Public

NAP OC2 Forum

4 March 2025

Birmingham

NESO
National Energy System Operator

Contents

Please note, all content is correct at the date of presenting (04 March 2025)

Public

Breakout 1: Connections Reform

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Agenda

Topic

1. Overview of overall design
2. Overview of the proposed industry code changes
3. Overview of the proposed new methodologies
    a) Gate 2 Criteria Methodology
    b) Project Designation Methodology
    c) Connections Network Design Methodology
4. Q&A

Note: The Ofgem Minded-to Decision consultation is currently open and this closes 14 March 2025. We are in the process of developing our response.

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Overview of overall design

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Key building blocks to align connections reform with strategic energy planning

	Variable	Definition	Options		
1	**Time horizon for determining "aligned" project**	Under what time horizon is alignment considered	2030	2035	2035+
2	**Approach for managing scope of the new queue**	How we determine the size and make-up of the new queue	Readiness based	CP30 Plan aligned projects prioritised, then followed by any other 'ready' projects	Only 'ready' CP30 Plan aligned projects or 'ready' projects not known or out of scope of CP30

Final recommendation, as included in consultation

Other assessed options

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Overview of three overall designs

Three potential overall designs

1

New queue formed of:

i) 'ready' projects already in the queue

ii) 'ready' NESO designated projects

iii) then, any new 'ready' projects that 'align with' the CP30 Plan are prioritised In future Gate 2 windows

2

New queue is formed of:

i) 'ready' projects 'aligned with' the CP30 Plan (inc 'protected' projects)

ii) 'ready' NESO designated projects

iii) 'ready' 'tx connected demand', 'wave/tidal' and 'non-GB generation' projects (these are the technologies specifically outside scope of CP30 Plan)

Our final recommended design

3

New queue is formed of:

i) 'ready' projects 'aligned with' the CP30 Plan

ii) 'ready' NESO designated projects

iii) 'ready' 'tx connected demand', 'wave/tidal' and 'non-GB generation' projects (these are the technologies specifically outside scope of CP30 Plan)

iv) any other 'ready' projects

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Technologies in and out of scope of the CP30 Action Plan

Technology	In scope of CP30 Action Plan?	Breakdown in CP30 Action Plan
Offshore Wind	Yes	GB-wide
Onshore Wind	Yes	Zonal*
Solar	Yes	Zonal
Nuclear	Yes	GB-wide
Low Carbon Dispatchable Power	Yes	GB-wide
Unabated Gas	Yes	GB-wide
LDES	Yes	GB-wide
Batteries	Yes	Zonal
Interconnectors	Yes	GB-wide
Transmission-Connected Demand	No	N/A
Wave	No	N/A
Tidal	No	N/A
Non-GB Generation	No	N/A

*Onshore Wind has a multi-zone breakdown to 2030 and then is amalgamated to a two-zone split (Scotland, England & Wales) for 2031-2035.

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Zones (for onshore wind, batteries and solar)

Transmission Zones

Distribution Zones

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Overview of the proposed industry code changes

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CMP435 (Gate 2 to Whole Queue)

Key Components	Why is this important?
Existing Agreement Timetable Publication and Application Window	When published this will set out when the application window will open and close, and other key dates/milestones. The application window will not be opened earlier than 4-weeks after the implementation date. It must be open for at least 2-weeks.
Multiple points/routes for Existing Agreements to become Gate 1 or Equivalent	As projects will lose their confirmed connection dates and connection points, and User Commitment / Finals Sums liability will no longer apply from acceptance of the contract variation (the security return process will also commence at this point).
Gate 2 Process, including Readiness Declaration and Original Red Line Boundary	Sets out the high-level requirements/process in relation to becoming a Gate 2 Project in respect of the new Methodologies.
Introduces Ongoing Gate 2 Compliance Requirements (and Potential Exceptions)	Details additional/amended ongoing compliance requirements for Gate 2 Projects connected to the Transmission System i.e. i) the earlier of the backwards looking M1 and forward looking M1 will be the Queue Management Milestone M1, and ii) whatever Installed Capacity MWs is eventually built within the Original Red Line Boundary, only 50% of that number can then be located outside of the Original Red Line Boundary.

Gate 2 Criteria Methodology

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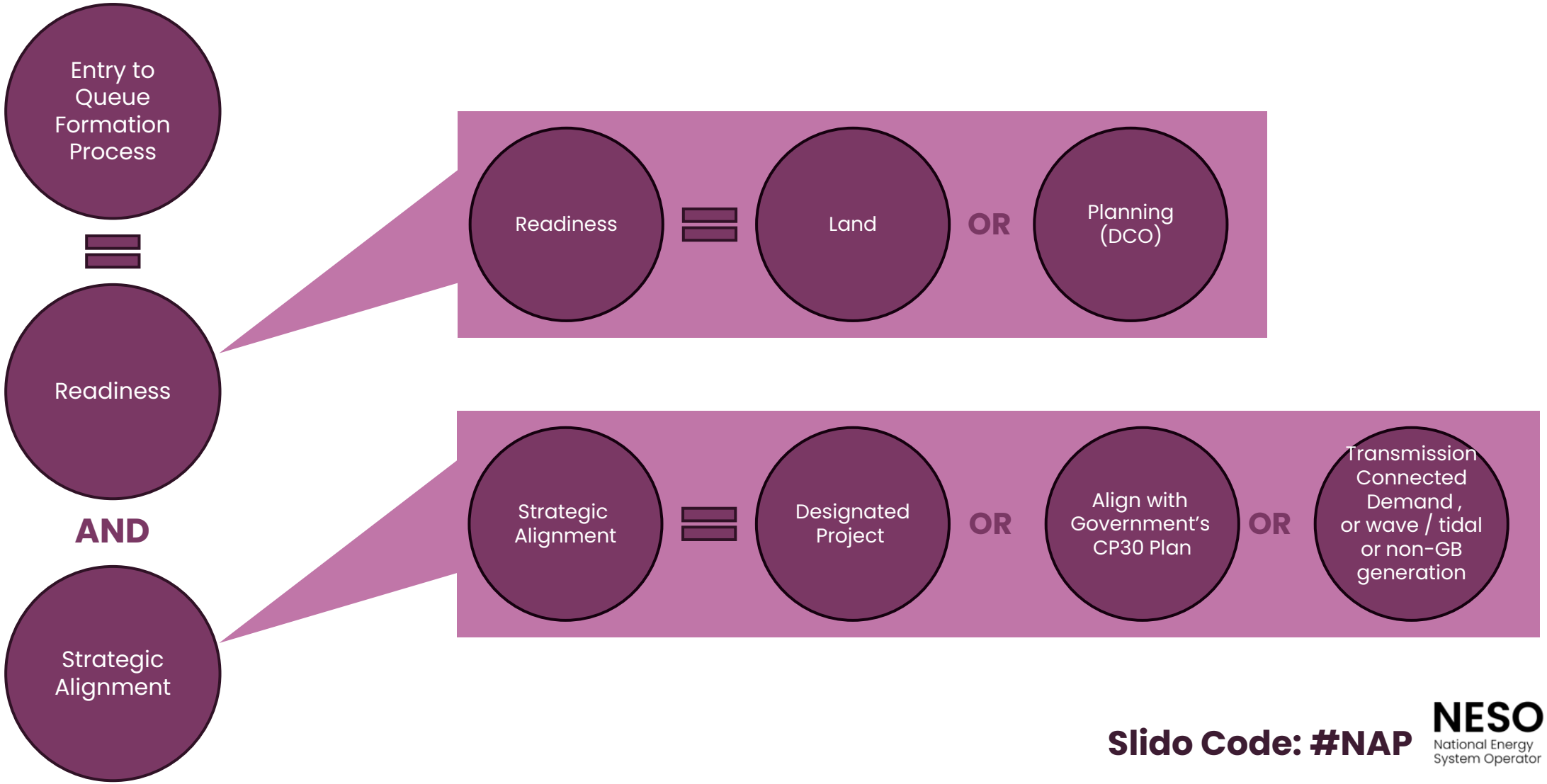
Overall Gate 2 Criteria



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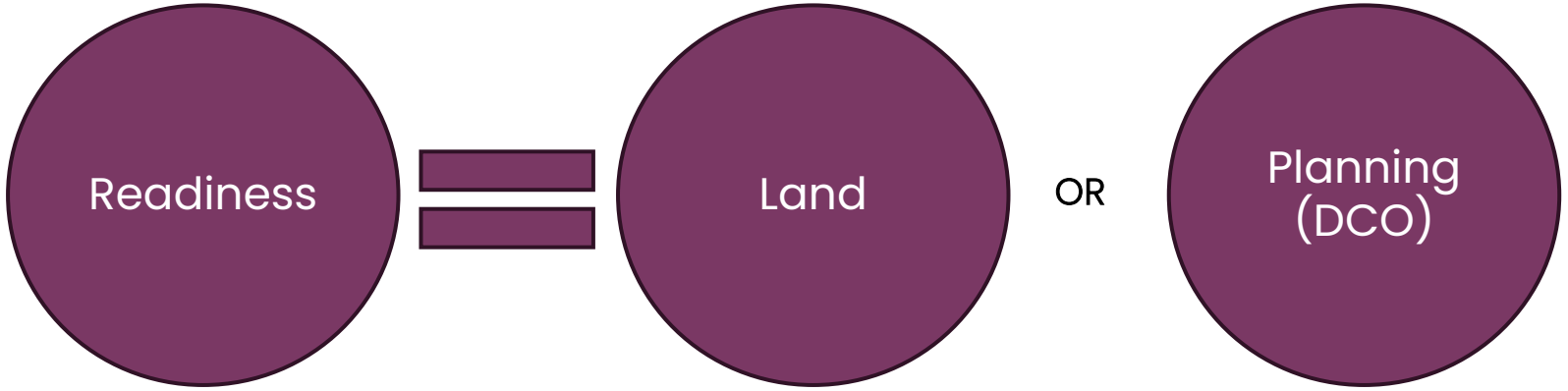
Gate 2 Criteria Methodology: Readiness



LAND (See Section 4)

- Meet Minimum acreage requirements (or Offshore equivalent); and
- Provision of Original Red Line Boundary for site on which project is located; and
- Secured Land Rights including evidence of exceptions (if applicable);; and
- Readiness Declaration (signed by a Director of the User applying).

PLANNING (See Section 5)

- Submission of (and validation of) application for planning consent for projects following the Development Consent Order (DCO) process; and
- Readiness Declaration (signed by a Director of the User applying);

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Strategic Alignment Criteria

Strategic Alignment Criteria	Protections	"Significantly Progressed"
a) Eligible for **protections**	1 — Projects contracted to connect by end 2026 that have met M2 and M7 (CMP435);	Planning obtained (M2) (and submitted, M1, by 20th Dec 24)
b) Aligned to the CP30 Action Plan	2a — Projects which are **significantly progressed** (CMP435);	CfD
c) Designated Project	2b — Projects which are **significantly progressed** (those who reapply in CMP434 only); and	Capacity Market
d) Not in scope of the CP30 Action Plan	3 — Projects which obtain planning consent after closure of the CMP435 Gated Application Window (those who reapply in CMP434 only).	Ofgem 'live' Cap and Floor
		Ofgem 'live' Merchant Interconnector

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Project Designation Methodology

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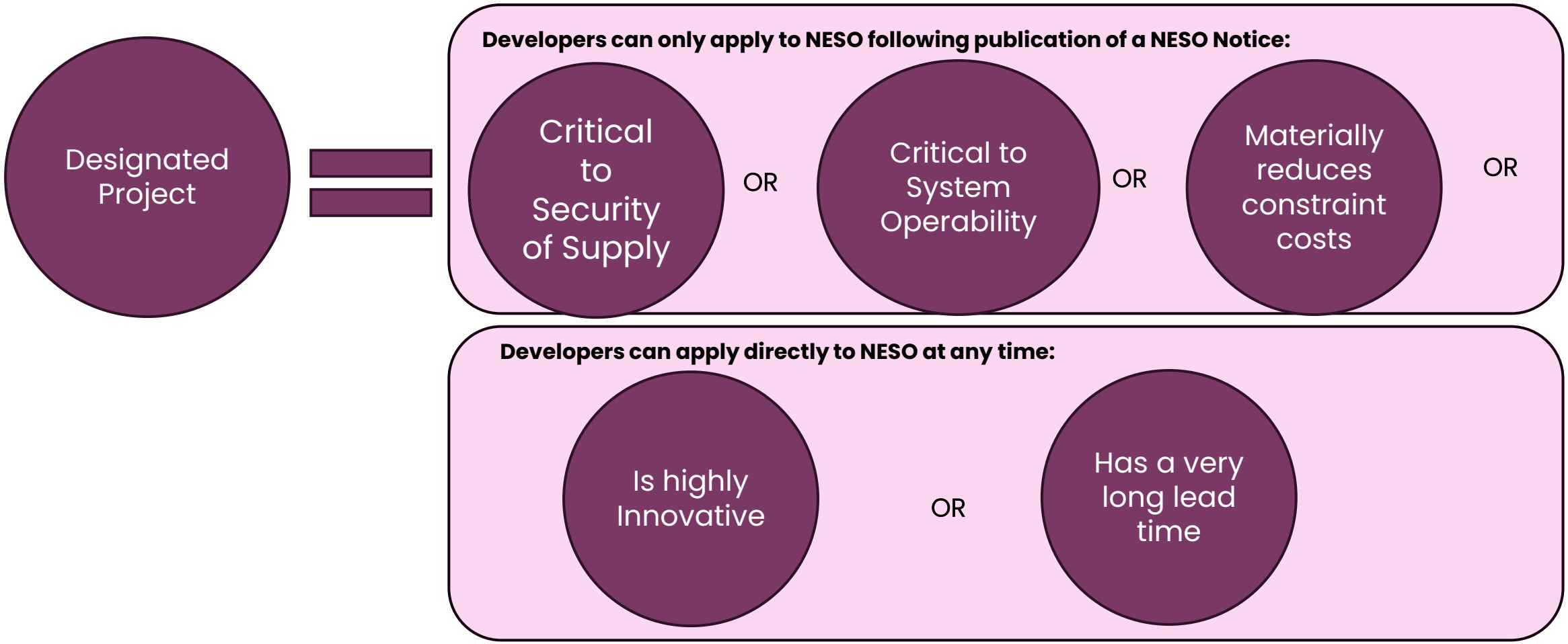
Project Designation Overview



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Connections Network Design Methodology

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Aligning the queue to CP30 Action Plan

After applying the Gate 2 Readiness Criteria, the process below will be used to determine the projects that meet Strategic Alignment Criteria b):

1. Form a sub-queue for each technology in each zone (e.g. Solar in Transmission Zone T1)

2. Identify projects that are eligible for 'protections'

3. Assign these projects to a phase, based on their contracted connection date, or advancement date where requested*

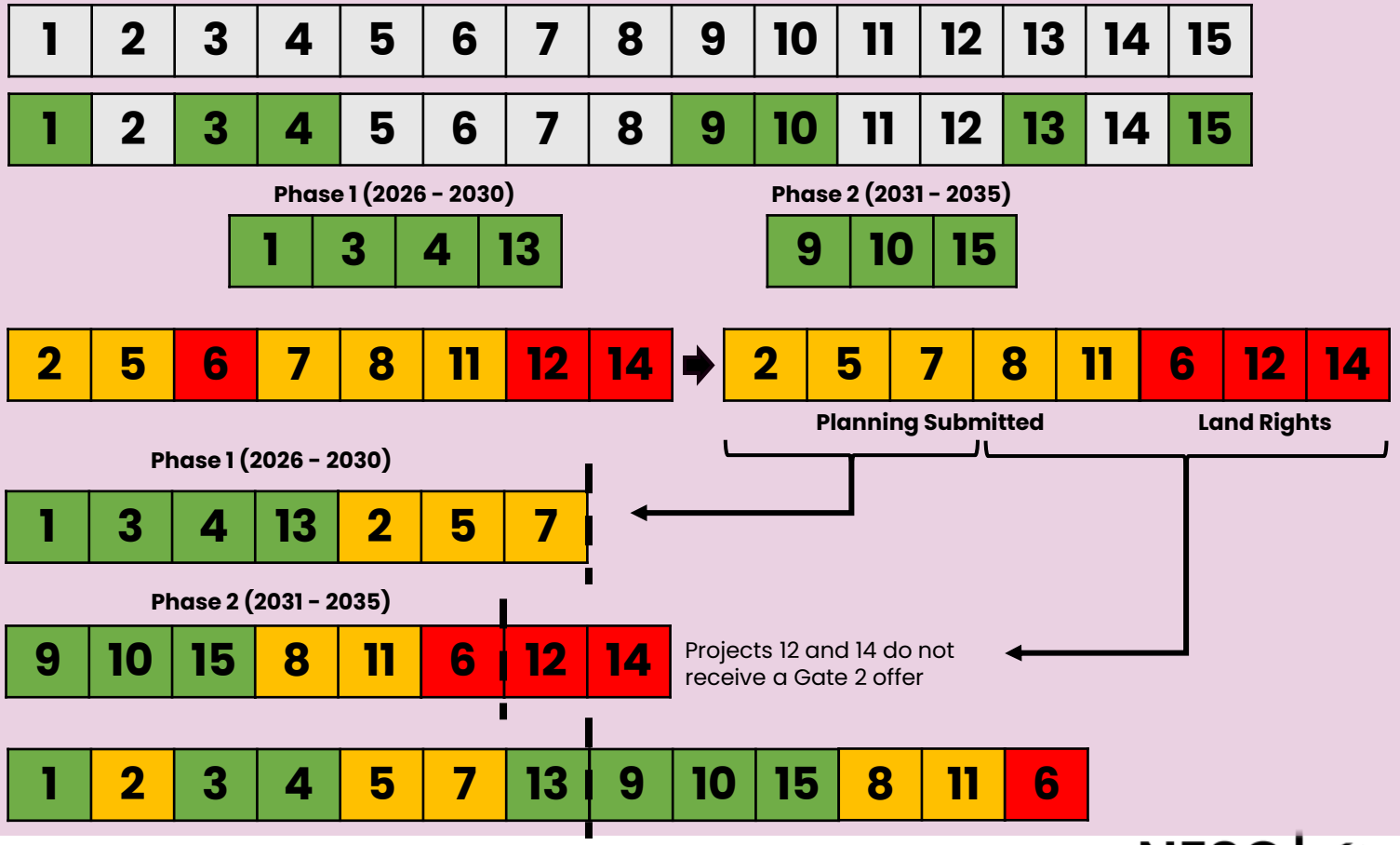
4. Determine the planning status of the remaining projects and order them based on this planning status

5. Relevant TO/DNO identify any network limitations preventing advancement (prior to detailed network study)

6. Where remaining projects have an existing or requested date of 2030 or earlier, add them to Phase 1 until the permitted capacity is reached

7. Add the rest of the remaining projects to Phase 2 until the permitted capacity is reached. Any exceeding this will not receive a Gate 2 offer

8. Return Phase 1 projects to existing relative queue positions and recombine Phase 1 and Phase 2



*if the 2030 permitted capacity is reached at this stage, all remaining 'green' projects will be allocated to Phase 2, even if this results in the 2035 permitted capacity being exceeded.

