DSO

Operational Decision Making Framework

23rd January 2025

nationalgrid

Operational Decision Making – 23rd January 2025

Please mute your microphones during the presentation.
There is time allocated for Q&A.

Questions can be submitted via the Q&A function at any time.

This workshop will be recorded.

The slides from today and the recording will be available on our website;
www.flexiblepower.co.uk

access code: 2133 1054

https://www.menti.com/ala1zt3e62vd

Welcome & Objectives

Introduce our DSO Operations team

Share key insights from our Operational Decision Making Framework

Deep dive into topics around flexibility and generation curtailment

Share our proposals for ongoing development

Gather your feedback - we'll use this to directly inform our development roadmap

Answer your questions and inform next steps

Agenda

1	Introduction	Helen Sawdon
2	Operating Flexibility	Joe Davey / James Mitchell
3	Maximising Generation	Reuben Leaver
	Q&A	
4	ODM Development	Helen Sawdon
5	Governance & Next Steps	Helen Sawdon
	Q&A	

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Introduction

Helen Sawdon
Head of DSO Operations

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About NGED

National Grid's distribution networks supply electricity to 20m people within the Midlands, South West and South Wales.

The Distribution Network Operator (DNO) has an important role in, building, maintaining and operating a safe and reliable network to keep the lights on for our customers. As demand on the network has grown, the focus has traditionally been on building more wires.

As the energy landscape evolves, there is an ever increasing role for the Distribution System Operator (DSO) in making sure a broader range of options are considered and used where they offer value for money to consumers. In this way, the DNO continues to provide a safe, stable, and reliable electricity supply at lower cost to consumers while supporting the rollout of low carbon technologies such as renewables, heat pumps, and electric vehicles.

About NGED DSO

1. Planning and Network Development
2. Network Operation
3. Flexibility Market Development

About DSO Operations

The growth in thermal and low carbon generation connected to our distribution networks has been significant and will continue. As a result, the flows of electricity across the network are less predictable. This will be accompanied by significant growth in EV chargers and heat pumps which can be operated flexibly to support whole system balancing and help manage flows on both the distribution and transmission networks. DSO Operations is central to ensuring that, that with this increasing complexity, we continue to operate a safe and reliable network to keep the lights on for our customers.

It requires informed trade-offs to achieve the best whole-system outcomes while balancing our three key objectives:

Our Tool-Kit

Flexible Network Capacity

We are ensuring that the capacity of the network can meet the needs of our existing customers when and where they need it by leveraging services from local flexibility markets.

Flexibility services change the consumption and generation behaviour of customers, ranging from domestic customers who avoid charging their cars at peak times to larger commercial customers who can increase the volume of their generation production at times when the demand for electricity is greatest.

Tool-kit

Procurement of Flexibility Services: Up to a year ahead, using DSO produced load forecasts informed by historical data, we determine the volume of flexibility services we should contract to be available to us in the event we need to dispatch it to deliver as we get closer to real-time.

Dispatch of Flexibility Services: Week-ahead, we update our forecast of loading of the network using more recent load data in order to decide when to instruct the flexibility we've made available and any further flexibility we need to procure to manage our more accurate view of actual likely electricity demand as we get closer to real-time.

Faster Connections

We are advancing generation connections to release additional capacity to the existing network for customers who want to connect new demand.

Through optimising the running of our network and by offering tailored generation connections that prevent networks limits to be exceeded, we avoid making customers wait for new network build before they are able to connect.

Tool-kit

MW Dispatch & Technical Limits: We have worked with NESO to develop both of these pathways for advancing connections without needing to wait for transmission infrastructure. Network visibility for relevant generators or storage is provided to NESO in realtime, with connections accepting potential temporary reduction in export to connect quicker.

Modelling Assumptions: Flexible connections enable accelerated connection without waiting for distribution or transmission assets to be built. We have taken a less conservative approach to network modelling particularly with batteries to provide improved curtailment analysis for customers progressing through Technical Limits.

Increased Generation Production

Through more dynamic assessment of our network assets and improved modelling of generation behaviour, we are able to better quantify any risks to the security of supply during planned network maintenance where sections of the network need to be taken offline.

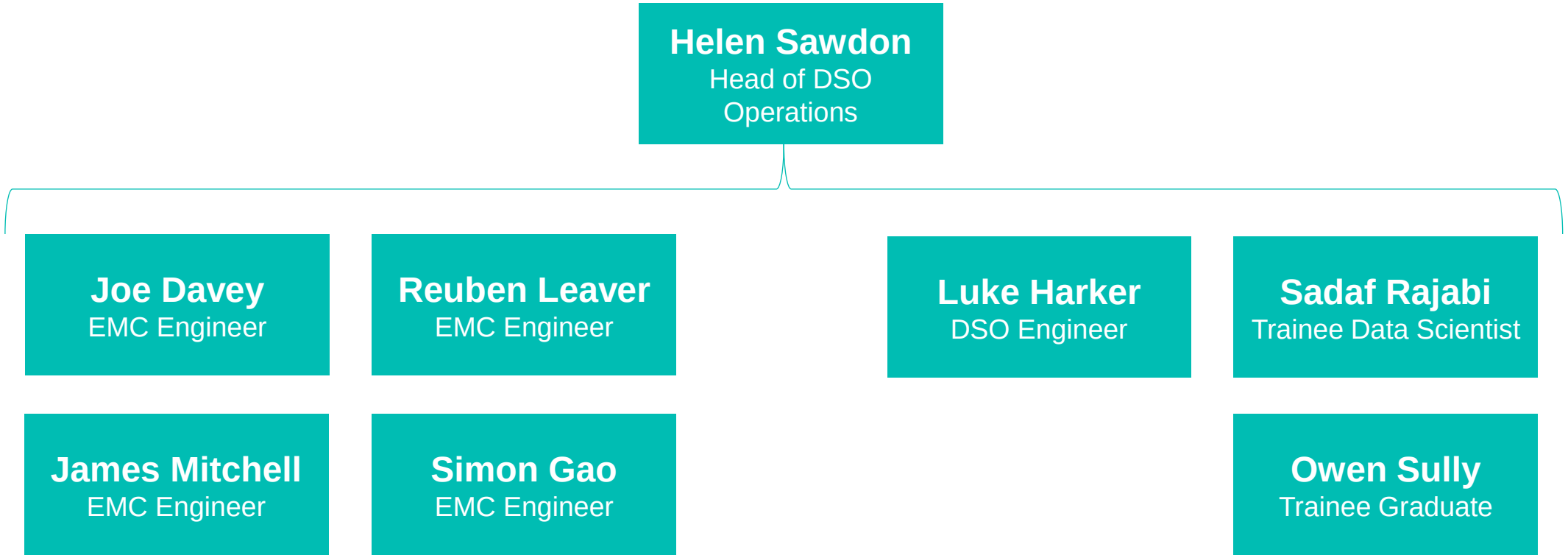
This enables us to minimise the volume of restrictions to generation production that are necessary during planned maintenance.

