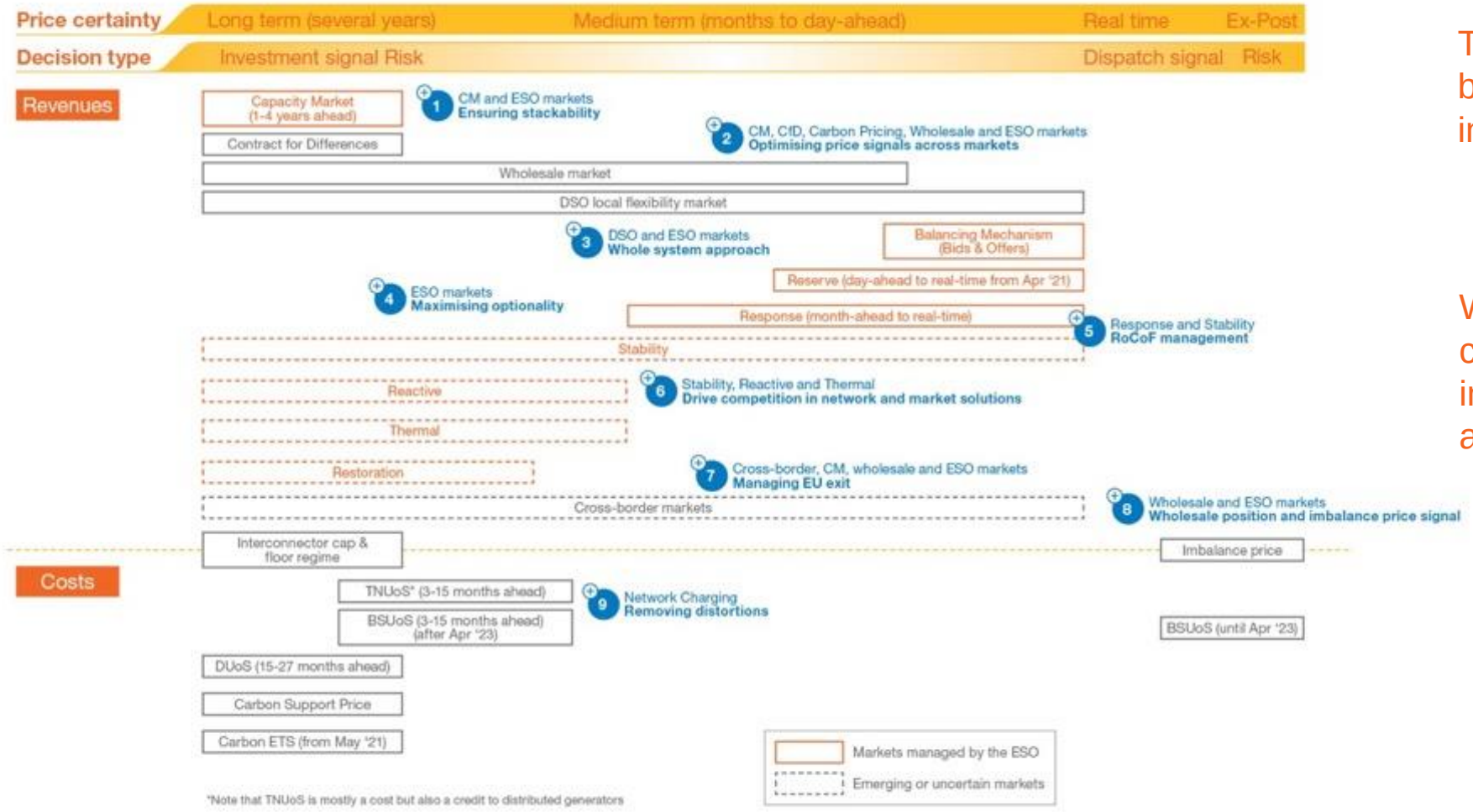
Key Interactions

Government strategy for energy is a big input into how our markets will develop for the future.

We are committed to realising the benefits digitalisation can bring to enhance transparency across our markets.

We are also working closely with BEIS to share what our market plans look like through to 2025.

Market Interactions



There are many interactions between our markets and those in wider electricity sector.

We need to ensure coordination and enhance interoperability across existing and future markets.

DSOs and ESO markets - Whole system approach

Interaction

- Two way interactions will exist between the core operations of a DSO and the ESO
- Market participants to be able to participate in many different markets, providing a need at a distribution or transmission level
- To facilitate this we need to work coherently
- Decisions and rules will need to be transparent and accessible

How we are managing

- These interactions are being managed through the Energy Networks Association, Open Networks Project
- We are working with DNOs to develop co-ordinated markets for flexibility services through the Regional Development Programmes (RDPs)
- We will be discussing our strategy at a deep dive session this week

ESO markets maximising opportunity

Interaction

- ESO markets will be designed so that any participant who can technically provide the service has access to this market
- Adding the ability to stack revenues in ESO markets will increase the efficiency of the service and value for consumers

How we are managing

- We currently procure Dynamic Containment (DC) in 24-hour single price contracts. But we are developing our auction capability to enable market participants to bid in smaller blocks at different prices. This will provide greater flexibility
- As part of the continued development of Dynamic Containment (DC), we have unlocked stacking within the Balancing Mechanism (BM)

Stability, reactive, thermal – driving competition in network and market solutions

Interaction

- Historically different system needs have been provided through different routes (including the delivery of new assets, as a by-product of conventional generation or through mandatory services)

- We believe in the development of markets to drive innovation and deliver the best consumer benefits through competition

- Those new solutions could be provided by both commercial and network solutions

How we are managing

- It is our plan to transform our network development process and to identify the most efficient solutions by considering all options

- We are working with market participants through a learning by doing approach (via our Pathfinders)

- These system needs could also compete as part of our proposed Early Competition Plan

Q&A with the ESO team

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The road to net zero electricity markets: other events

Tuesday 23rd March		*Wednesday 24th March*		*Thursday 25th March*	
10am	*1pm*	*10am*	*1pm*	*10am*	*1pm*
The road to net zero electricity markets launch	**Market reform insights**	**Code change roadmap to 2025**	**Electricity Market Reform: Capacity Market and Contracts for Difference**	**Net zero market design**	**DSO markets**

Are you interested in finding out about how the electricity market is changing and progressing to a zero carbon grid?

The Markets team in the ESO are running a series of interactive, online events in March, where you will be able to take part in focused sessions with subject matter experts on different aspect of electricity market change.

Click here to find out more and register for the events or access the recordings if you can't make the session.

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Thank you

We’d love to hear what you thought of the event.

Contact us:

Via your account manager, or email:

commercial.operation@nationalgrideso.com