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Q&A

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Breakout 2: CP30 & Zero Carbon Operations

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Clean Power by 2030

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Focus of this session

1. Describing Clean Power
2. CP 30 overview
3. Analysis
4. Key Challenges
5. Actions
6. Conclusion

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Describing clean power

Describing clean power

We describe clean power as at least as much power being generated from clean sources as Great Britain consumes across the year, and when unabated gas generation makes up less than 5% of Great Britain's generation in a typical weather year.

Clean Power in numbers

	Share of GB clean power produced to GB consumption	**Share of unabated fossil generation**
Today	62%	33%
Clean Power 2030	>100%	<5%
Before 2050	>100%	~0%

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CP30 overview

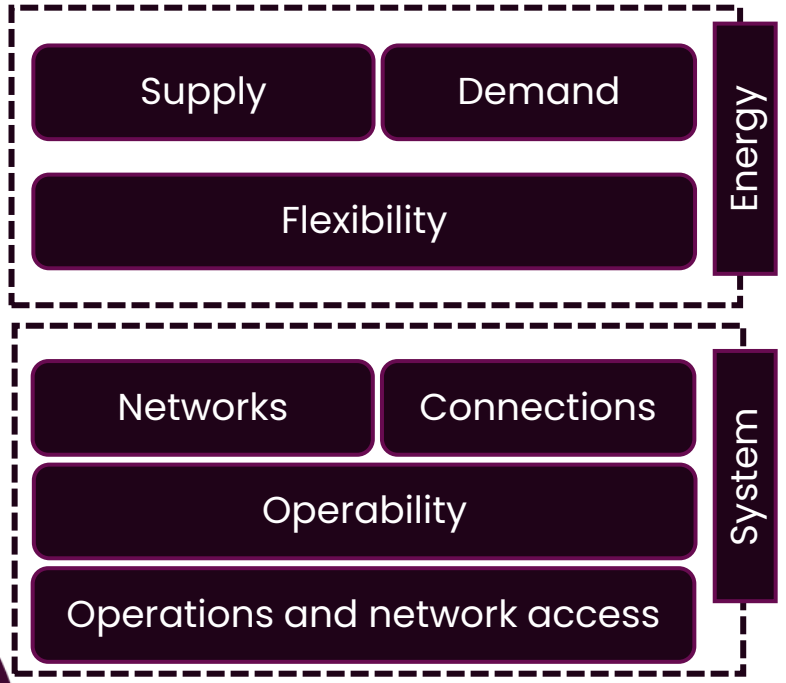
Economics

Flexibility

System Operability

Resilience & Restoration

Key **analysis strands**



Network Operability

DNO Interface

Demand

Generation Mix

People

Gas System Interactions

Connections

Networks

Network Access Planning

Markets

System Operations

Innovation

Stakeholder

Context

- July 24, Secretary of State commissioned ESO to provide advice on how clean power can be delivered by 2030.
- Analysis focuses on key energy and system elements required to deliver clean power 2030.
- Report was issued 5th Nov and was the first major piece of work issued as NESO

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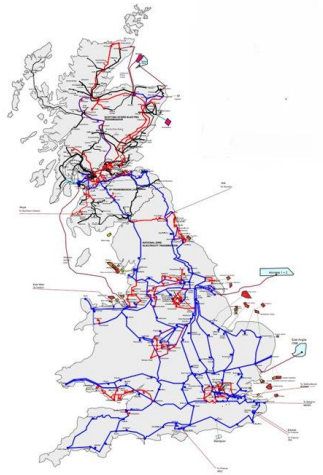
Analysis

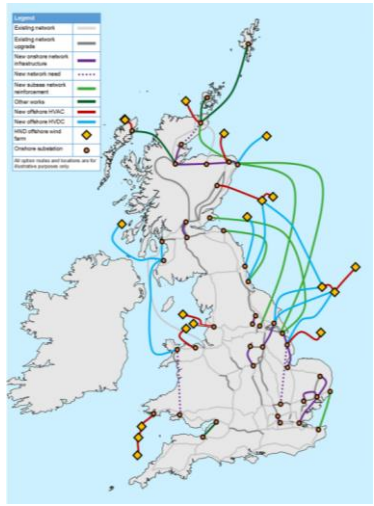
- Analysis builds on our existing network plan
- Network that was recommended for 2030 in *Pathway to 2030,* is the network which delivers Clean Power in 2030.



Today's Network

Only moves 75% Clean Power, even with a Clean Power generation mix

Pathway to 2030



2030 Network

Designed to meet 50GW offshore wind by 2030
Meets Clean Power 2030 Objective

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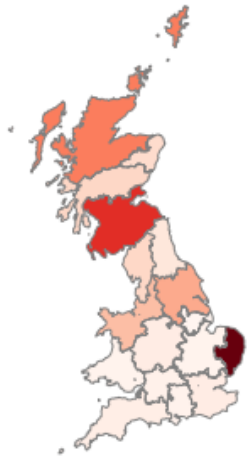
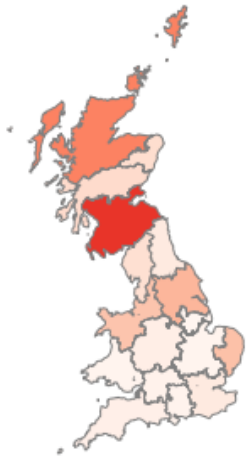
- **Delivery of 88 transmission projects required**

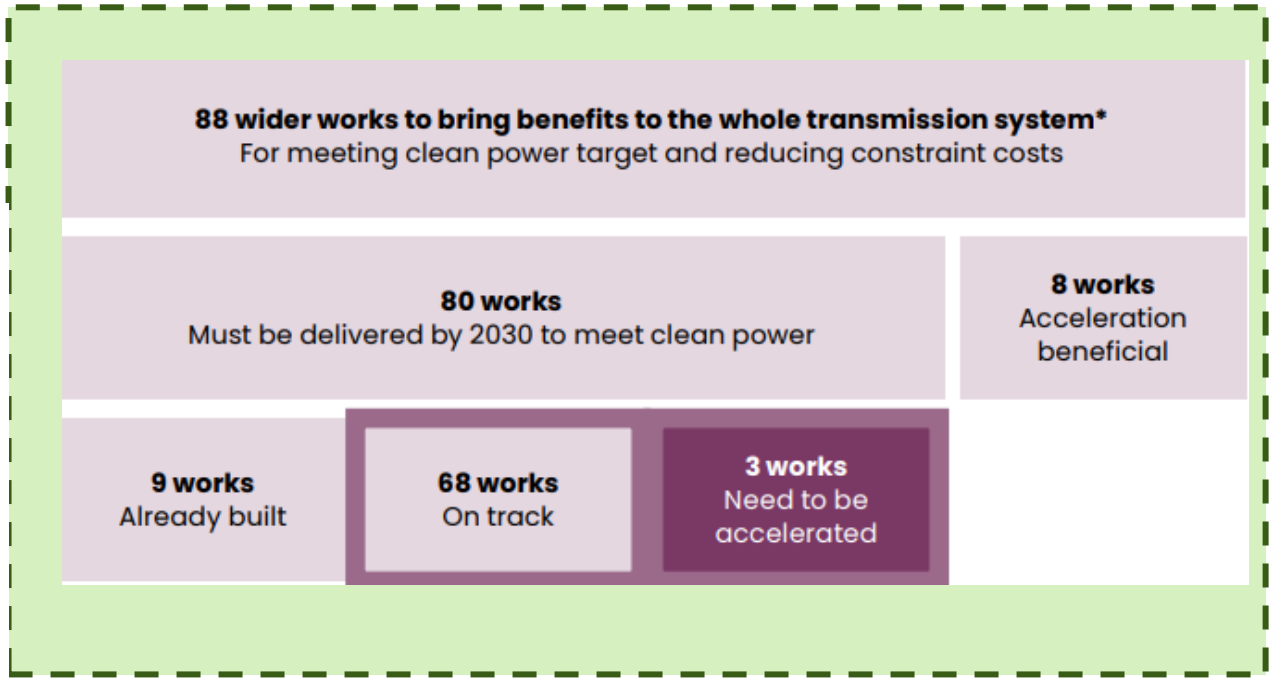
(80 already recommended in *'Pathway to 2030'*



The network we have today is significantly limited in capability. The heat map shows the areas where clean power would potentially be constrained on the transmission network, resulting in about £12.7 bn in constraints in 2030 and 8.1 % unabated gas.



However, the timely delivery of 80 works recommended for 2030 will result in a threefold reduction in constraint costs in 2030 and 4.97% unabated gas usage across the year.



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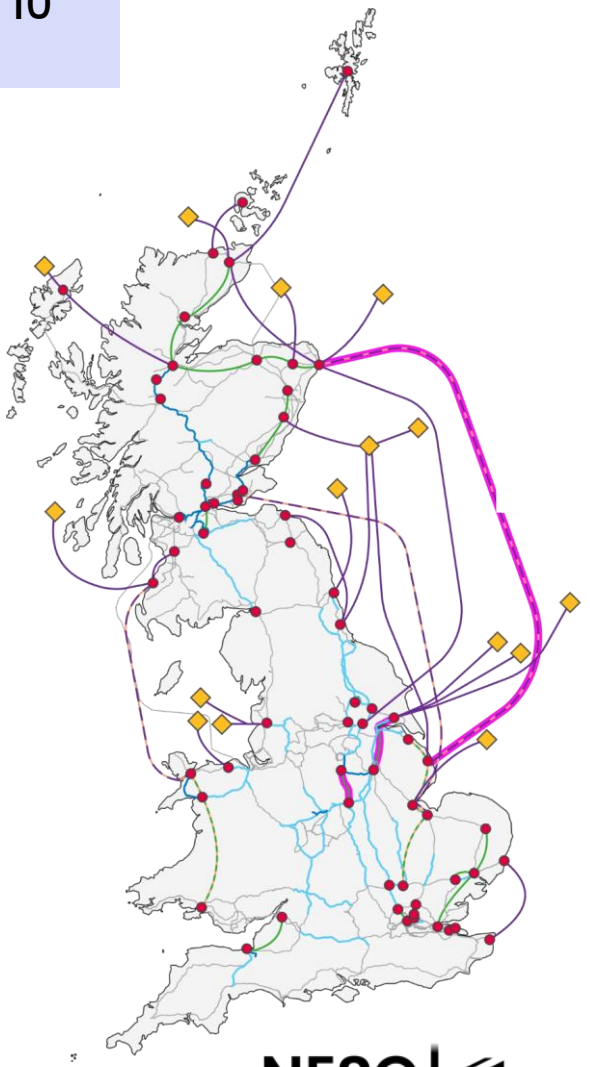
Delivering the network already planned for 2030 will allow us to meet Clean Power. However, success requires double the level of onshore and offshore network build seen in the last 10 years, in the next five.

Context: The last decade

- GB has delivered around 313km of Onshore and 2092km of Offshore network in last 10 years.

For Clean Power 2030

- Requires up to £60bn of investment, and delivers 988km of Onshore and 4650km of Offshore network



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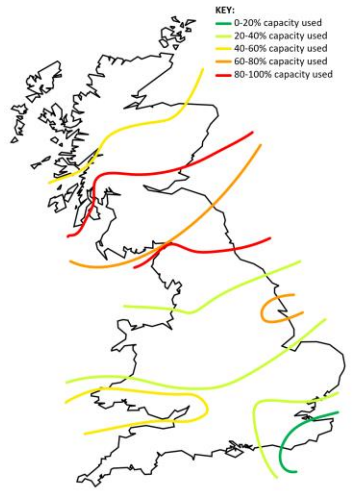
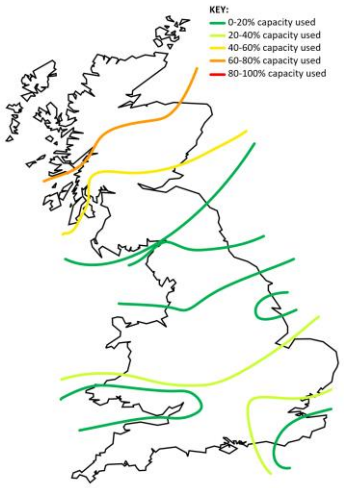
- Review of current system access requests carried out and contrasted against key boundaries 2025-2030 to provide system access outage days capacity. (YA and LT submission)
- Boundary selection per ETYS/FES documents
- Cross referenced against NOA7 refresh to capture all expected projects
- Assumptions against current planning security and economical recommendations
- Analysis of 24/25 plan to provide baseline for all necessary system access requirements and the ratio of scheme and non-scheme related work (40% / 60%)

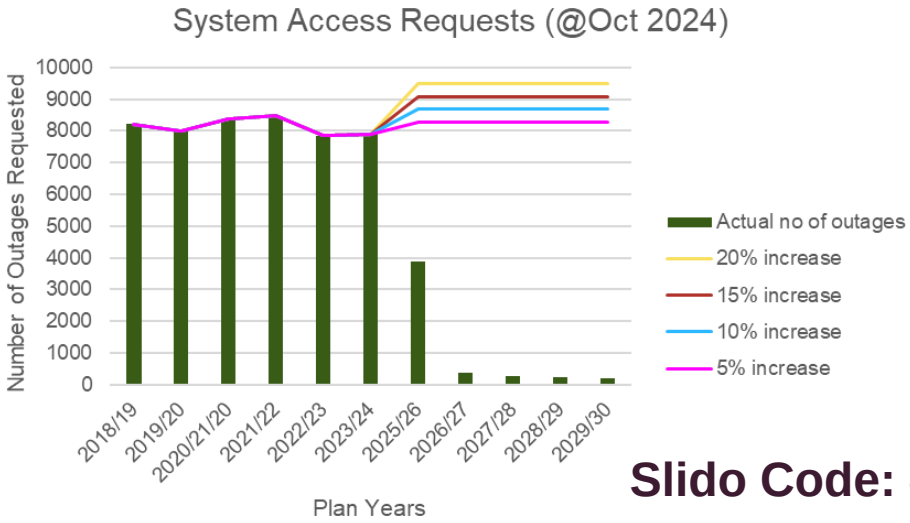


2024/25



2029/30

Approximately 8,000 outages take place on the electricity transmission system each year. Typically, 50% of these will have been agreed 12 months ahead of delivery with the remainder mostly requested and agreed in the year that the outage takes place. The outage plans agreed and planned from 2-10 years ahead of delivery are significantly lower in magnitude, on average 15% of the outages at year ahead are visible in the 3-to-6-year space.