Tool-kit

Network Maintenance Optimisation: During planned maintenance work we transfer the load of the section we've taken offline to another section of the network. This temporarily increases the power flows through the new section and we must manage any risk to ensure its isn't overloaded. Historically that has included preventing all generation from any production until the maintenance is complete. Now, before planned maintenance work is finalised and scheduled, DSO Operations assess the risk to the temporary network section, removing the curtailment of production or permitting partial production.

Network Maintenance Scheduling: Additionally, we are also able to find more suitable timings of network maintenance to minimise impact to generation production.

DSO Operations Team



Decision Making Timeframes

		DSO Operations	DNO Control Centre
Planning Timescale Decisions	Long Term; 3-4 years Medium Term 3-1 years Short Term 1 year – 8 weeks	**Identifying Where Flexibility Is Cost Effective** During the Planning Phase, the DSO focuses on network assessment to identify where actions needs to be taken to ensure the network can meet the volume power that needs to flow through it. Where Flexibility is identified as the more economical solution, the DSO Operations team will then undertake further analysis to identify what volume of flex that should be secured to meet the load growth forecast.	**Planning for Network Maintenance** Where NGED's distribution network requires routine maintenance and upgrades to ensure safety and longevity these activities often necessitate isolating sections of the network. It may be necessary to require generators to reduce output (Curtail) whilst the network is running in an abnormal condition to prevent overloads. This impacts how much generation is being made available on the UK energy system. DNO Outage planners share these impacts with the DSO operations Teams so they can be minimised.
Programming Timescale Decisions	Near Real-time 8 weeks-24 hrs	**Flexibility Dispatch Decisions** Using closer to near time network load data, the DSO Operations team undertakes analysis to determine the accuracy of the Planning Timescale forecast for flexibility and if any adjustments need to be made before making decisions on the volume of flexibility to dispatch to deliver services **Optimising Generation During Planned Network Maintenance** The DNO share their planned network maintenance with the DSO Operations Team who can use advanced forecasting and modelling to explore alternative network operation strategies without compromising safety or equipment health	**Scheduling for Network Maintenance** Once the DSO Operations Teams assessment is shared back to the Outage Planning Team, they can schedule the work and inform any generators that might still be impacted.
Control Timescale Decisions	24hrs to Realtime	**Pre-Scheduled Dispatch** The DSO pre-schedules flexibility service dispatches, ensuring that commercial decisions are made independently from the DNO to avoid conflicts of interest. **Post-Fault Advice** When unexpected faults happen on the network, the DSO provides post-fault recommendations to the DNO.	**Real-time response** The DNO Control Centre has visibility of the real-time delivery of flexibility scheduled by the DSO operations Team and monitors network conditions during planned maintenance so they are able to respond to any issues impacting network integrity.

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Operating Flexibility

Joe Davey / James Mitchell

DSO Energy Management Centre Engineer

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Operating Flexibility

We procure flexibility services across two main timeframes: our Long-Term flexibility market and our Short-Term flexibility market. These timeframes influence the operational decisions required to optimise the network;

Long-Term Flexibility – Year Ahead; Baseline needs, ensures certainty

Short-Term Flexibility – Week Ahead; Supplements Long-Term, responsive to real-time forecasts

Product	Attributes	Procured	Utilisation Dispatch Decision
SU_SPP Scheduled Utilisation - Specific Periods	Utilisation Only	Long-Term – Year Ahead	**Planning Phase:** Scheduled year ahead post procurement close
SAOU_DA Scheduled Availability, Operational Utilisation - Day Ahead	Scheduled Availability, Utilisation instructed day ahead	Long-Term – Year Ahead	**Programming Phase:** Day ahead
SU_SEP Scheduled Utilisation – Settlement Periods	Utilisation Only	Short-Term - Week Ahead	**Programming Phase:** Scheduled week ahead post procurement close
OU_15 Operational Utilisation – 15min	Utilisation Only	Long-Term – Year Ahead	**Control Phase:** In real-time

Flexibility Dispatch Principles

Guiding Principles

The following principles form the foundation of our dispatch methodology:

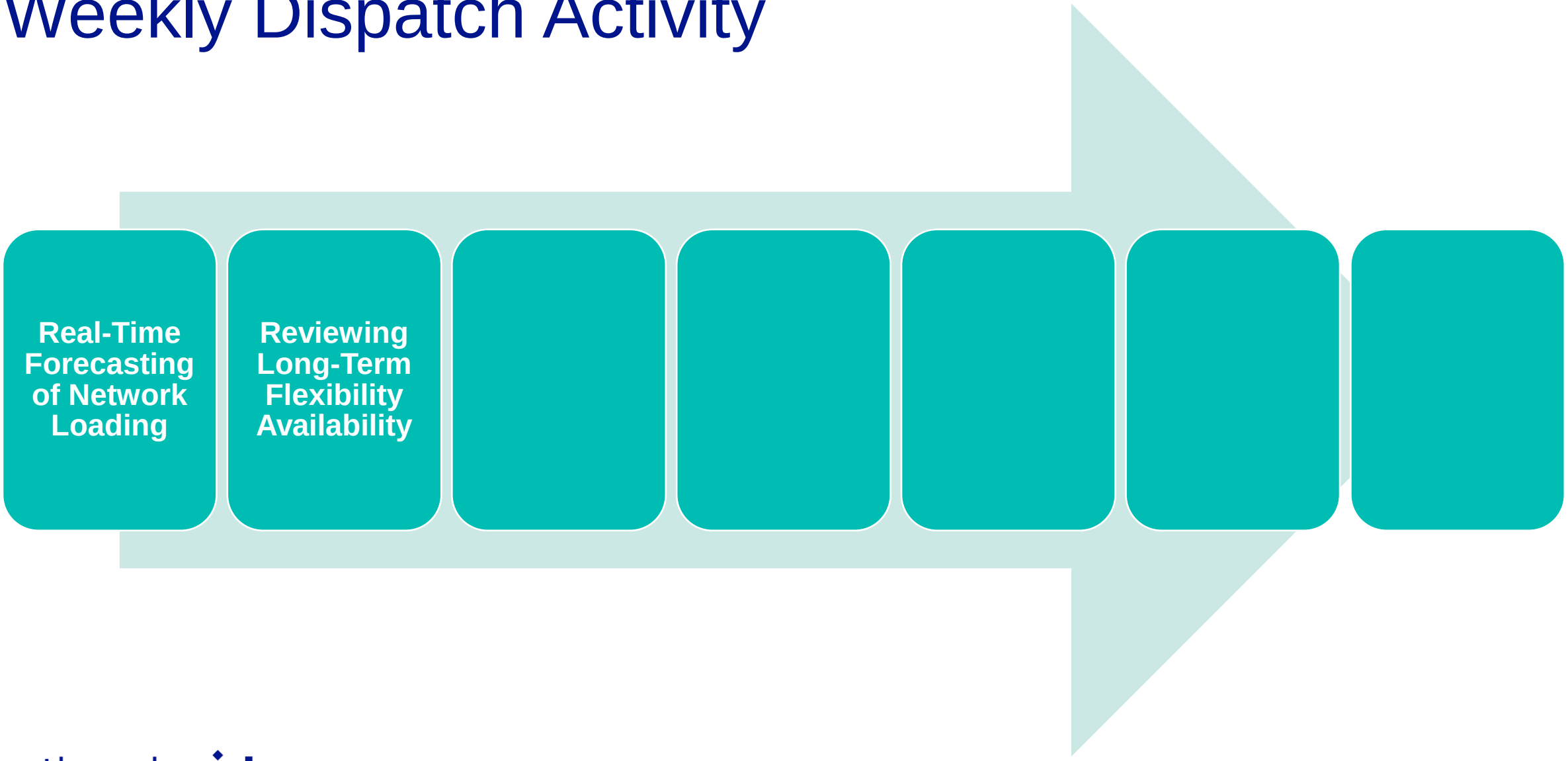
Principle	Description
Security	Flexibility will be dispatched in a way that maintains the security of supply.
Cost	System needs will be met at the minimum level of cost.
Operability	Services will be selected based on their compatibility with operational requirements.
Competition	Transparency will be provided in all dispatch decisions and activities.
Fairness	Equal opportunities to participate will be ensured, supported by a fair dispatch methodology.

Prioritised Service Selection Principles

Within National Grid DSO, we have developed a prioritisation service selection framework which is our practical implementation of the ENA guiding principles. This prioritisation ensures consistency and clarity in decision-making and supports both immediate service selection and the ongoing development of rules for implementing an automated rule-based approach to dispatch.

Priority	Name	Description	Corresponding Open Networks Principle
1	**Technical Integrity**	Network and system frequency integrity requirements must be met, supported by appropriate flexibility services.	Security
2	**Customer Security**	The ability to meet customer demand and accept customer export under both normal and outage network conditions.	Security
3	**Value**	Flexibility services will be procured and operated to deliver cost-effective outcomes.	Operability & Cost
4	**Market Resilience**	Where multiple suitable services are available at similar costs, dispatch will be shared among providers.	Competition & Fairness

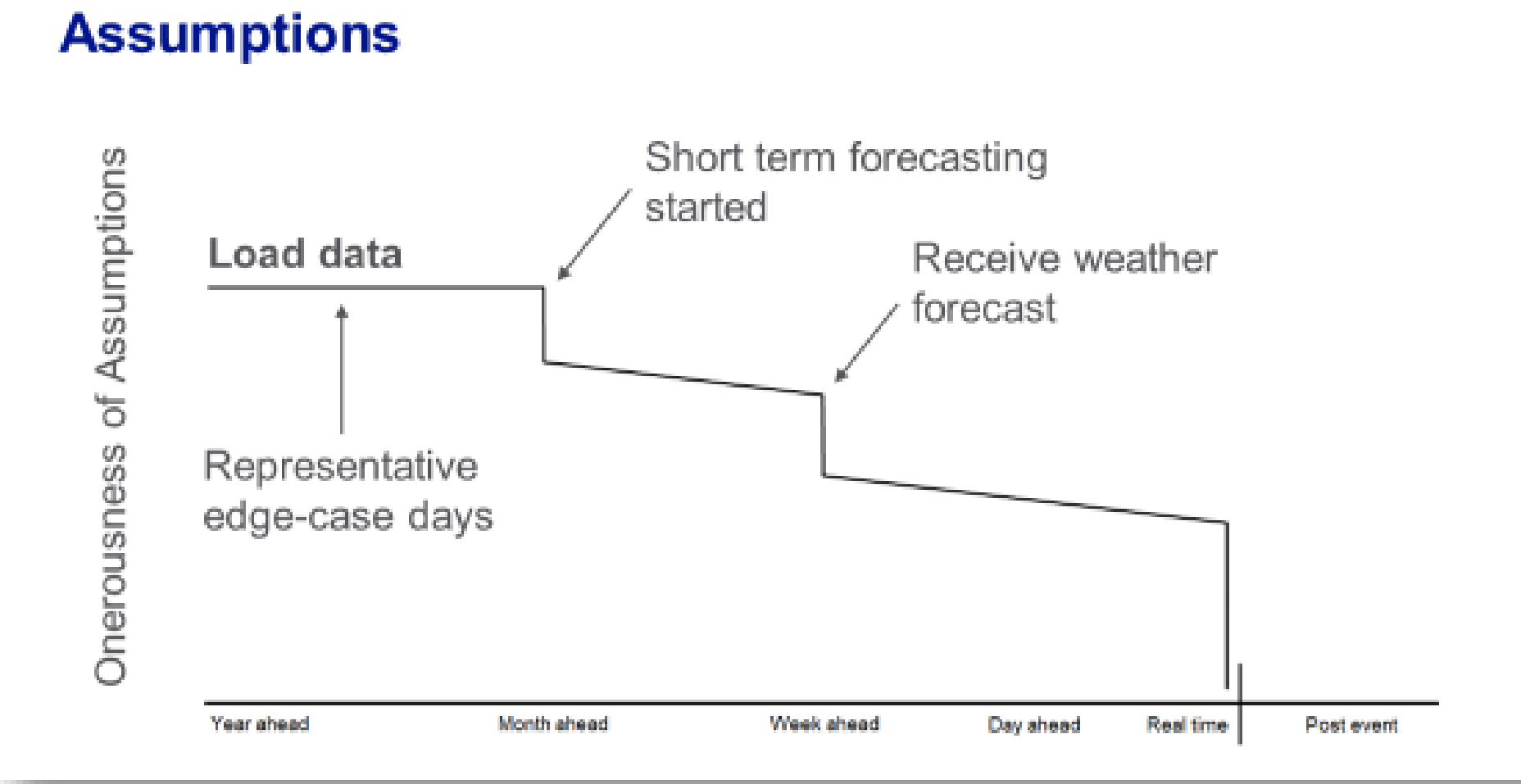
Weekly Dispatch Activity



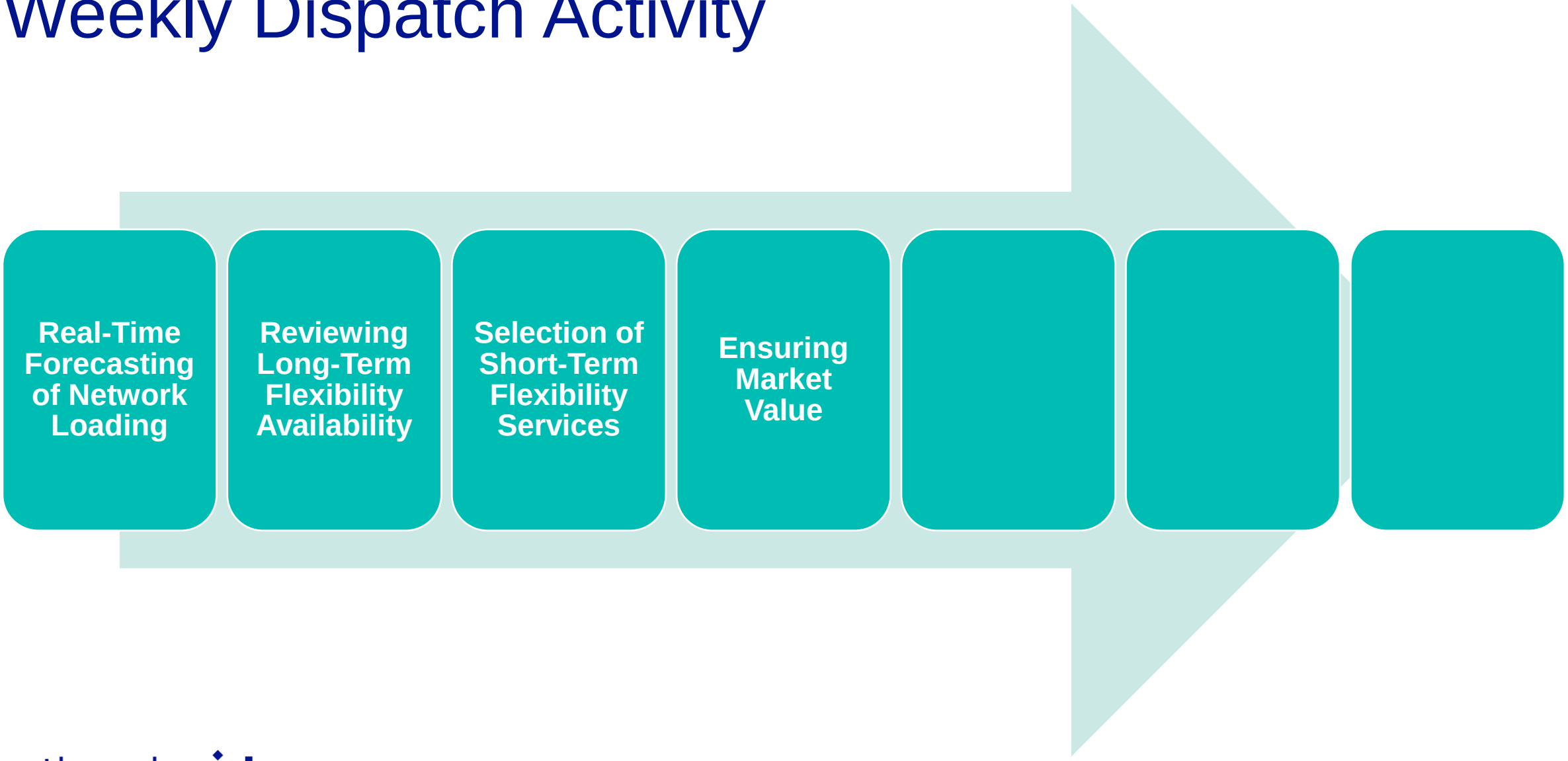
Refining Load Forecasts

Our view of the network changes over time, we often plan for the credible worst case scenario based on historic data and future load forecasts.