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KEY CHALLENGES

- **Short Term Industry Focus** – Network Access plans are currently built over 2 years. 50% of outage are requested in the year of delivery and 50% are requested in in the year ahead phase. The number of outages requested further out in time is negligible in comparison. This short-term planning can lead to less sight of future options that can be taken to manage network access.
- **Managing outage delays** – The System access plan is tightly congested and delays to one outage can impact on many others due to a ripple effect.
- **Reactive Compensation Equipment availability –** Reactive compensation equipment is essential in supporting the voltage security of the network and is essential in providing system security. System access can cause challenges to managing voltage on the system and improved availability of reactive compensation across the network will be essential in allowing an increased number of outages to proceed.
- **Asset Ratings and Capabilities –** The assessment of system access is made against the ratings and capabilities of the assets on the system**.** Across the industry, there is an inconsistent approach to deriving the ratings and capabilities across industry and differences between organisations.
- **Constraint Optimisation –** Outages can cause constraints on the network and can carry associated constraint costs as action needs to be taken in the balancing mechanism to manage. It is crucial that the phasing of outages on the system is optimised to ensure that the associated constraint costs are minimised.
- **Generation Reserve Capacity Management –** Constraints reduce the amount of energy that can be transferred from one area of the network to another, which also means that the amount of generation reserve capacity that can be accessed behind a constraint is reduced. This can also lead to subsequent difficulties in the redispatch of generation.
- **Unplanned Outages –** Unplanned outages take place when immediate asset interventions are required on the network. The level of unplanned system access will impact on the delivery of the increase to planned system access that is required for system reinforcement and connections. It also increases constraint costs as it leads to sub-optimal phasing of system access. Current levels sit between 15% and 25% of all outage unavailability being unplanned.
- **SQSS Review –** The Security and Quality of Supply Standard (SQSS) sets out the criteria and methodology for planning and operating the Electricity Transmission System. Currently, there are occasions where system access cannot be granted within the rules of SQSS and are needed in exceptional circumstances, but this separate process can take time to work.
- **Increased Outage Liaison –** With the increased volumes of connections and new customers/users on the network, communication, and liaison in regard to planning network access becomes more challenging to balance the needs to more parties.
- **Wider project risks –** Potential impacts of wider delivery issues such as procurement, logistics, resources, capabilities, etc. can cause delays to future and current plans and diminish certainty on delivery

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Actions

Action Needed

- More strategic network access plans - built across multiple years, not just 1 or 2 as now
- Action across industry to:
  - provide maximum amount of system access through an optimised plan built across years;
  - maximise amount of work carried out within each outage window;
  - Implement less intrusive ways of working (off-line build, temporary circuits, etc);
  - Review risk profiles for assets
  - Innovate, driving forward future technologies.

Activity underway

- Delivery of Electricity Commissioners Report Recommendations:
  - OP1 Winter Emergency Return to Service (ERTS) Outage Process
  - OP2 SQSS Review
  - OP3 Long Term Project Design Process Review
  - OP4 Outage Planning Process Review.
- Working with TOs on implementation of Dynamic Line Ratings Initiatives
- Working with TOs to improve reactive compensation equipment availability
- Enhanced Services from TOs to increase constraint boundary capacities and allow more system access to be planned, e.g. HVDC run-back schemes.

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CONCLUSION

A more strategic approach across industry will be required to provide assurance around the deliverability of Clean Power 2030 and to address the network access challenges in timescales where there are a greater number of options available. This will also help to:

- Provide greater assurance around deliverability of clean power projects;
- Facilitate greater efficiency in outage days per circuit, i.e. include as much foreseeable work in one outage rather than several outages of the same equipment in the same year or across years
- Deliver a more cohesive optimal system access plan across years which will allow more work to be completed and constraint cost management to be optimised across years.
- Ensure that blockers and challenges to the provision of system access are highlighted further out in time for solutions to be identified in timescales where there are more options available such as changes to project design, procurement, enhanced services, etc.

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Zero Carbon Operation 2025

Short Term Operability Team - NESO

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Where did the Zero Carbon Ambition start?

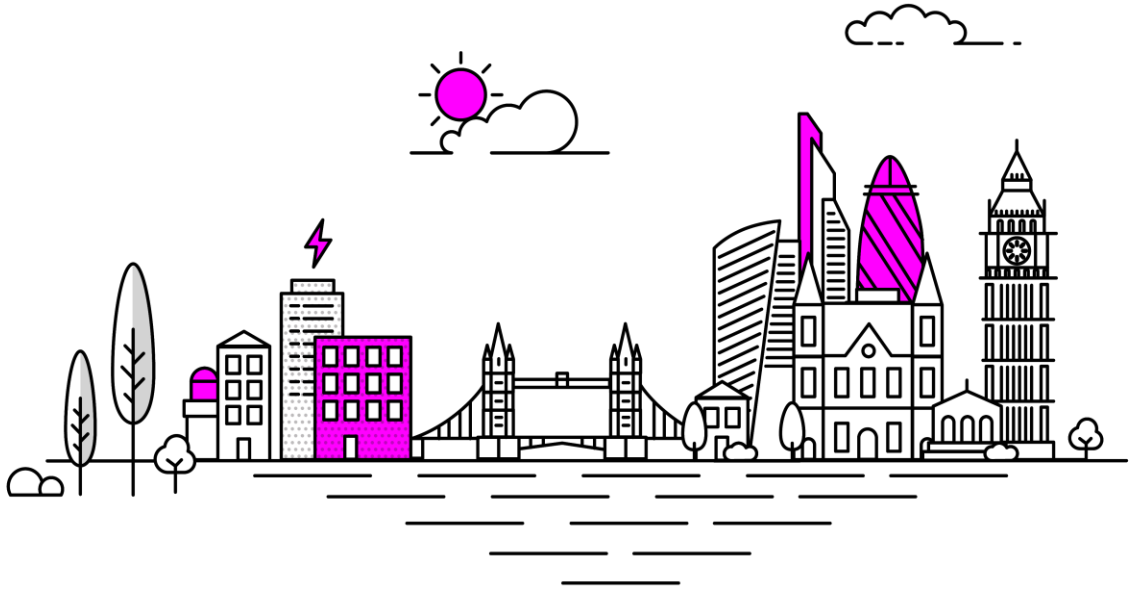
In 2019, NESO (previously ESO) set an ambition to be **capable** of operating the system for at least one Zero Carbon Settlement period in 2025. At present our engineers need to draw on conventional power plants (typically gas) to deliver system reliability and manage properties such as voltage and frequency.

Multiple projects have been set up to allow changes to be made to the system, all contributing to the ambition of being capable of running a Zero Carbon Settlement Period if the market were to deliver the right conditions**.**

But why now?

As NESO, it's our job to keep the grid stable at all times so we can deliver safe and reliable electricity. We are preparing to be capable of operating at zero-carbon by 2025 as part of the UK's net zero target for 2050.

So, we're looking for solutions that will allow us to operate an electricity system which will carry increasing amounts of energy generated from renewable and low carbon sources.



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What do we mean by Zero Carbon Operation?

"Our ambition is to be **capable** of operating a 100% zero carbon generation mix for at least one settlement period, while maintaining a secure and stable system."

Operational Principles:

The relevant NESO License conditions will not change for 2025. Our licence requires us to operate at the lowest cost while maintaining a secure and stable system - and does not consider carbon.

NESO will have the **capability** to run a Zero Carbon system by 2025, however we will be dependant on the below to meet the ambition of one settlement period:

1) The market will need to provide a 100% zero carbon (ZC) generation mix

2) Operational actions to secure the system must be taken in merit order; and,

3) NESO License conditions will not change operational decision-making processes.

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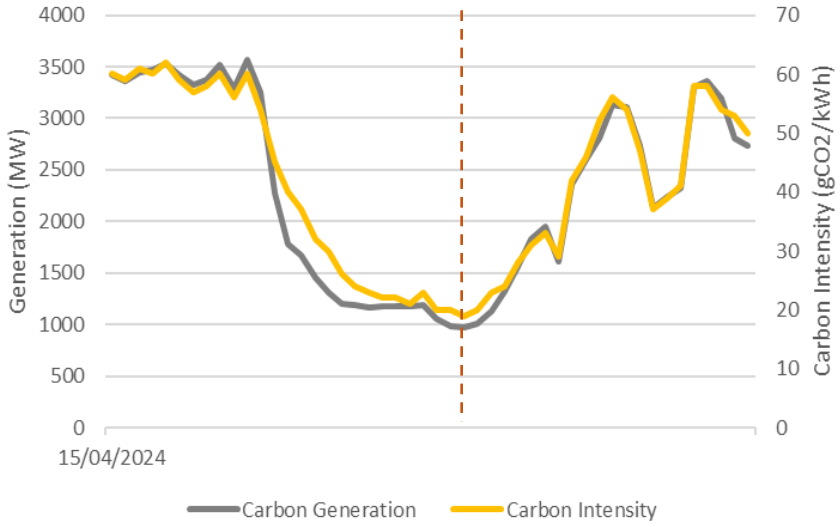
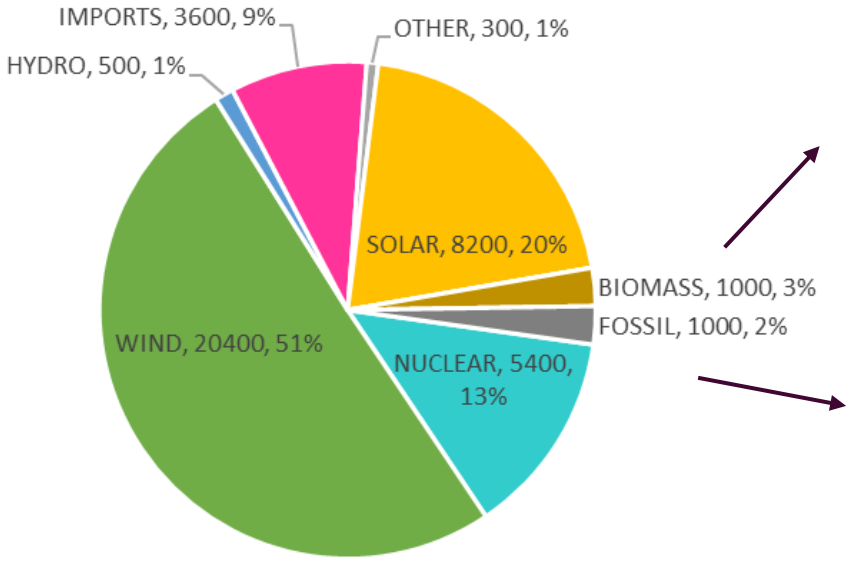
Progress to date – Lowest Carbon Intensity period

Our record for minimum carbon intensity was on 15th April 2024 at 14:00 – 14:30.

19gCO2/kWh





Drax	Ran in the market for steam and CfD reasons
Lynemouth	
Teeside	
Saltend	
Pembroke	Bought by NESO for system reasons
Ratcliffe	

What enabled this to happen?

- We reduced the minimum inertia requirement to 130GVA.s which effectively removes 3 carbon emitting generators.
- We've grown the Dynamic Containment market to offer increased volumes of response.
- Increasing wind capacity meets an increasing proportion of demand, making these days more likely.

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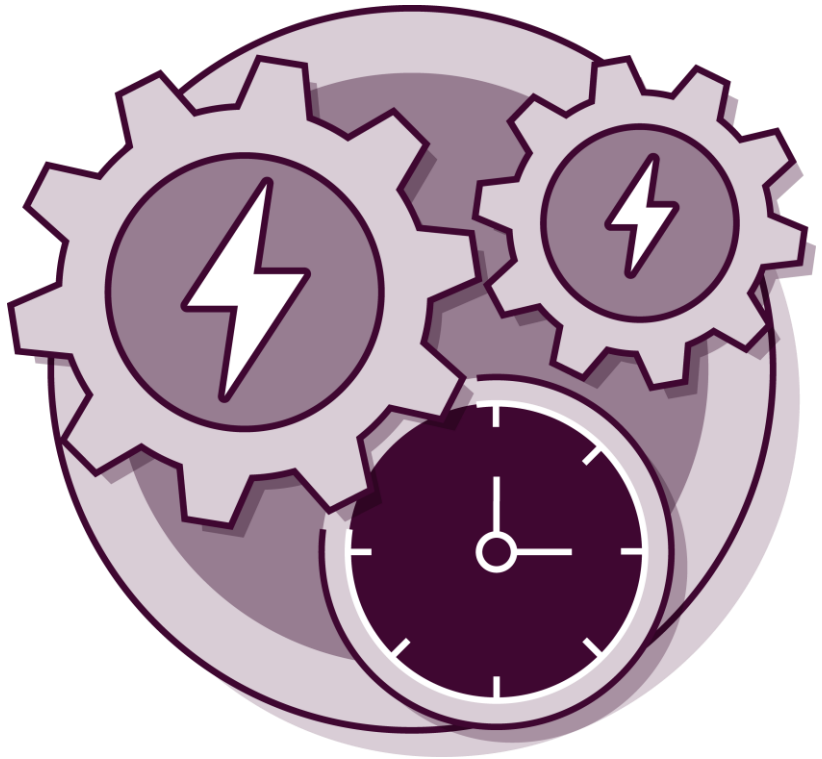
When could ZCO happen?

- ZCO is highest when it is windy with significant contributions from nuclear, pumped storage and hydro.
- It will be reduced by our actions to alleviate system constraints.
- There is a zone where operational interventions are minimised because system conditions are favourable.
- Stability and voltage requirements will need to be met without dispatching fossil fuel generation.
- We do not expect to be able to do this across all demands. We will begin with capability across some demand ranges and expand over time.
- Our ambition is to be able to operate a 100% zero carbon system **when the market delivers** such a solution!



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Delivered Projects

Frequency Risk and Control Report (FRCR) 2024

minimum inertia requirement moved to 120GVAs in April 2024.

Quick Reserve

became operational on 03/12/24, this new service is part of the suite of services to improve the existing response services, replacing Fast Reserve.

Balancing Reserve

Allows NESO to procure Regulating Reserve on a firm basis at day ahead. Go live - March 2024.

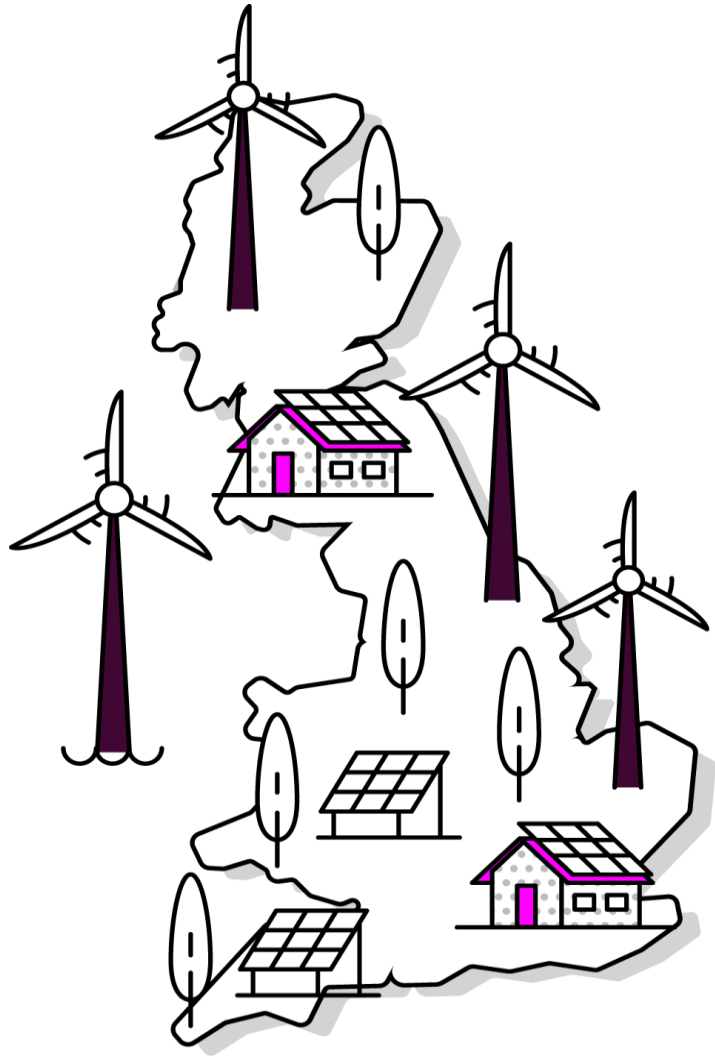
NOA Voltage Pathfinder - Pennine tender

Commissioned 3 of 4 reactors and now offers good voltage support. Removes the need for the DRAXX voltage machine in most circumstances.

Stability Pathfinder Phase 2

2 of the projects are now live.

Guaranteed availability of OFTO reactive



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Projects due to deliver soon

STC Planning request to NGET

Compliance and Economic reactors

Mid Term (Y-1) Stability Market

Part of the Stability Market Design innovation project to explore the design for the enduring stability market.

Stability Pathfinder Phase 2 and 3

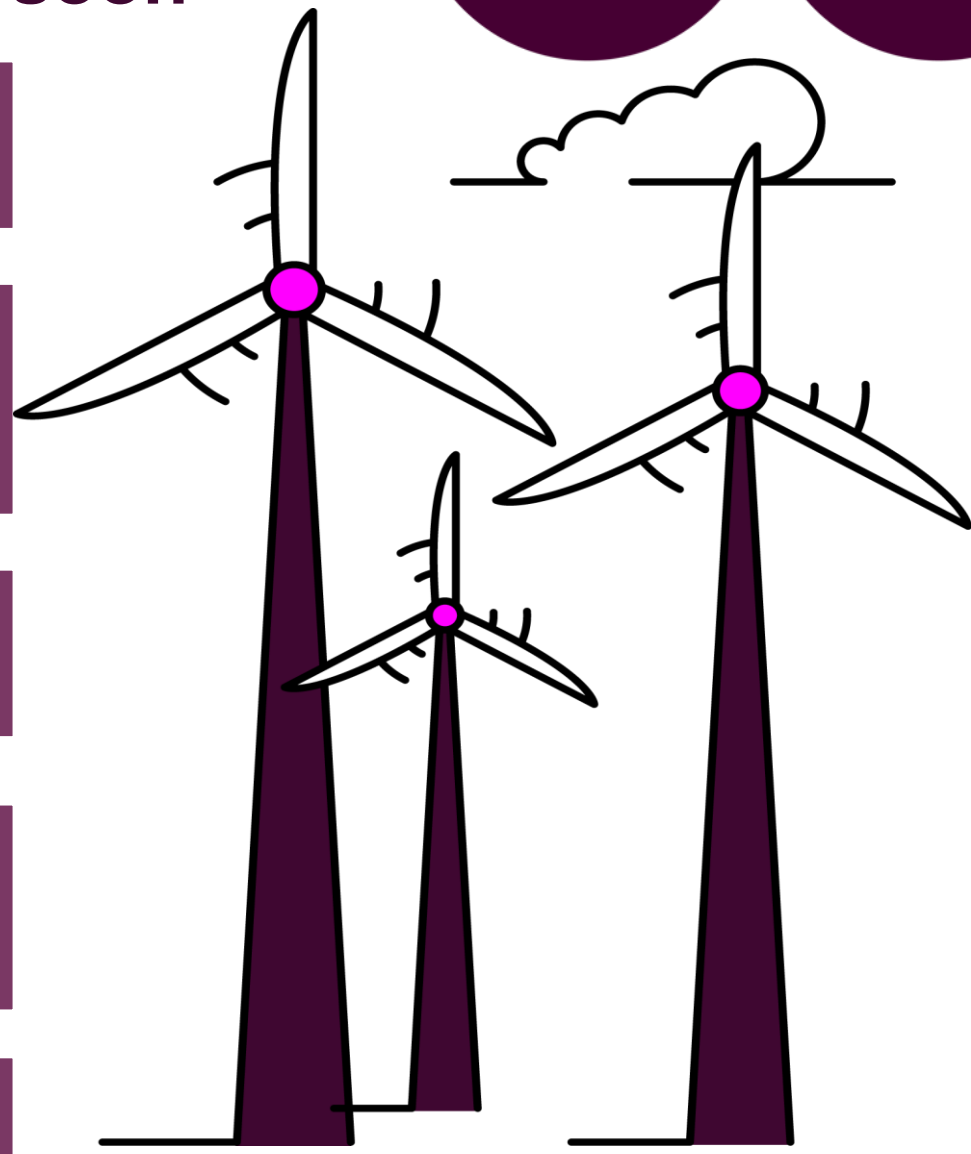
Procuring long-term stability requirements

Frequency Risk and Control Report (FRCR) 2025

Explore system risks and cost benefits from reducing minimum inertia from 120 GVA.s to 102 GVA.s.

Constraint Management Pathfinder B6 and EC5

Seeking to reduce network congestion costs and create an electricity system that can operate carbon-free.



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QUESTIONS?

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Breakout 3: NAP Processes, RDP & PODE

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Network Access Planning – OC2 Forum

Mohamed Ali & Ravinder Singh

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Overview

- **Aim - to help understand the processes undertaken in NESO Network Access Planning when planning outages**
- Introduction to the two main disciples/job roles in ESO Network Access Planning
- Overview of outage planning timeline (Long Term to Day Ahead)
- Practical outage planning example
- Challenges faced by NAP

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NAP Teams

Regional Planning Teams

- NESO Interface for all outage planning issues with DNOs, TOs, OFTOs, generators and directly connected customers
- Agreement of all outages with above users
- Three teams – Scotland, North E&W, South E&W
- Ensuring outage plan meets NETSSQSS at local level
- GSPs (Grid Supply Points) are secure during outages
- Thermal overloading to customer connections (SGTs)
- Voltage within limits to 132kV and below
- Consideration of bar faults and switch faults
- Fault levels are managed within limits of circuit breakers and other equipment
- Substation running arrangements 400/275/132kV
- Management of all outages in the outage planning database (eNAMS)

National Planning Teams

- Two Teams – National A and National B
- Ensuring outage plan meets NETSSQSS at National level
- Identification of system constraints (bottlenecks) and ensuring the planning of viable options to resolve
- Thermal overloading on transmission circuits
- Voltage within limits at transmission voltage levels
- Generation stability on the transmission system
- Working with the Cost Forecasting and Optimisation team to sanction outages that cause constraint costs

Substation running arrangements at MIS sites

Also in NAP

- Cost Forecasting & Optimisation (CF&O)
- Regional Development Programme

Slido Code: #NAP

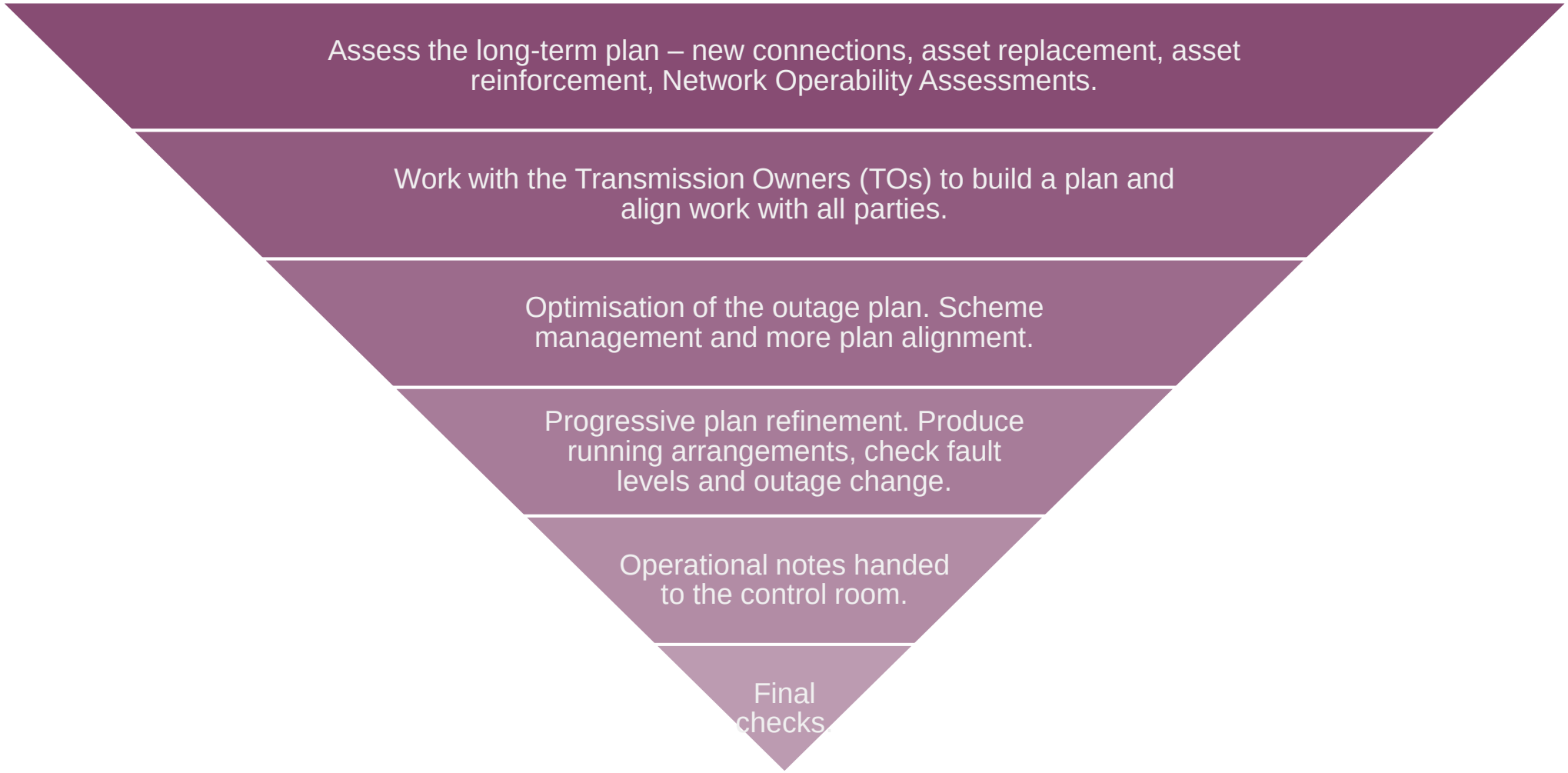
NESO National Energy System Operator

Outage Planning Timescales

- Outage Planning timescales are set out in **Grid Code OC2** and **STCP11-1**
- Within NESO, these are implemented in the following timescales:
  - Long Term and Year Ahead
  - Medium Term (Current Year to 4 week ahead)
  - Delivery (3 Week ahead to day ahead)
- At day ahead, the outage plan is handed over to the Control Room (ENCC)

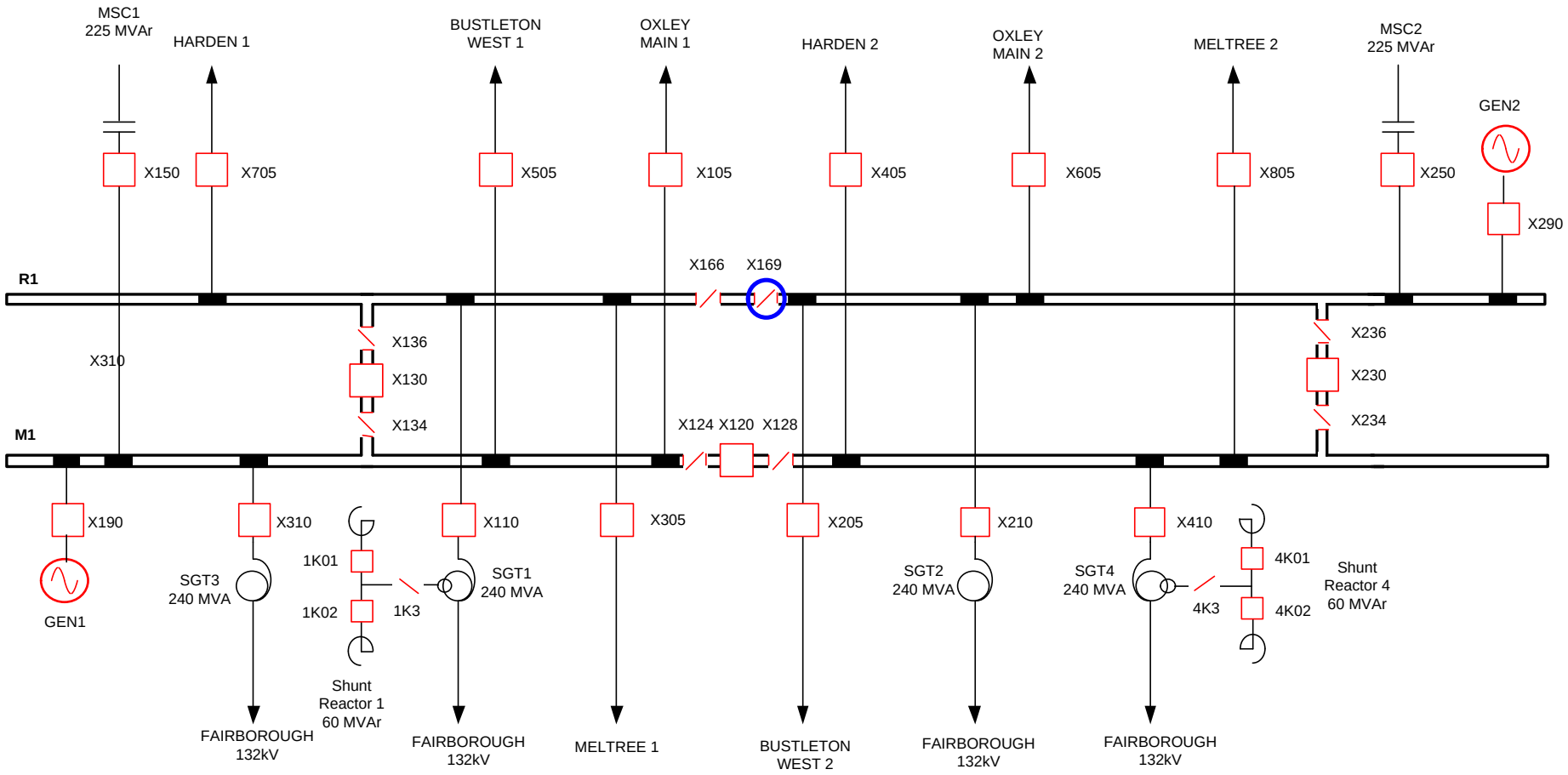
Slido Code: #NAP

Outage Planning Timescales



Slido Code: #NAP

Outage Planning Scenario



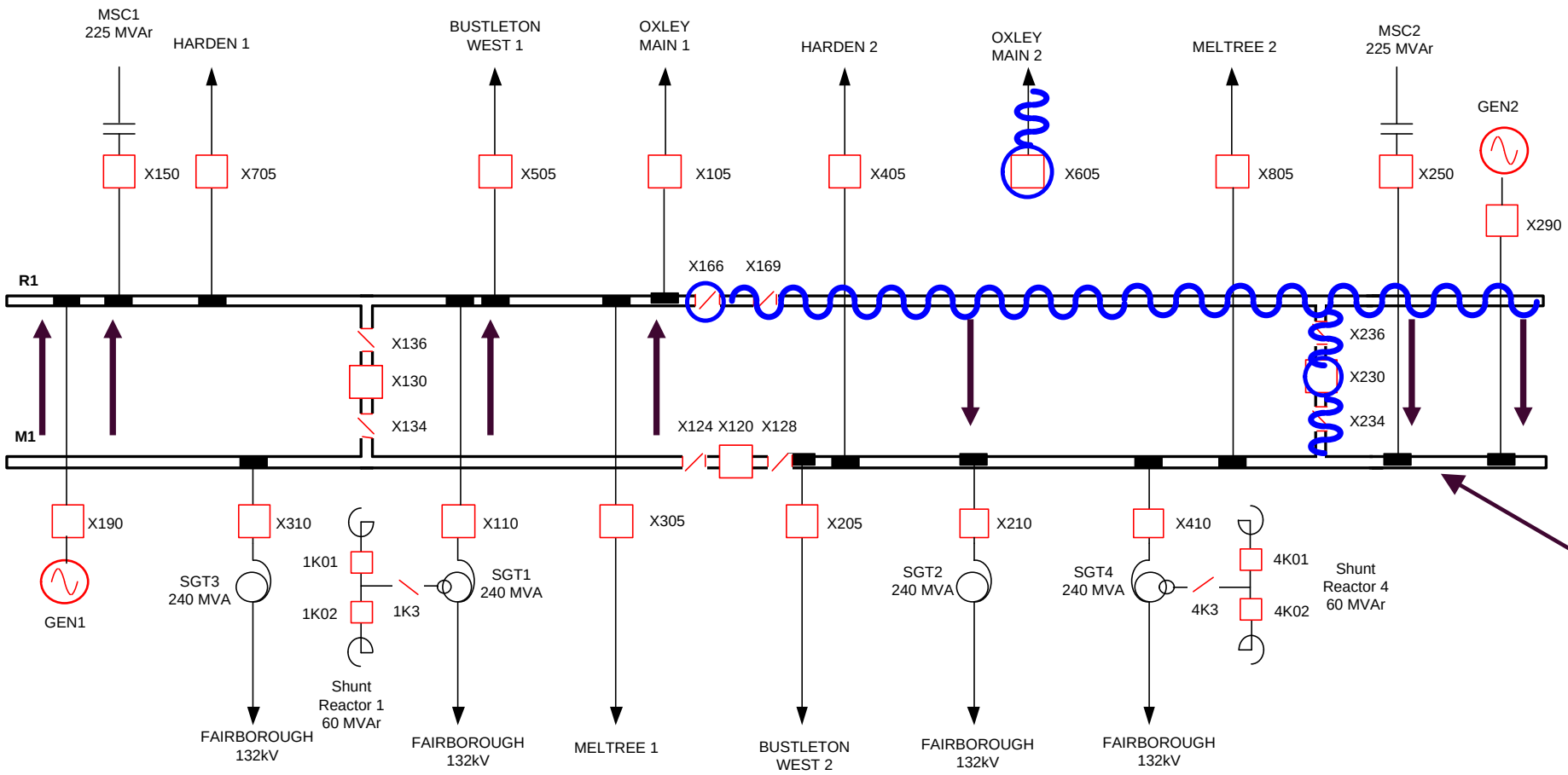
Requested Outages:

- Oxley Main 2
- RBB2

FAIRBOROUGH 400kV

Slido Code: #NAP

Outage Planning Scenario



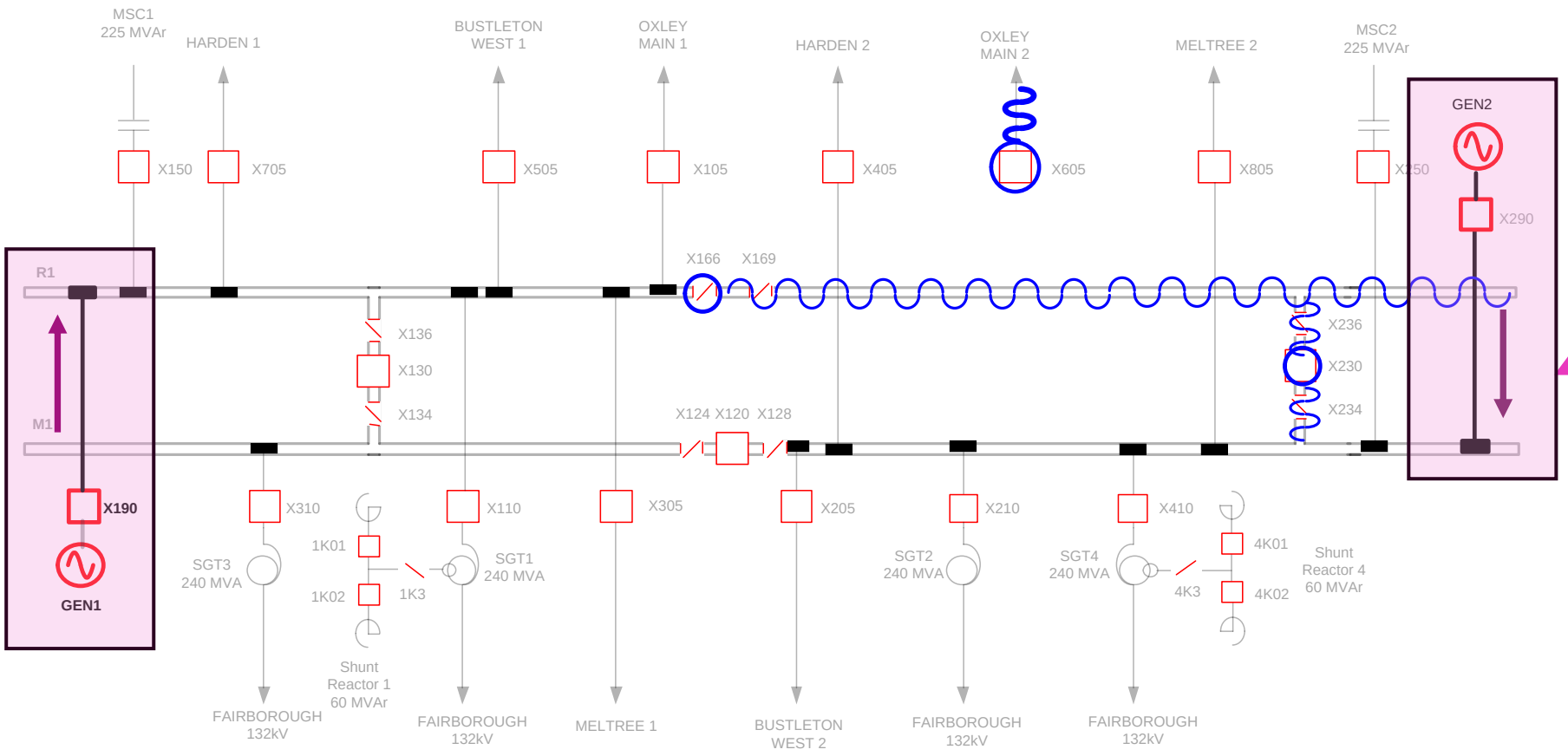
FAIRBOROUGH 400kV

Both National and Outage Planning disciplines in NESO consider optimal running arrangement since this is a 400kV substation

Circuit reselections of generator, SGT and Transmission Owner circuits will be required (shown with blue arrows). These parties, and the affected DNO will be consulted about the running arrangement

Slido Code: #NAP

Outage Planning Scenario

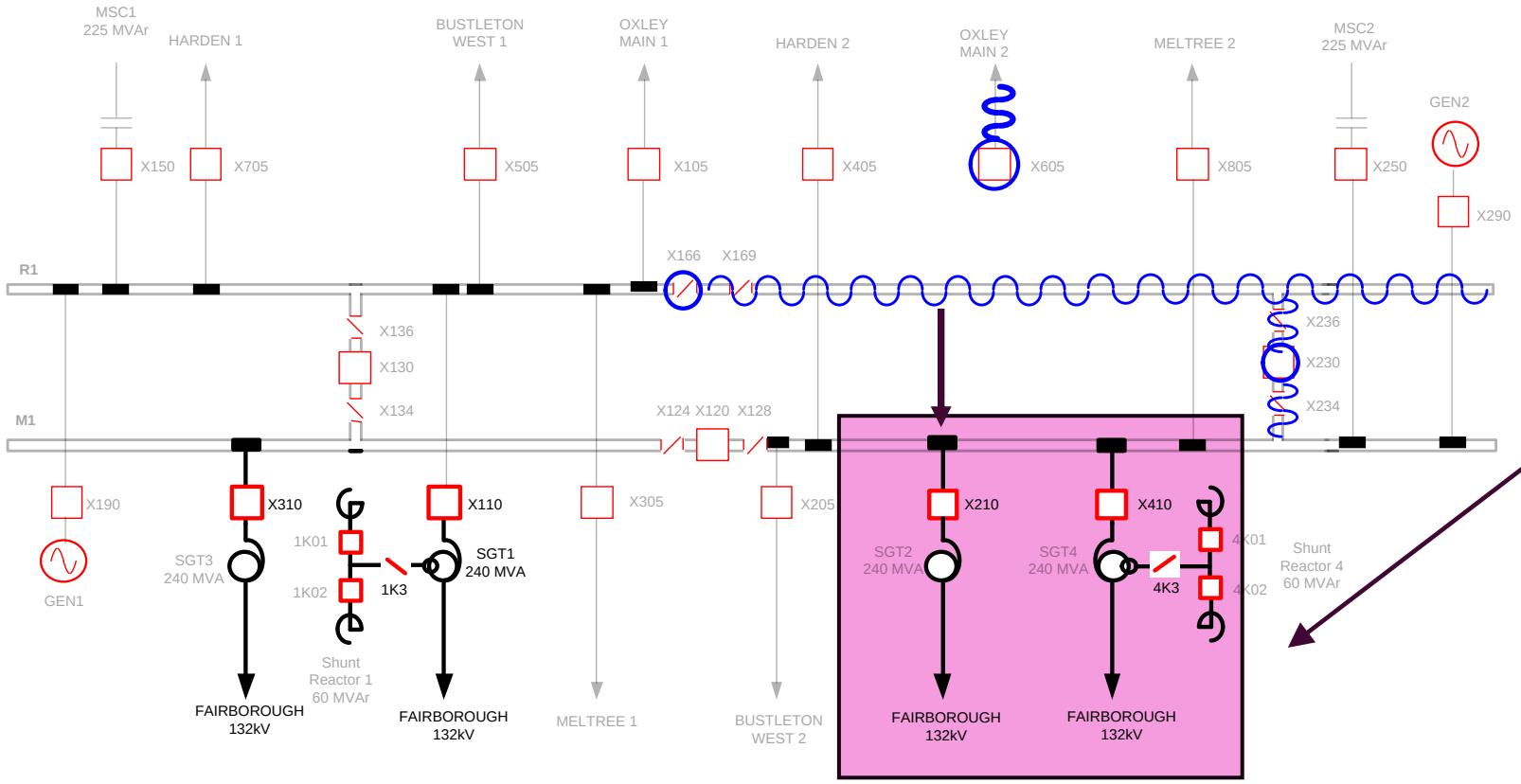


Generator circuits require reselection – Outage Planning engineer will consult generator to discuss and agree proposed reselections and overall running arrangement

FAIRBOROUGH 400kV

Slido Code: #NAP

Outage Planning Scenario



FAIRBOROUGH 400kV

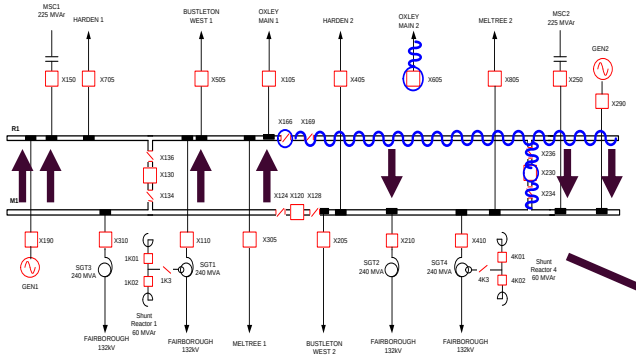
Outage Planning engineer will consider security of DNO supplies when creating the Running Arrangement (R/A).

In this case, the bar outage forces two transformers onto the same busbar. The effect of the busbar fault will be studied to determine whether the DNO demand can be secured on the remaining two SGTs.

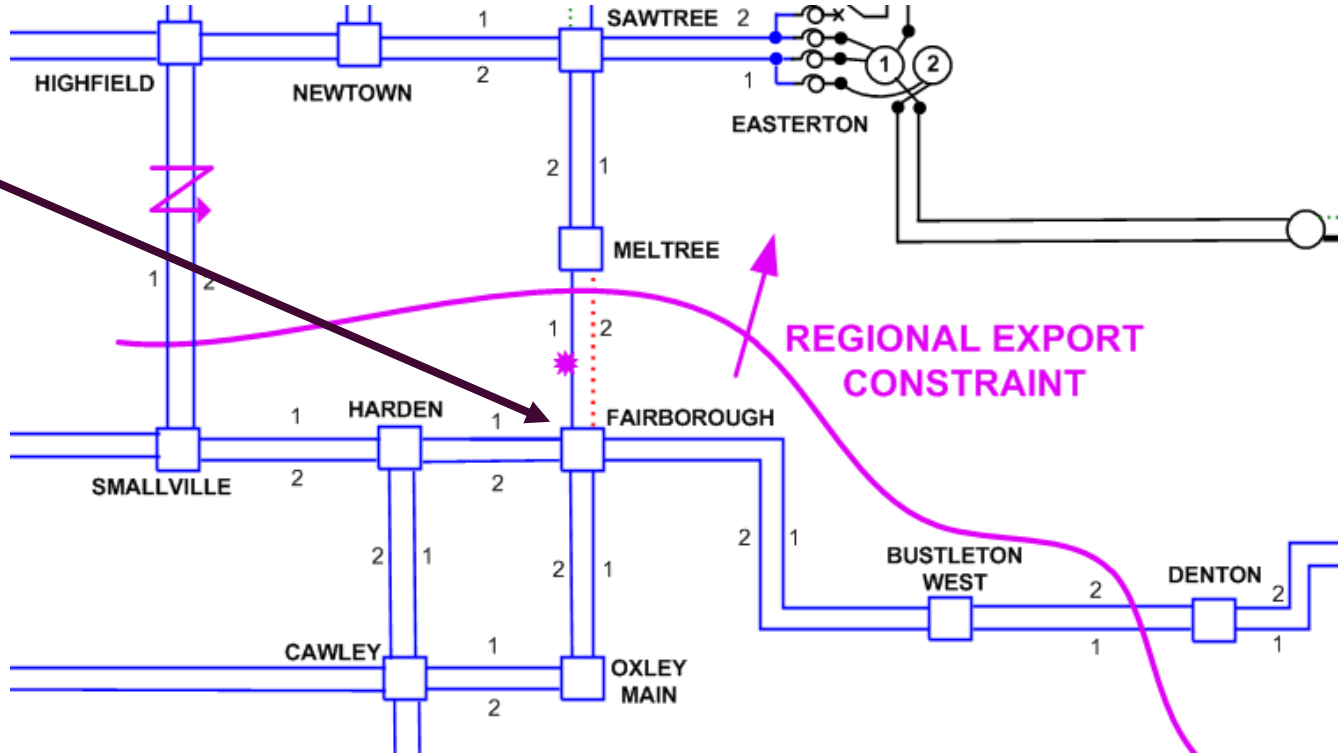
The DNO will be consulted by the outage planning engineer about the security implications and the new R/A to agree the outage. Any requirement to change the 132kV R/A will also be agreed with the DNO.

Slido Code: #NAP

Outage Planning Scenario



FAIRBOROUGH 400kV



The National Engineer will assess the constraints to see if the transmission system can manage the expected flows on the system. If constraints of generation are possible, the National Engineer will work alongside commercial analysts to sanction the forecast costs and cost exposure

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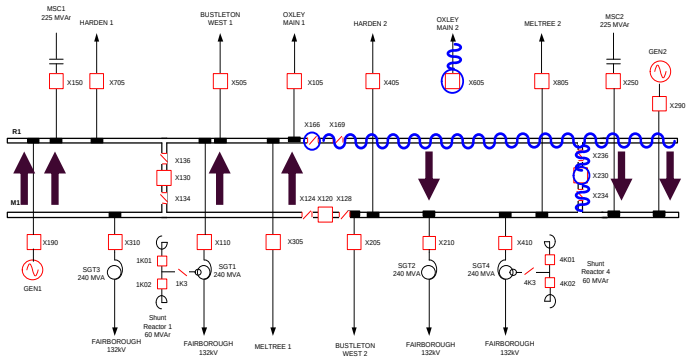
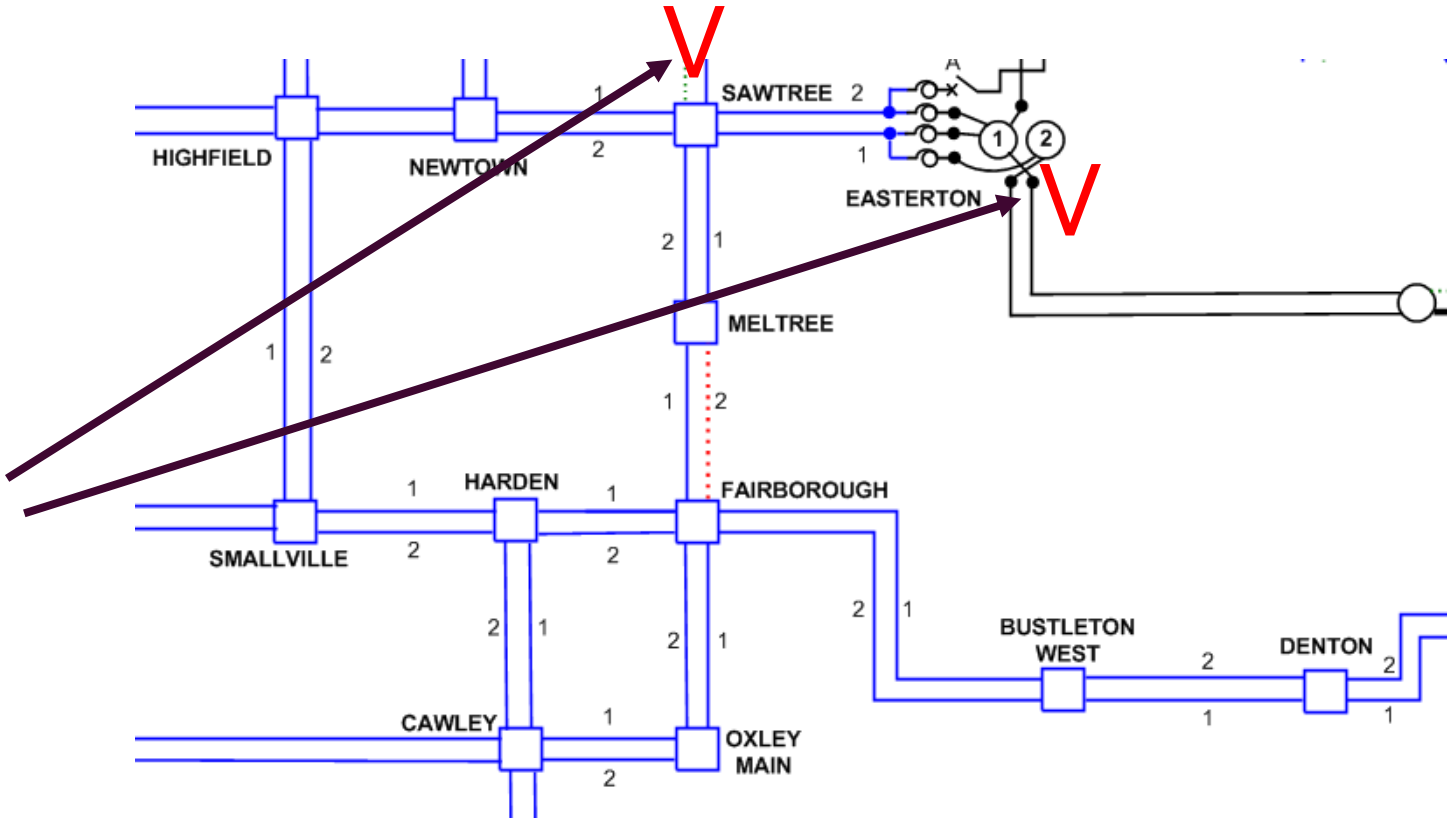
Outage Planning Scenario



FAIRBOROUGH 400kV

The National Engineer will also assess high voltage issues. In this example, the outage reduces connectivity between the generation and remote demand groups leading to high volts at these sites. This is made more challenging by less generation running during low demand periods. Final assessment remains uncertain until generation PNs are available at day-ahead



Slido Code: #NAP

National Planning

Core roles within the team

2WA>DA Engineers

Voltage Engineers

Study Setup Engineers

What we secure for

- Any double-circuit, busbar or mesh-corner fault.
- Thermal overloading of transmission circuits.
- Steady-state and step-change voltage limits.
- Generator stability.