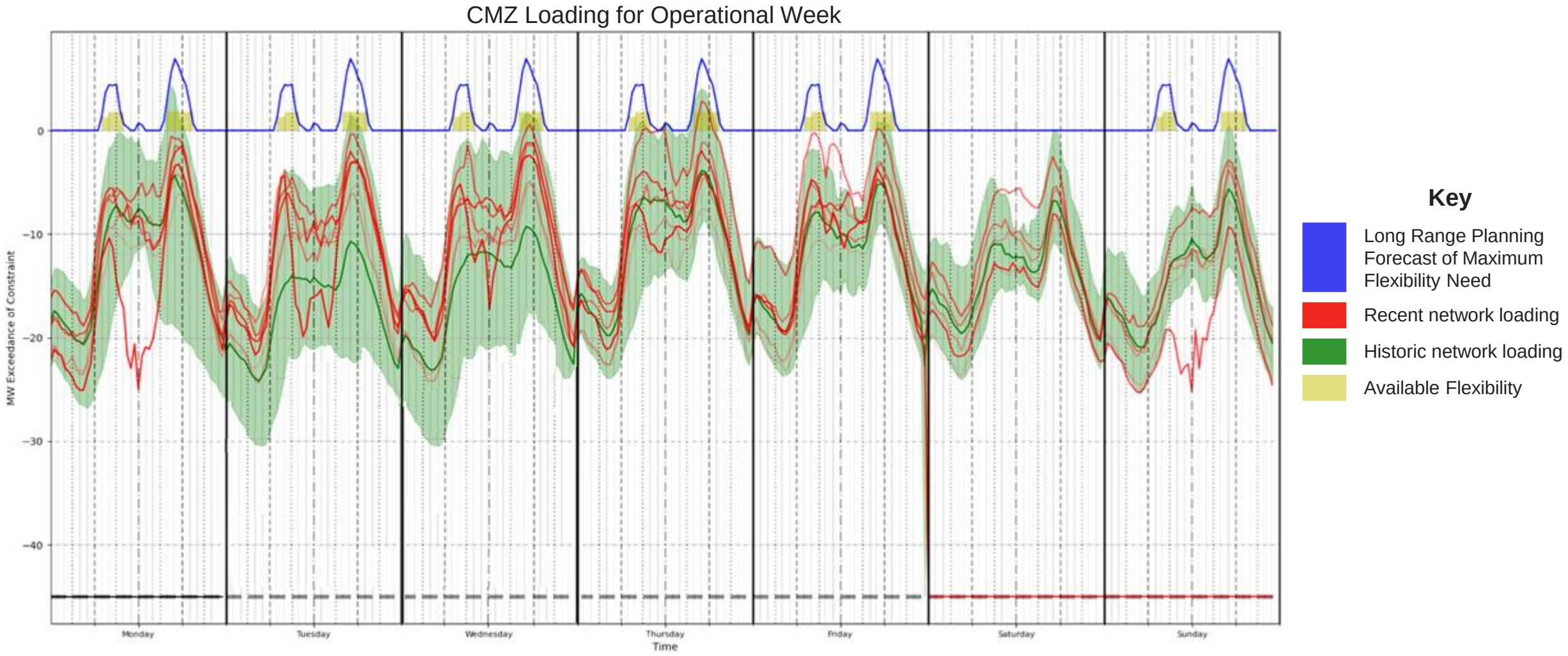
However, in real-time those scenarios don't always materialise.



Weekly Dispatch Activity



When to Utilise



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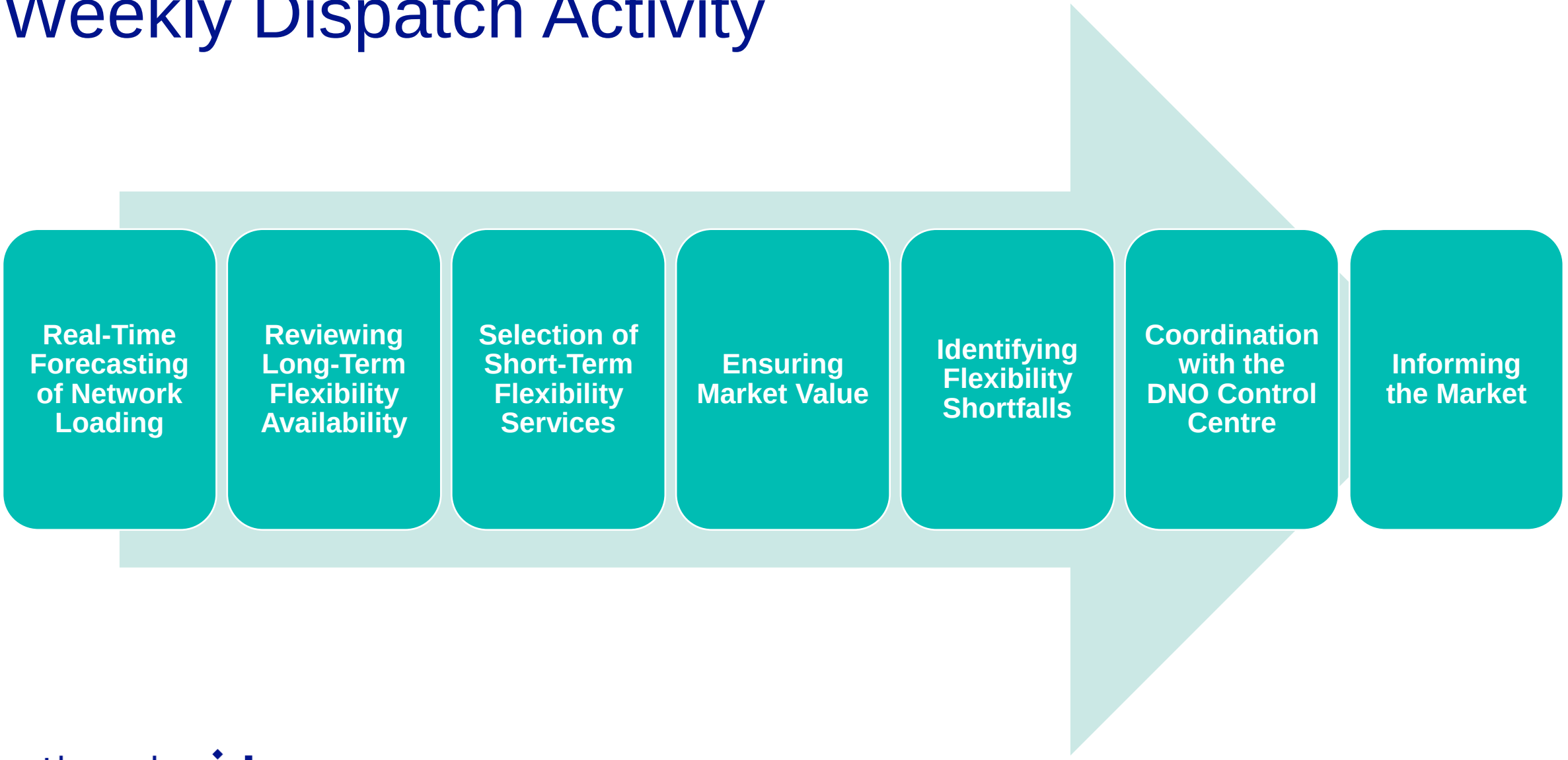