How we do it

- Use of PowerFactory as an offline modelling tool to assess the impact of network outages.
- Identify and analyse system constraints.
- Seeking sanction for high-cost work.

Key deliverables to ENCC

Day-Ahead handover document

“Picasso Diagram”

Limits for transmission system constraints

Voltage advice to manage overnight volts

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NESO National Energy System Operator

Constraint Forecasting & Optimisation

Core roles within the team

Medium Term National Engineers

Constraint Analysts

Constraint Forecasting

What we do?

- Assess cost implications of outages
- Calculate the risk of an outage costing and comparing to not taking the outage
- Liaising with TOs/DNOs and generators to optimise the plan

How we do it?

- Using data from Regional and National
- Calculating costs based on data.
- Comparing with the cost of not taking an outage or assessing potential move options.

Key deliverables to NAP

Sanctioning of high-cost outages

Forecasting constraint limits and costs

Producing the Medium-Term (4WA) plan

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Public

RDPs and PODE – OC2 Forum

Keith Parker

NESO
National Energy System Operator

Overview

- **Aim - to provide a brief update on our Regional Development and Planning and Outage Data Exchange Programmes**
- On overview of RDPs and PODE
- Update on MWD and GSP Tech Limits
- Update on PODE
- Questions

Slido Code: #NAP

What are RDPs ?

- A method of addressing issues in areas of the network that have inherent challenges due to large connection volume of DERs
- Taking a ‘whole system’ approach to reduce consumer costs
- A ‘learn by doing’ approach to implementing solutions quickly and effectively
- Collaborating with Industry Participants (DNOs / DERs / TOs) to ensure we deliver optimal solutions
- Implementing MVPs quickly - and evolving to enhance and improve organically
- RDP 1 – 4 – Initial MVP MW Dispatch solution in both NGED (RDP 1) and UKPN (RDP 2) regions, followed by an enhanced service offering delivering automation, process alignment and scalability (RDP 3 & 4)
- RDP 5 – GSP Technical Limits across (ultimately) all DNO regions
- RDP 6 – MW Dispatch solution in South Scotland region

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MW Dispatch

Why do we need it?

There has been rapid expansion of energy resources connecting to local distribution networks. We have been working with DNOs through RDPs to get their customers connected more quickly and at lower cost to the consumer through innovative non-build solutions.

Where does it exist?

MW Dispatch applies to DER connecting at 13 Grid Supply Points - 8 with NGED in the South-West and 5 with UKPN on the South-East Coast. Discussions underway for a solution in South Scotland also.

What is MW Dispatch?

MW Dispatch is a whole system approach to managing transmission network thermal constraints between NESO and each partner DNO. NGED went live in Feb 2024 / UKPN operational trial complete moving to full service usage.

MW Dispatch utilises 'visibility and commercial control' conditions built into in customer connection agreements, curtailment is enabled through existing DERMS / ANMs.

The service requires a basic real power 'turn to zero' response from DER following instruction from NESO, taking into account any potential provider 'conflicts'.

Service providers are paid for the volume of energy they have curtailed up to the point of NESO ceasing the instruction. Current minimum unit size for eligibility is 1MW.

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GSP Technical Limits

- Anticipated for delivery across all DNOs – allows DNOs to connect DERs without expensive reinforcement
- DNO agrees to manage the export generation to a pre-agreed limit within the DNO network via their ANM
- NGED just gone live / UKPN and SSEN in process of agreeing PID documents – remaining DNOs to follow
- Relies on an ICCP (Inter-Control Room Communications Protocol) comms link to exchange data
- Puts DNO in control of their connections and managing their capacity

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What is PODE ?

- A programme to look at and improve our industry outage planning and system access processes – aims to take a more holistic view of outage planning.
- Co-ordinating outage requests and plans across multiple parties to become more efficient and effective in outage sanctions.
- Improving ways of working and business processes as well as making IT changes
- Facilitating the upcoming Grid Code 0139 changes and associated changes needed
- Wider data sharing between NESO and DNOs
- Lays the foundations for Primacy and DER Visibility

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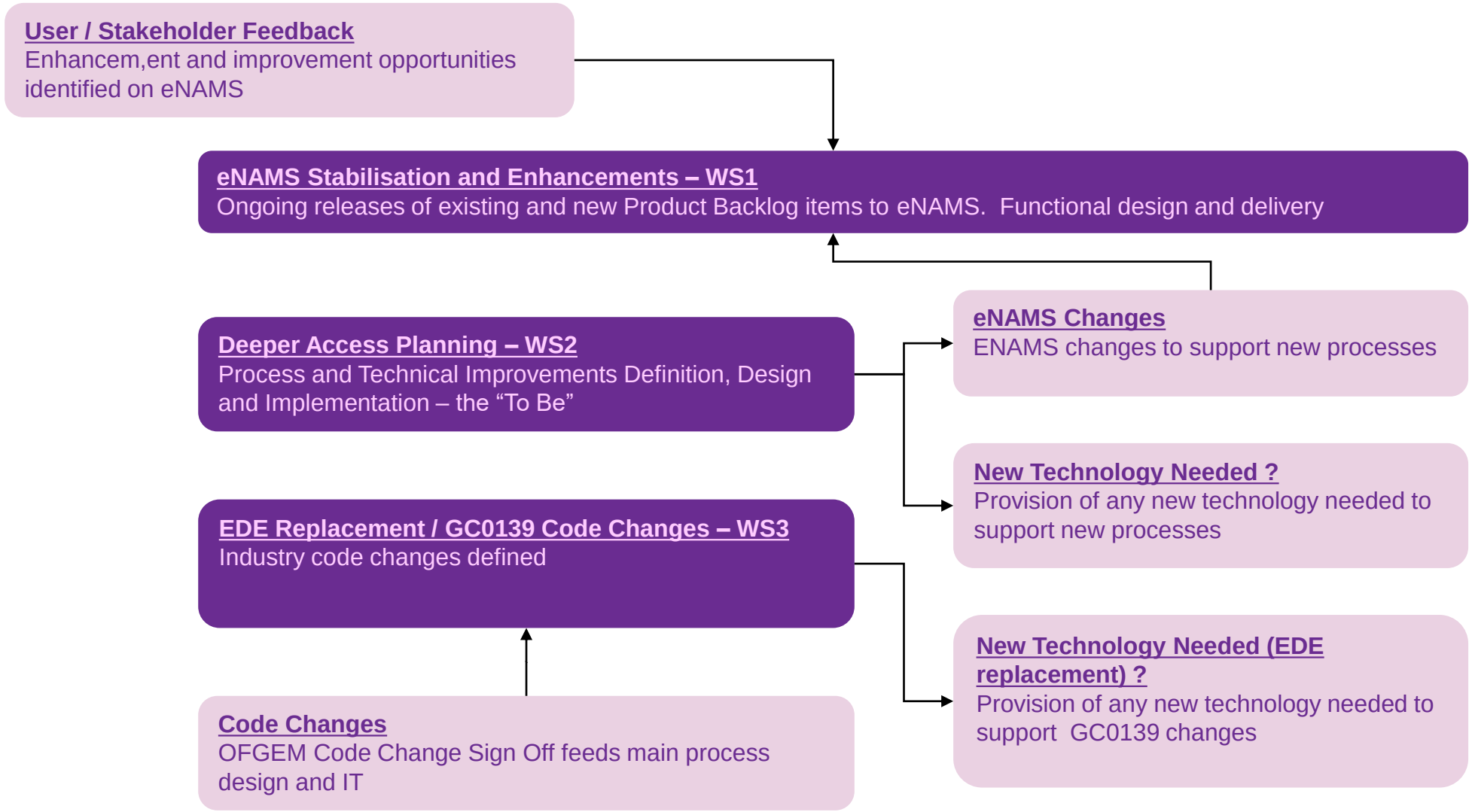
PODE Programme Landscape



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eNAMS Stabilisation and Enhancements – WS1
Ongoing releases of existing and new Product Backlog items to eNAMS. Functional design and delivery

- eNAMS Bulk Upload improvements
- Provision of APIs for exchanging data
- Improved reporting facilities
- Improved email outage notification processes

Deeper Access Planning – WS2
Process and Technical Improvements Definition, Design and Implementation – the "To Be"

- Sharing wider DER availability to support holistic outage planning
- Tool to allow NAP teams to undertake effective decisions – first deliveries in March 2025
- Working with DNOs / TOs to define strategic changes
- Requirements fed into eNAMS but may also lead to wider IT changes

EDE Replacement / GC0139 Code Changes – WS3
Industry code changes defined

- Facilitating the changes from GC0139 – understanding the extra data available
- New processes and systems delivered
- Modelling Distribution network into NESO systems to manage increased visibility

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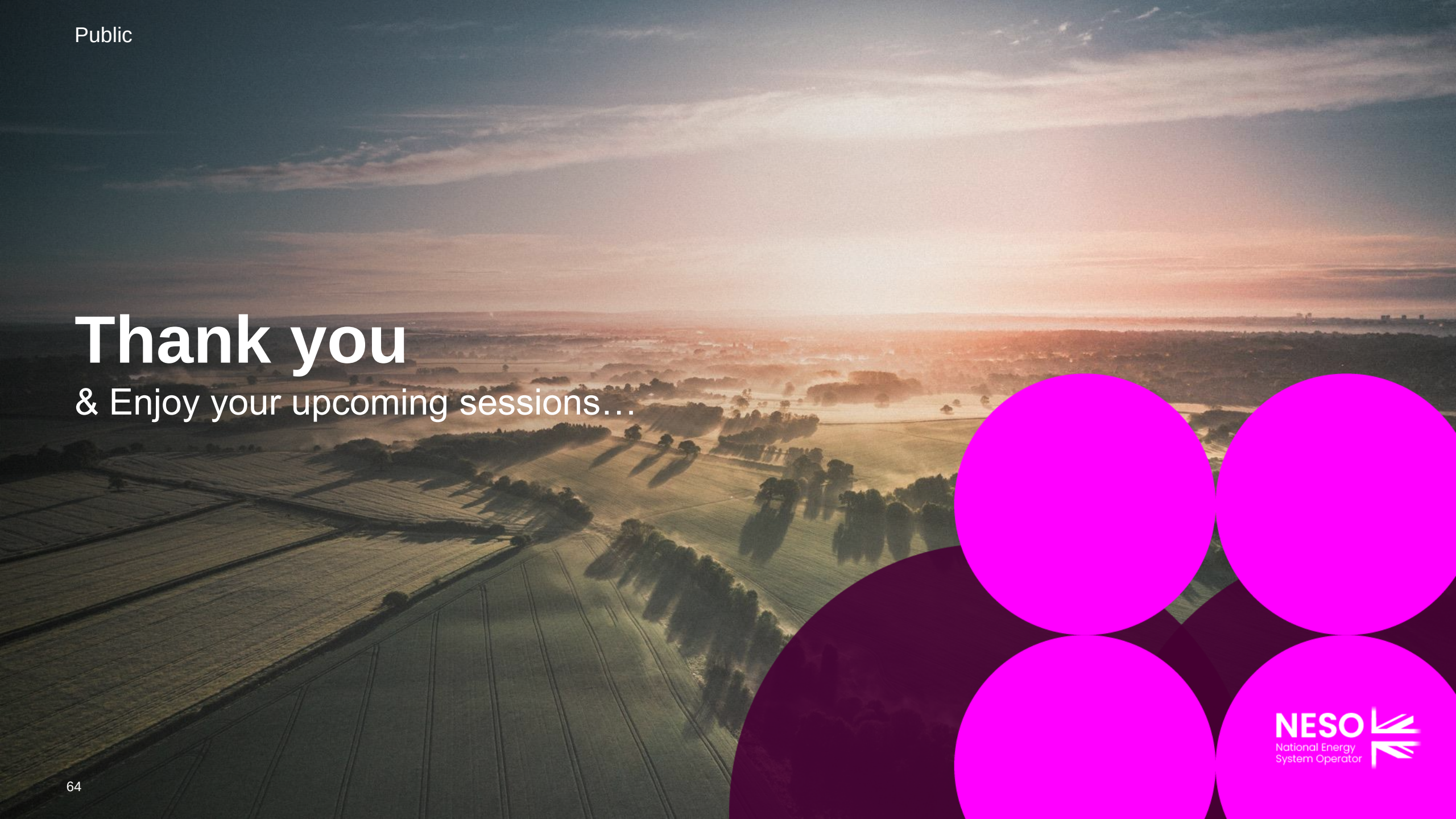

Thank you

& Enjoy your upcoming sessions…

Breakout 4: Constraint Management

NESO
National Energy System Operator

Contents

1. Defining a constraint
2. Analysis Challenges
3. Operational Challenges

Slido Code: #NAP

Public

Defining a constraint

Matthew Chapman

NESO
National Energy System Operator

What is a constraint?

“A constraint is defined by a critical fault that requires action, the overloading circuit as a consequence of that critical fault, and any generation, demand and equipment that are effective in managing the constraint.”