Managing Flexibility Shortfalls

We proactively and consistently monitor the likelihood of flexibility shortfalls and introduce mitigations when needed, this starts well ahead of real-time in Programming Timescales and continues through the Control Phase;

Programming Phase; 8 weeks to 24hrs

During this phase, we assess flexibility availability alongside network outages and load forecasts. To mitigate for shortfalls first we will consider options for Network Optimisation;

- **Dynamic capacity assessment:** Leveraging weather forecast data to more accurately predict loading on the network, colder weather = more demand
- **Network reconfiguration:** Re-routing power flows to transfer loads to different sections of the network

If further mitigation is needed, we will consider;

Unplanned customer behaviour changes: Where connection agreements allow, requesting that generators reduce output or battery assets alter their planned charging and discharging.

- **Outage rescheduling:** Shifting planned network maintenance to less critical periods, thereby maintaining the maximum power flow across the network.

Lastly we can consider;

- **Temporary reinforcement:** Deploying mobile generators or temporary infrastructure such as a portable substation.

Control Phase; 24hrs to real-time

In this phase, our DNO Control Centre actively monitors network performance through alarm systems that detect exceedances in network capability. In the Control Phase, shortfalls arise due to;

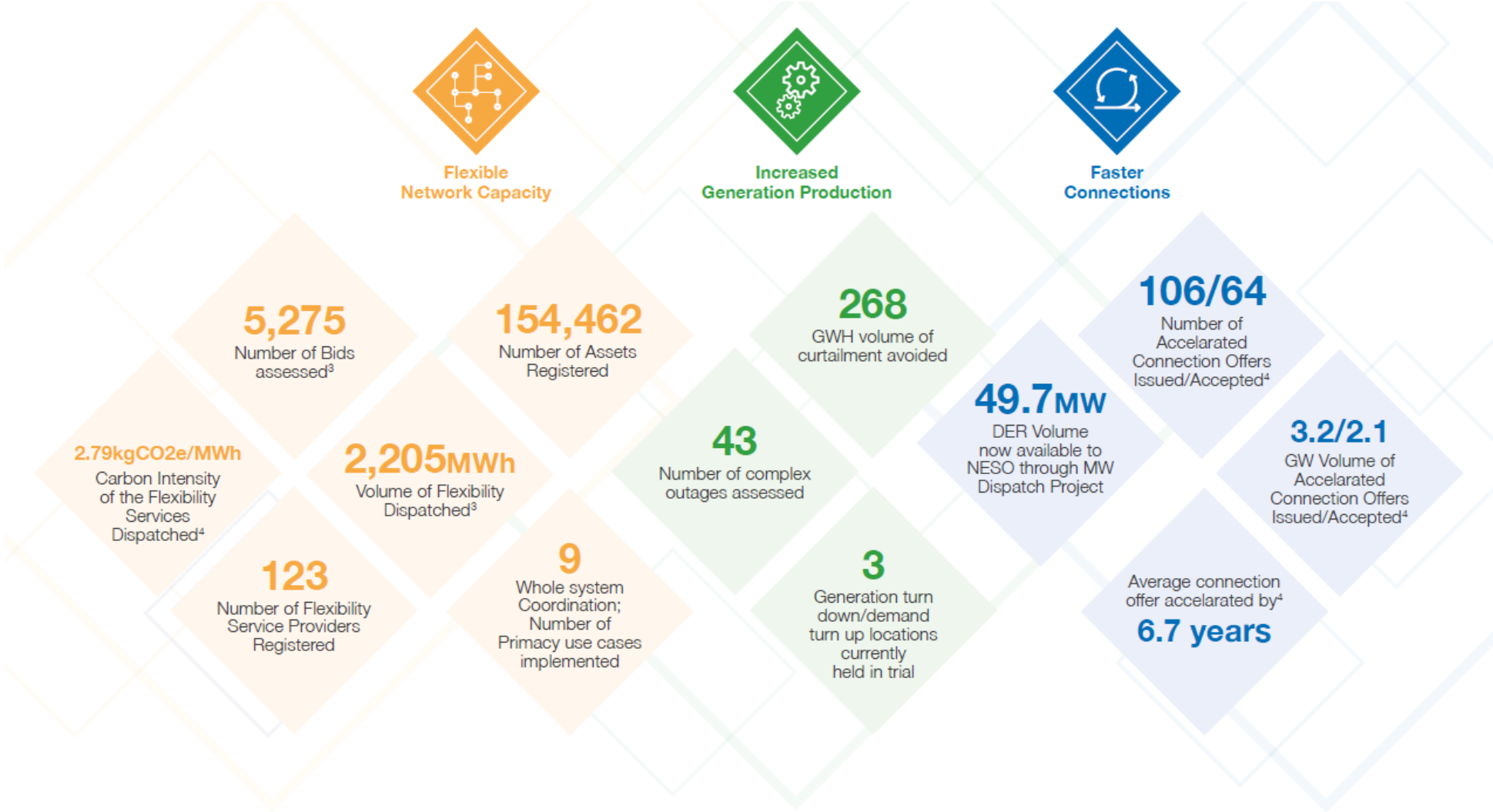
- An under-delivery of flexibility services, or
- Unforeseen load increases or unplanned outages.

To address these the DNO Control Centre will use the same mitigations used by DSO Operations in the Programming Phase. In addition they can utilise additional flexibility products such as Operational Utilisation (15-minute instruction).

While the DNO Control Centre manages real-time operations, it collaborates closely with DSO Operations to leverage pre-scheduled and additional flexibility options effectively.

Operating flexibility is integral to our ability to maintain a safe and reliable electricity network while meeting the needs of a decarbonising energy system. By procuring flexibility across long- and short-term markets and implementing effective shortfall management strategies, we ensure the delivery of high-value services to customers.

Ongoing collaboration between the DNO and DSO remains essential to achieving our vision of a secure, flexible, and future-ready energy network.



[3] 2023/24 figures, published in our annual flexibility reporting; https://www.nationalgrid.co.uk/distribution-flexibility-services-reporting
[4] 2024/25 YTD

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Maximising Generation

Reuben Leaver

DSO Energy Management Centre Engineer

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Maximising Generation

The electricity flowing across our networks used to be generated by a relatively low number of large centrally located power stations connected to the transmission network.

Over the past two decades, the amount of **electricity generated locally has risen and now accounts for around 20%** of energy used in our region.

Of the **1,200 generators sized at 1MW** and above connected to our network, the vast majority are renewable technologies such as solar, wind and hydro.

Moving away from dispatchable generation, such as gas and towards more intermittent technologies which have more variable output patterns has required us to adapt the way we operate our network. Should it all be running at the same time, the 13GW of generation connected to our network would exceed the demand being consumed for the majority of the year.

In certain scenarios we need to instruct generation, in accordance with their Connection Agreement, to reduce generation output to keep the network operating within safe limits. We aim to find new ways of reducing this curtailment wherever possible.

Maximising Generation

Maximising production during planned network outages

We target maintenance during the summer where demand levels are lower, meaning customers supply in unaffected.

Generation connections do not follow the same load patterns and so during these planned outages, it may be necessary to require generators to reduce output whilst the network is running in an abnormal condition to prevent overloads.

Through the use of dynamic forecasting methods and improved network visibility, the DSO can further optimise planned outage windows to reduce generation curtailment;

- Moving planned outages to periods of lower production or increased adjacent demand
- Aligning with the generator's own outage programme
- Reducing the outage time period itself.

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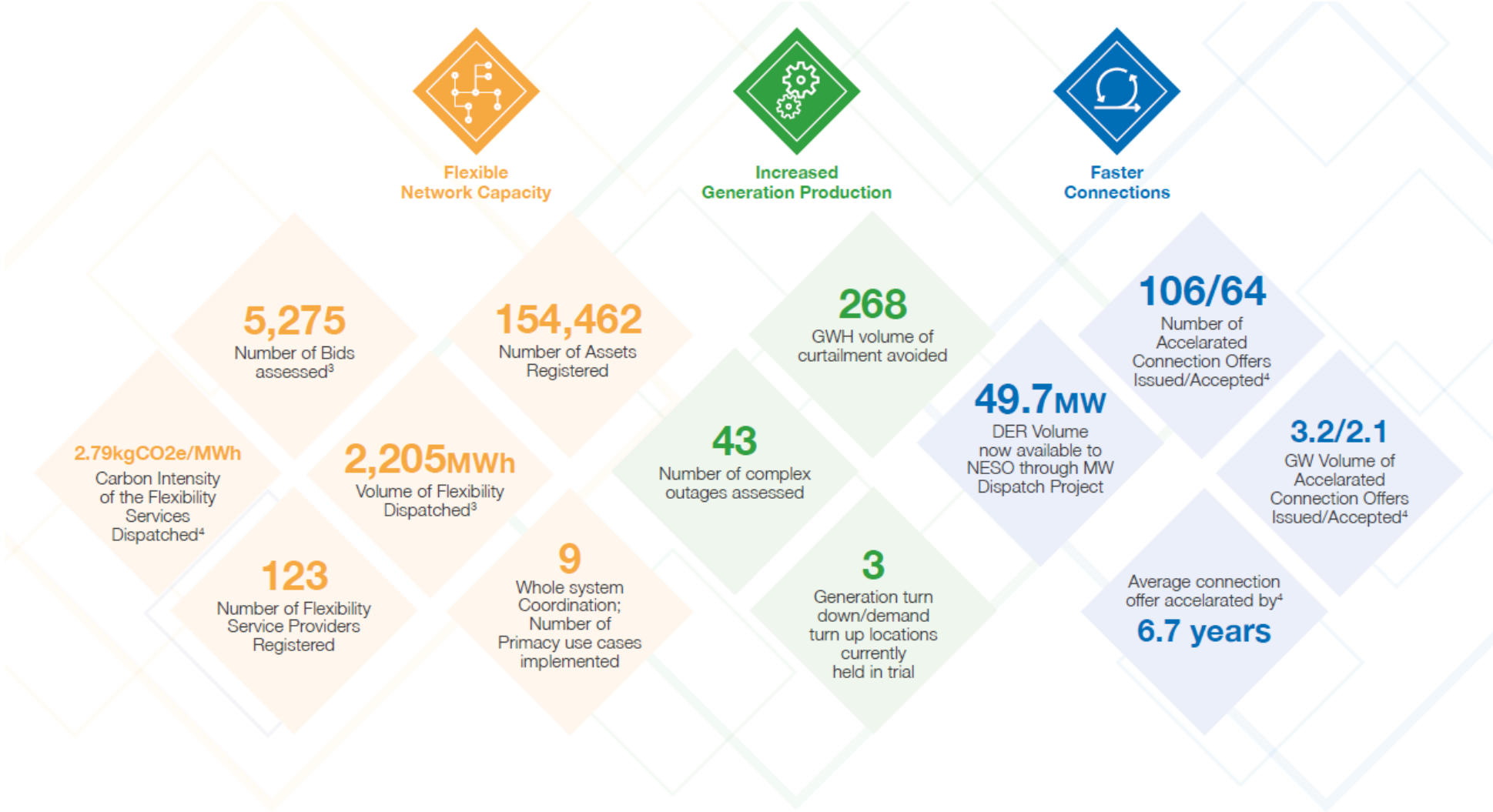
Maximising security of supply during unplanned outages

Generation connections embedded in our network will produce electricity to support adjacent customer demand, removing some of the electricity needing to flow down from the transmission system.