Position of the boundary:

- Cuts through the critical fault
- Cuts through the critical overload
- Encompasses “effective” plant

Contents of the boundary:

- Generators driving an overload
- Demand driving an overload
- Reactive equipment
- Substations with effective running arrangements
- Quad-boosters & SSSCs

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Types of constraint

Thermal

- Limited by the current capacity and heating
- Can be export or import

Voltage

- Limited by SQSS steady-state or step-change limit
- More onerous in areas with lots of underground cables

Stability

- Limited by the transient stability of synchronous generators
- Is becoming more onerous with lower system inertia

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Public

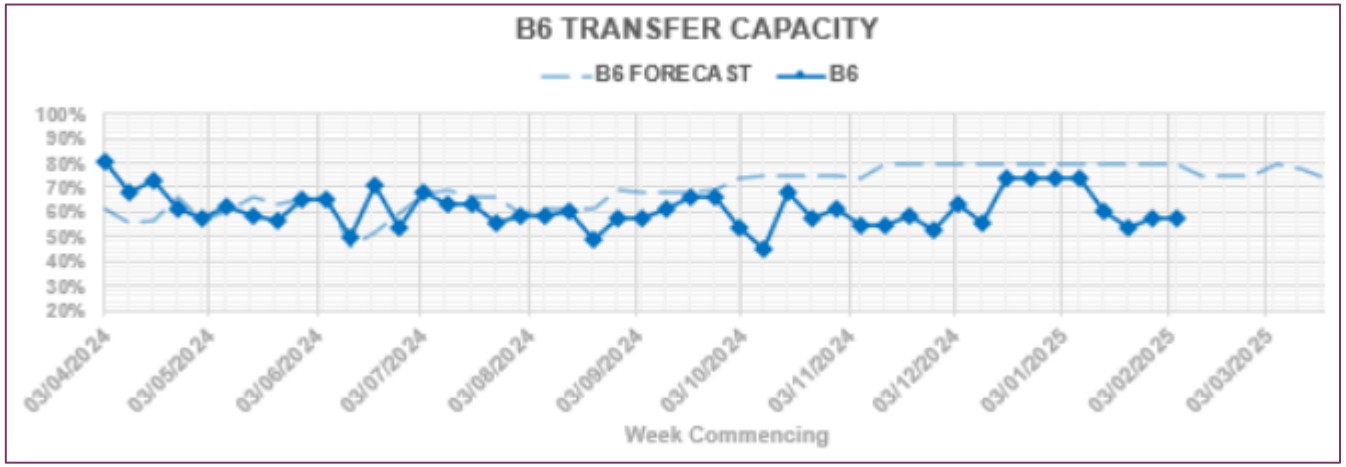
Analysis Challenges

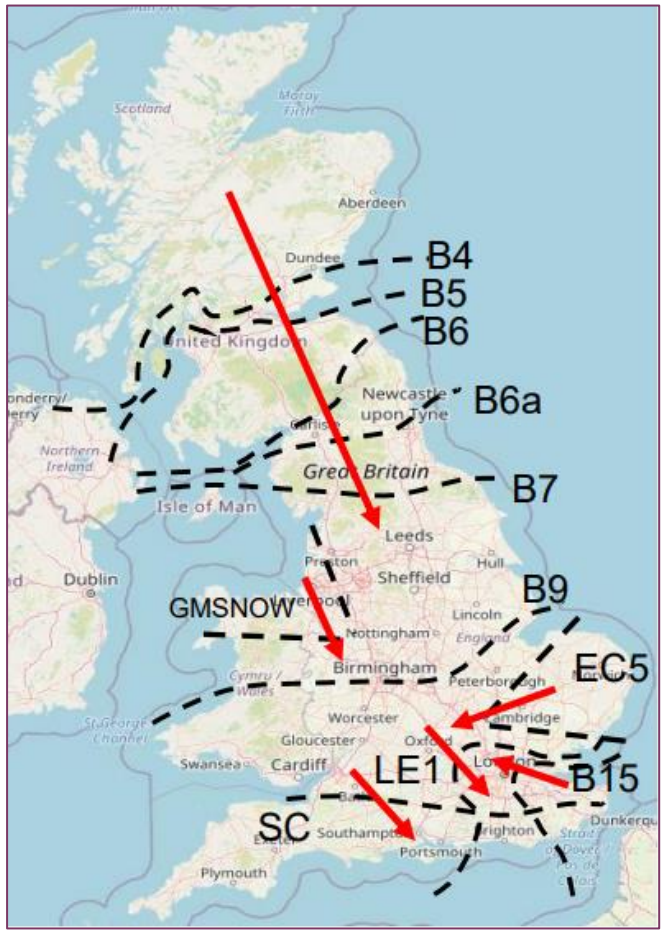
Matthew Chapman

NESO
National Energy System Operator

Constraint transparency

- **Maximum Limit:** Highest value achieved at Day-Ahead within the last 12-months
- **Forecast Limit (%):** Limit achieved by Year-Ahead & Medium-Term
- **Current Capacity (%):** Actual limit handed over at Day-Ahead





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Challenges in planning timescales

Rapid Network Reinforcement

- Delays to major scheme work have big knock-on effects
- Record number of outages year-on-year constraints the network

Wind Forecasting

- Highly volatile with changes even within Day-Ahead & Intra-Day
- Different generation profiles create different constraints

Embedded Assets

- A combination of embedded generation and BESS cause uncertainty around transmission demand in short-term timescales

System Faults

- A persistent fault can cause more onerous constraints
- Outages delayed/recalled for network security for major events such as Storm Éowyn

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Public

Operational Challenges

Allen Muhoma

NESO
National Energy System Operator

Managing the System

Network Access Planning (NAP) Team

Carryout network analysis using the offline transmission analysis tool (OLTA) in a time frame from 8+ year ahead to 24 hour ahead – produce outage plan.

Trading Team

Energy Market, sufficient margins

Energy Forecasting Team

National Demand
Solar, wind, GSP demand

Systems:
- Energy Forecasting System (EFS)
- Platform for Energy Forecasting (PEF)

Handover of outage notes

Handover of Transmission System Operating Plan (TSOP)

Strategy Team

Plan for security of the system based on Security & Quality of Supply Standard (SQSS), from 24 hours to 4 hours ahead of time.

Scheduling, System Operating Plan, Margin Analysis, Data Processing and Profiling

System: Scheduling Platform in Controlled Environment (SPICE)

Handover of System Operating Plan (SOP)

Real Time Operation

Transmission Team

- Monitoring & managing System flows, outages, faults, and voltages following SQSS to ensure Security of the System.

Energy Team

- Monitoring & managing System Frequency following SQSS, and Transmission Constraints.
- Demand Prediction, Dispatch Advice, Energy Balancing i.e., Issuing Instructions (BM & Non-BM), Ancillary Service Management.

Systems:
- System Operation in Real-Time (SORT)
- Versatile Graphical Instruction Logger (VERGIL)
- Contingency Logging System (CLOGS)
- Open Balancing Platform (OBP)
- Ancillary Services Dispatch Platform (ASDP)

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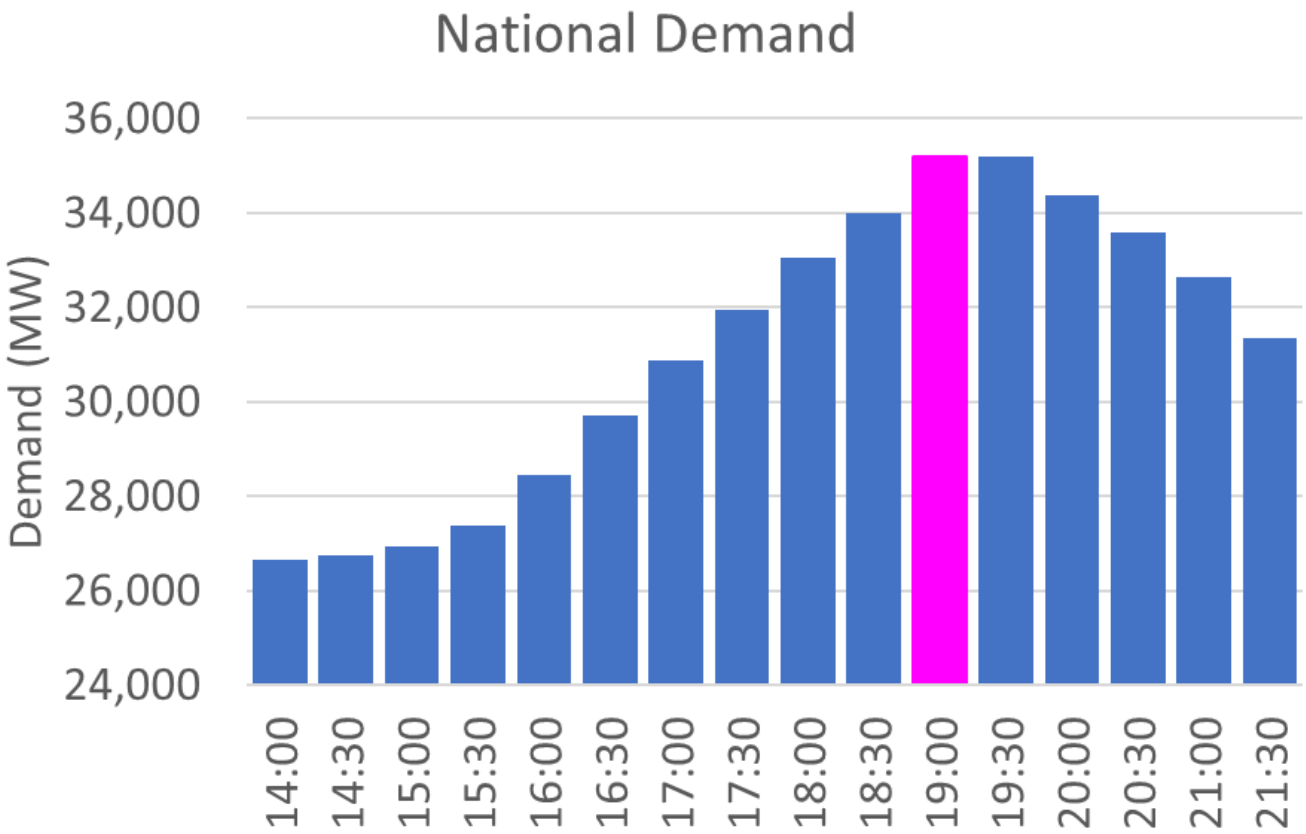
NESO National Energy System Operator

Managing the 30-minute Peak

From the perspective of the Energy Team



- **Evening Peak (19:00 – 19:30) Thursday 03/10/24**

- Normal Autumn Evening peak
- 3.8 GW wind
- 5.8 GW interconnector import
- Demand rising from 26.6GW to 35.1GW

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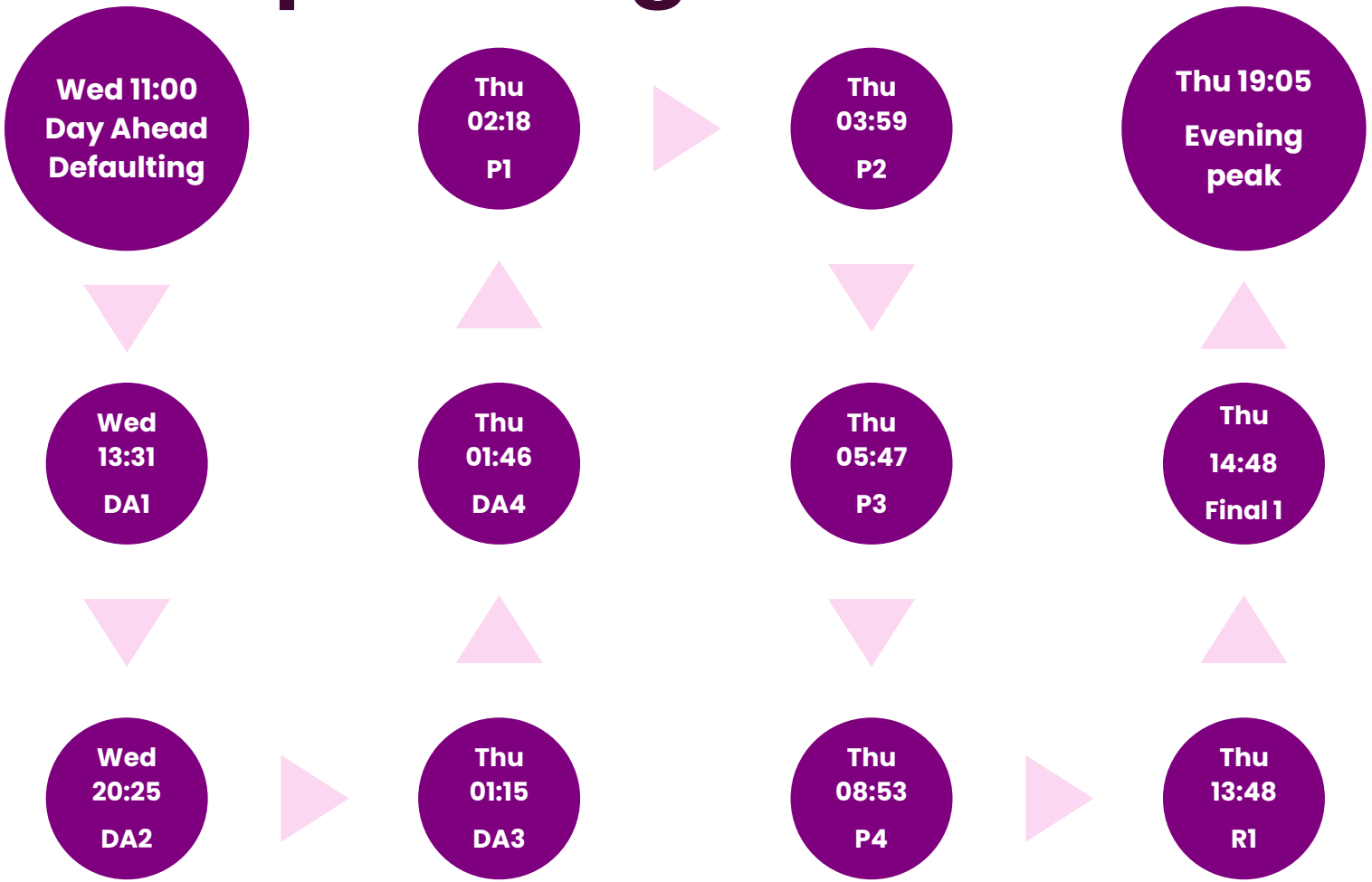
System Operating Plans



System Operating Plan (SOP) details the cost-effective actions needed to deliver a secure solution

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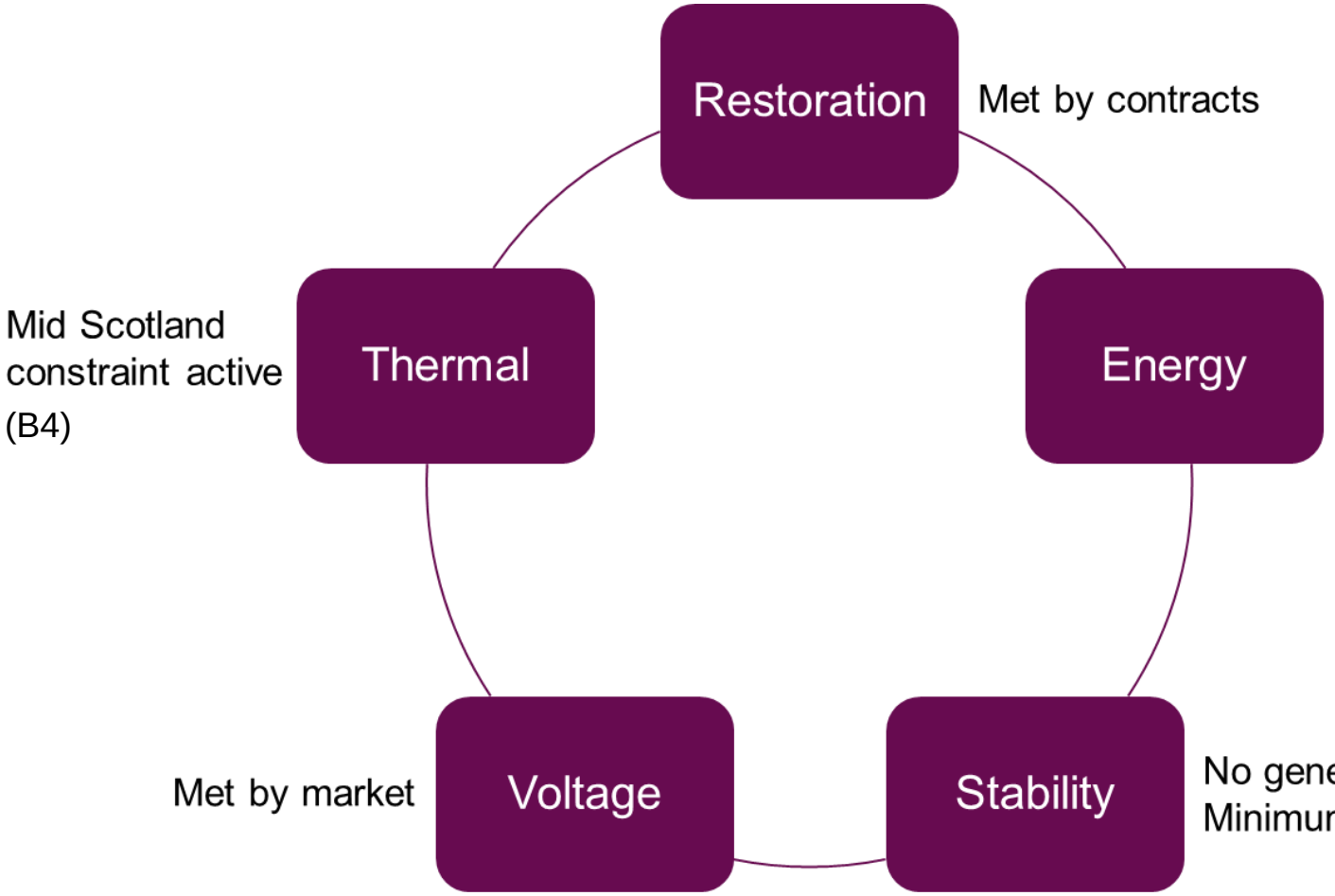
System Security

Evening Peak Thursday 03/10/24

Abbreviations:
STOR: Short Term Operating Reserve
DC: Dynamic Containment
DM: Dynamic Moderation
DR: Dynamic Regulation



Reserve
Need 750 MW positive,
Balancing Reserve = 345MW, additional needed
2300 MW negative met by market
STOR requirement met by contracts
Response –
DC/DM/DR contracted, small additional needed

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Evening Peak – 03/10/24

15:00 Journey to the peak continuously evolving through time

15:00

380MW loss on the interconnectors 16:00-17:00

16:00

100MW gain on the interconnectors 17:00-18:00, 240MW gain 18:00-19:00

17:00

650MW loss on the interconnectors 18:00-19:00

17:30

Wind starting to be bid down for B4 constraint

18:00

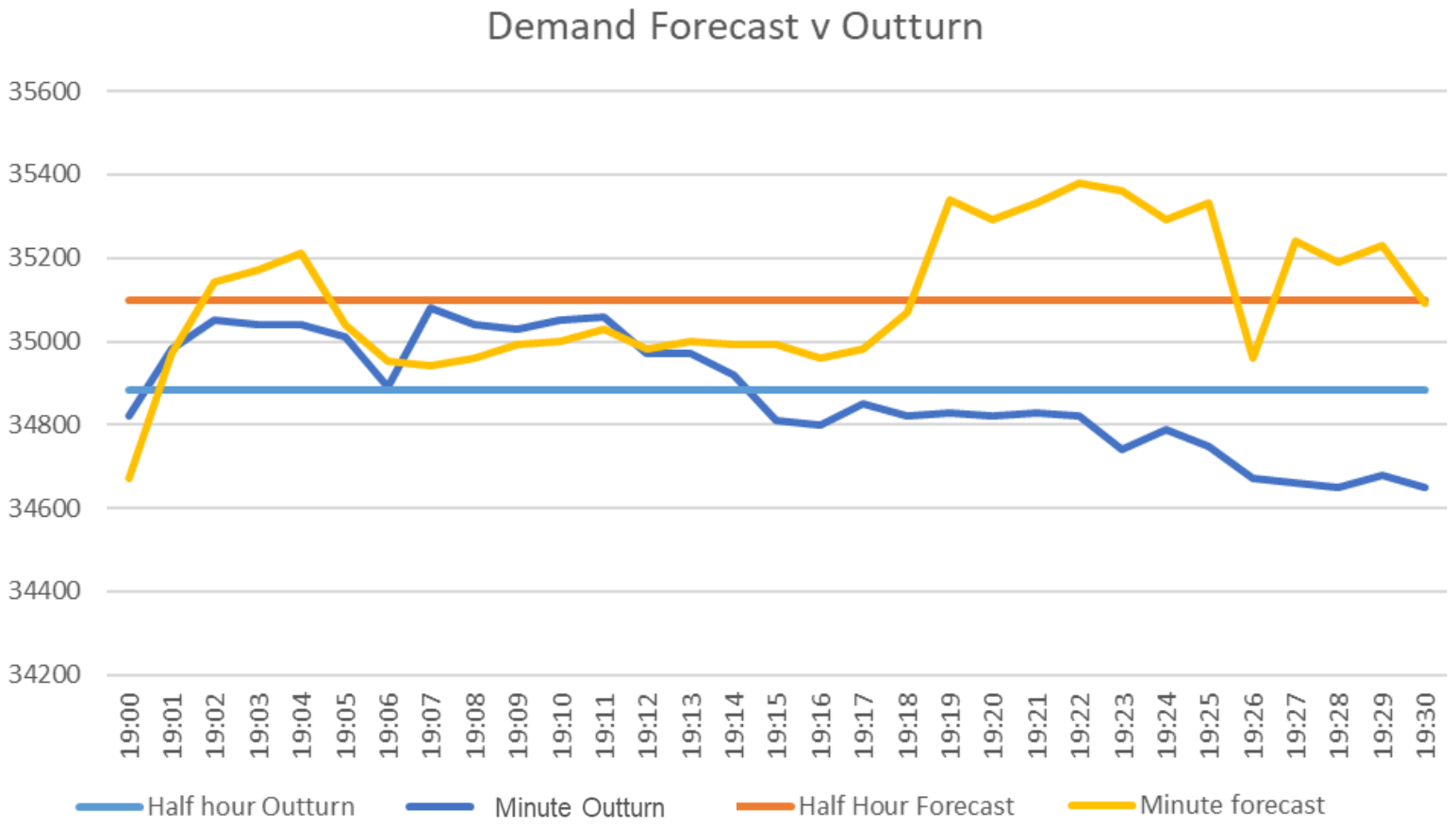
675MW loss on the interconnectors 19:00-20:00

Slido Code: #NAP

Evening Peak – 03/10/24

19:07 At the peak

- At 19:07, Peak out turned at 34.8GW, 300MW below the forecast
- Wind was 300MW higher than forecast
- Interconnectors were 675MW lower than forecast
- Generation shortfall 125MW
- **Net difference i.e., residual balancing – 200 MW**



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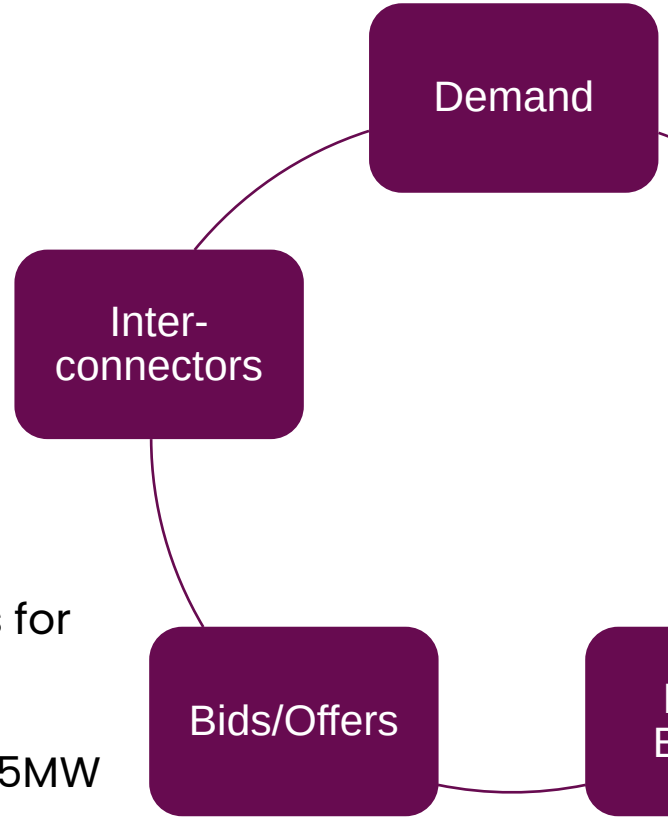
Review of the peak



300MW below forecast

BMU A had to be ordered by 14:25
BM gate closure 17:30
Gate closure at 18:00

200MW residual balancing actions
BMU A would have been at full load if demand or wind had been at forecast

800MW of system bids for constraints
1000MW offers
Generation shortfall 125MW

675MW below forecast

Need to balance cost, security and risk across all timeframes not just single half hour

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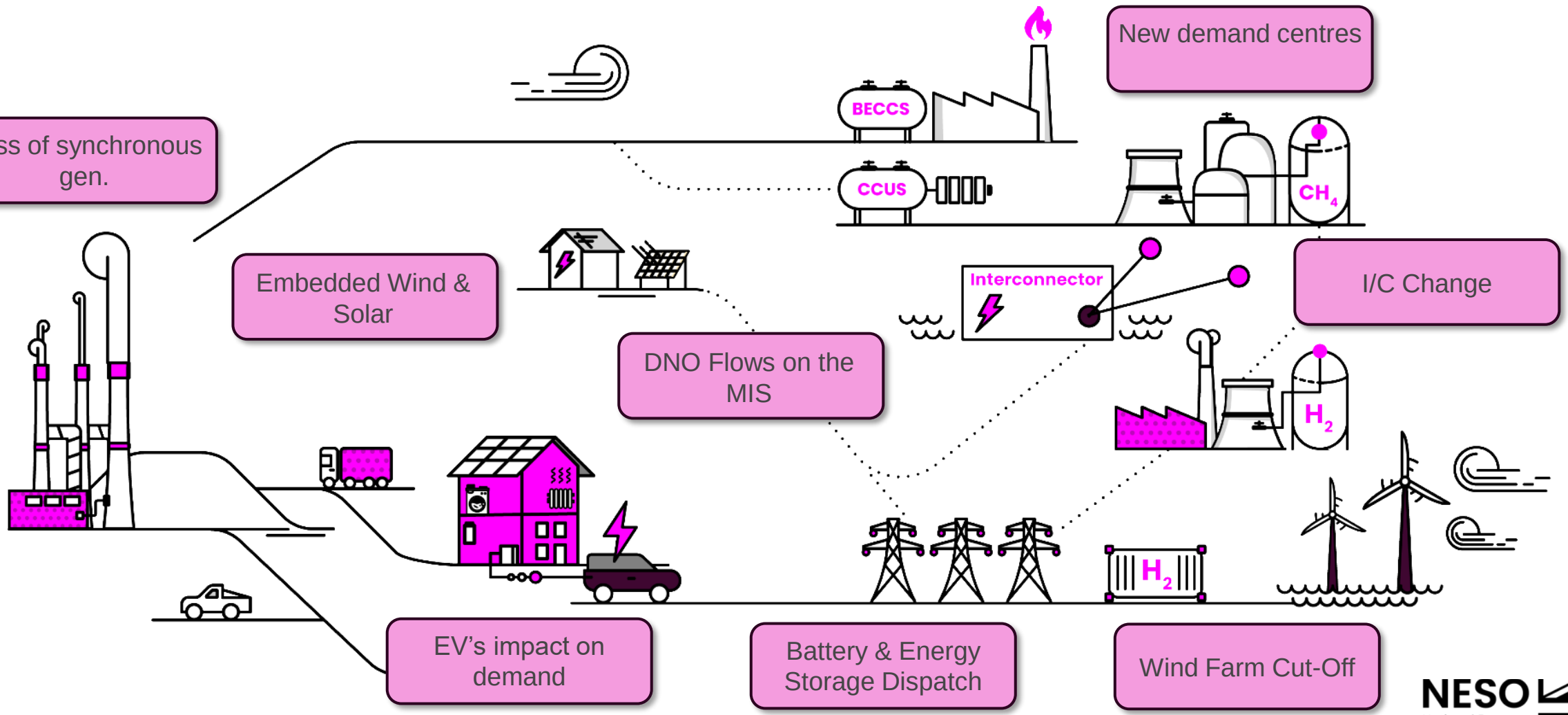
Challenges on the MIS & DNO Flows



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Thank you for listening

NESO
National Energy System Operator

Public

Transmission Acceleration

04th March 2025

OC2 Forum – Birmingham.

NESO
National Energy System Operator

Introduction

- **In June 2023, the Electricity Networks Commissioner Report was published. It focussed on the need to accelerate electricity transmission network build (See full report)**
- It was followed by the Government response in November 2023 and subsequently the Labour Governments Clean Power 2030 policy paper. **(See Government response)**
- **From the report , four recommendations were made in relation to Outage Planning with NESO assigned as the action owners.**
- In November of 2023, NESO initiated a project to deliver the outage planning recommendations from the Commissioner's Report.
- **The project was extended to include representation from the GB Transmission Owners at both the project management and project delivery team level.**
- Over the course of 2024, projects were run in parallel to determine the actions and recommendations required to deliver in these 4 outage planning areas. Progress was presented at the last 2 OC2 forums.
- **In February 2025 a public consultation was released. This consultation includes a detailed summary of each of the project workstreams and can be found on the NESO website. This consultation can be found here**

The following slides give an overview of the 4 project workstreams

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Contents

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OP1 - Winter Emergency Return to Service (ERTS)

Recommendation:

Implement a risk-based approach to allow more outages during winter by assessing the Emergency Return to Service (ERTS) times and ensuring sufficient generation capacity to meet demand

Implementation:

NESO and Transmission Owners (TOs) will schedule outages with longer ERTS times during winter, using a robust risk assessment process

Benefits:

This approach is expected to facilitate 60 additional weeks of outages during the winter period, optimizing network reinforcement and upgrade projects

Slido Code: #NAP

OP2 - Security and Quality of Supply Standard (SQSS)

Recommendation:

Investigate opportunities to relax operational rules to allow more outages, such as relaxing network security during appropriate conditions.

•**Thermal Constraints**: Propose a probabilistic assessment which considers fault likelihood and risk mitigations.

•**Risk Assessment**: Develop a risk assessment form with TOs, NESO to sign off on acceptable risks.

•**Voltage Constraints**: Manage non-compliant voltage scenarios case-by-case using a risk assessment.

•**Thermal Overload Schemes**: Explore using thermal overload schemes to simulate 'cascade tripping' in E&W.

Implementation:

A probabilistic risk assessment approach will be used to identify and mitigate risks, allowing certain outages to proceed where there is a significant consumer benefit.

Benefits:

This approach could unlock many millions of pounds of opportunity by allowing major construction schemes to progress and reducing constraint costs.

Slido Code: #NAP

OP3 - Long Term Project Design

Recommendation:

Incorporate constraint costs into the assessment of project delivery options to ensure a holistic view of project costs

Implementation:

NESO will provide constraint cost calculations for different build options, and these will be included in the Centralised Strategic Network Plan (CSNP) methodology

Benefits:

This approach will lead to better decision-making for project build options, reduced system access requirements, and more opportunities for other essential works

Slido Code: #NAP

OP4 - Outage Planning Process Review

Recommendation:

Improve the timely identification and coordination of all outage requirements and reduce foreseeable changes to outage plans.

Implementation:

Develop a more strategic long-term system access plan, engage with affected parties, and enhance the transparency of the outage planning process.

Benefits:

This approach will provide greater plan stability, reduce constraint costs, and support the delivery of a clean power system by 2030.

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NESO National Energy System Operator

Transmission Acceleration update

Recommendations and actions to improve the outage planning process

Over 30 separate actions and recommendations have been made as part of the public consultation.

- **Winter Planning:** NESO will perform a commercial and security risk assessment on the security and viability of long duration outages in the winter months. With mitigating actions in place, NESO and the TO can agree to progress long ERTS outages on a case-by-case basis.
- **SQSS Risk Assessments**: Under certain circumstances in operational timescales, it may be possible to operate beyond the criteria outlined in the SQSS by completing a joint risk assessment and mitigation process.
- **Constraint Costing in Long Term Planning** : Work with the NESO Economic Assessment team and relevant TO functions to ensure that boundary capability assessments and constraint costs are included in the CSNP methodology
- **Strategic Outage Plans**: Thirteen separate recommendations and six actions are proposed to improve long-term strategic outage planning, impacting planning years from one to six years ahead.

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NESO National Energy System Operator

Transmission Acceleration update

Recommendations and actions to improve the outage planning process

- **Industry Collaboration**: NESO must review Grid Code sections with affected parties to ensure understanding and compliance, facilitating better outage discussions and agreements in the year ahead time frame.
- **Increased NESO & TO Capability**: NESO & TOs should review current resource and tool capabilities across all planning time frames to support increasing volume and complexity of outage requests.
- **Management of Long-Term Plans**: Engaging with affected parties to focus on two to six years ahead planning will produce more populated plans, providing greater notice of outages and ensuring deliverability of Clean Power 2030.
- **Addressing Late Regulatory Approvals**: Reviewing and revising the regulatory review and approval process for schemes and major projects will provide more stability and certainty in long-term outage plans.

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Transmission Acceleration update

Recommendations and actions to improve the outage planning process

- **Improvements to eNAMS**: Enhancing the bulk upload functionality in eNAMS will enable TOs to populate long-term outage plans more efficiently, giving NESO and the affected users earlier visibility of outages.
- **Reducing Foreseeable Change**: Implementing new change codes and a mandatory root-cause field in eNAMS will help monitor and reduce foreseeable changes in the outage plan.
- **Generator Outages**: Engaging with generation owners to review working arrangements in order to help reduce short-term transmission outage changes.
- **Transparency of Performance**: Publishing outage planning performance data more widely will demonstrate progress in reducing short-term changes and increasing focus on medium and long-term planning.

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Consultation Questions

Ref	Policy Questions	Section
1	Do you agree with the proposal to extend the Emergency Return to Service process into the winter months to allow greater access to the network?	3 OP1 - Winter ERTS
2	Do you agree with the recommendations identified in the report to modify the Security and Quality of Supply Standard (SQSS) to seek additional outage opportunities?	4 OP2 - Security and Quality of Supply Standard
3	Do you agree that constraint costs should be included in the assessment of various build options, and that they should be included in the currently developing CSNP methodology?	5 OP3 - Long Term Project Design
4	Do you agree that the implementation of the actions and recommendations for outage planning will lead to a better long term plan and increased stability to the short term plan?	6 OP4 – Outage Planning

Slido Code: #NAP

NESO National Energy System Operator

How to Respond

NESO have created a project team to drive forward the actions and recommendations set out in the public consultation.

If you wish to respond to the consultation questions in the document, please use the subject heading 'Transmission Acceleration' and email:

box.nesoregulationpolicy@nationalenergyso.com

The consultation will be open for responses until Friday **28 March 2025**.

Slido Code: #NAP

NESO National Energy System Operator

Questions

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