Traditionally, distribution networks have needed to size assets to accommodate worst case conditions of peak demand through the whole year. Using improved network visibility and time-series modelling techniques, the DSO can determine the security contribution from the local generation connected within a network area and factor this in to future network asset upgrade requirements.

This is particularly important at the transmission-distribution boundary, where the large volume of generation embedded within the lower voltage networks can contribute significantly in supporting local demand security.



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[4] 2024/25 YTD

Demand Turn Up Trial

- In our latest tranche of procurement we have procured a new Demand Turn Up/Generation Turn Down (DTU/GTD) service in three CMZs
- This aims to incentivise customers to shift their demand to times where we have an excess of generation
- Reduces carbon intensity and the need to run alternate forms of generation at other times of the day
- We sought a peak need of 2.3 MW of DTU/GTD services totalling 2.8 GWh of availability
- Zones had a utilisation price between £125/MWh and £240/MWh

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Q&A

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Developing our Operational Decision Making

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ODM Development

- Ensure whole system coordination
- Enhanced market information
- Improved forecasting
- Standardisation across DNOs
- Transparent decision making criteria
- Provide open quality, accurate real-time data

Our Development Areas

We will enhance **digitalisation and automation** to enable scaling of decision-making processes to ensure timely and consistent decisions can be made closer to real-time.

We will increase **situational awareness** to provide a robust foundation for well-informed decisions and support the integration of low carbon connections onto the energy system.

We will invest in enhanced forecasting tools and methodologies to support customers and ensure data accuracy.

We will work to increase **transparency** across our operational decision-making processes. This includes making both the data that informs decisions and the outcomes of those decisions more accessible to stakeholders. By improving access to market information, we aim to build trust and ensure stakeholders have the tools they need to engage effectively with the flexibility market.

ODM Development

Digitalisation and Automation

We recognise the increasing complexity of flexibility markets and the need for scalable, automated solutions.

Our focus areas include:

Flexibility Market Clearing: As participation in flexibility markets grows, clearing activities will become more complex.

- Engage with Flexibility Service Providers (FSPs) to understand their priorities across more complex clearing scenarios.
- Partner with experts to develop appropriate clearing algorithms which are transparent and shared with market participants and integrate these algorithms into our tool suite to enhance automation and efficiency.

Curtailment Modelling: Existing manual processes require development to ensure scalability.

- Develop new tools to automate outage-related studies and improve their scalability.

Whole System Constraint Management: Building on our current work, we aim to expand use cases for managing constraints.

- Implement the next phase of the MW Dispatch project.
- Collaborate with the National Electricity System Operator (NESO) to explore further coordination opportunities.

ODM Development

Situational Awareness

Improving our situational awareness is essential for delivering improved and timely operational decisions.

Our focus areas include:

Flexibility Services: Enhance the quality and granularity of data by accessing wider datasets.

- Utilise insights from the ongoing rollout of low-voltage (LV) monitoring within the DNO.
- Leverage smart meter data to refine our understanding of network conditions.

Short-term Load Forecasting: expand our data sources to strengthen forecasting capabilities.

- Develop more representative day loading cycles for improved modelling.
- Continuously improve operational forecasting through integration with wider datasets.

Managing Market Conflicts: Increase coordination with NESO

- gain greater visibility into service conflict frequency and high-risk areas.

ODM Development

Transparency

Transparency is key to building trust and ensuring that stakeholders can engage effectively with our processes.

Our focus areas include:

Flexibility Services: Provide stakeholders with accurate and up to date visibility into flexibility needs and decision outcomes.

- Develop automation tools to share flexibility Opportunities and dispatch decision outcomes on a weekly basis, evolving to a daily basis as we introduce day ahead flexibility trading.
- Introduce feedback mechanisms to explain the rationale behind decision-making.

Increased Curtailment Identification: open, transparent and accessible data

- Collaborate more closely with outage planners to review annual outage plans proactively.
- Enhance communication with stakeholders by sharing outcomes of curtailment modelling activity.

Managing Market Conflicts: open, transparent and accessible data

- Simplify the development and implementation of primacy rules to improve industry understanding.
- Tailor reports as part of the ENA's Open Networks programme for wider accessibility.

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Governance & Next Steps

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Governance

Effective governance is essential to ensuring effective DSO/DNO coordination

We have established a joint Operations Working Group with the DNO to ensure effective coordination across operational activities. This group includes representatives from: DNO Control Centre Engineers, DNO Outage Planners and DSO Operations leadership and engineers.

The group meets monthly to:

- Discuss and resolve operational issues.
- Agree on ongoing developments to ways of working.
- Share information and feedback to promote continuous improvement.

Annual Review of the ODM Framework

Governance Commitments:

- **Transparency:** The ODM Framework will be reviewed and published annually to share our progress openly.
- **Continuous Improvement:** Each iteration of the framework will incorporate feedback from stakeholders, ensuring it evolves to meet emerging needs and challenges.

Next Steps

You can submit feedback on our Operational Decision Making to negd.emc@nationalgrid.co.uk

We're also offering Surgeries for stakeholders who'd like to discuss our Operational Decision Making with us in more detail, please email us at negd.emc@nationalgrid.co.uk to arrange

Timeline for consultation

13th January 2025;	Operational Decision Making Framework launch
23rd January 2025;	ODM Consultation Webinar
17th February 2025;	Consultation Close

Post consultation

On the 21st March 2025, we'll publish our ODM development roadmap, which will show our updated and aligned development priorities directly informed by the feedback we receive.

We’d appreciate your feedback on todays webinar

Feedback Survey - https://forms.gle/iyNxEtLuvofrjC4g9

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Q&A

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Thank You

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