

Public

The Role of the National Energy System Operator in Delivering the Energy Transition

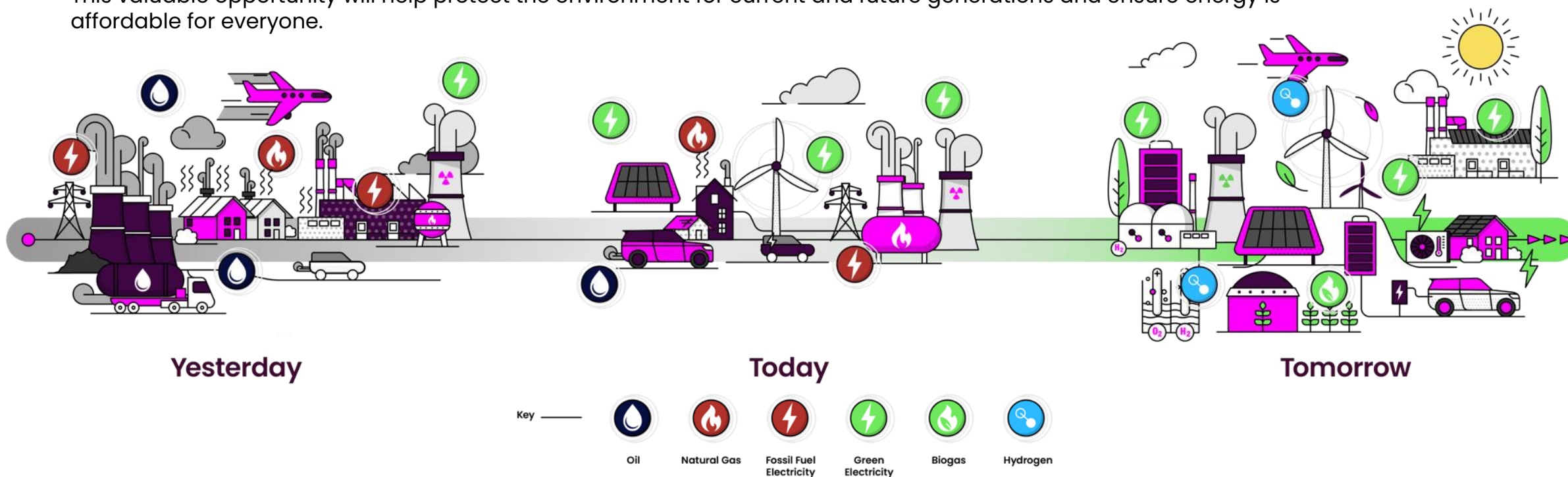
I-SEE Webinar

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A Changing Energy Landscape

- The energy system is critical to almost all aspects of our daily lives and fundamental to decarbonising the economy.
- The way we use, store and source energy is significantly changing and we have an opportunity in this period of change to shape an energy system that fosters economic growth and prosperity for Great Britain, creating jobs and building skills.
- This valuable opportunity will help protect the environment for current and future generations and ensure energy is affordable for everyone.



We must work collectively at a local, regional and national scale to realise the benefits of the energy transition for Great Britain, and the people who live here.

The National Energy System Operator

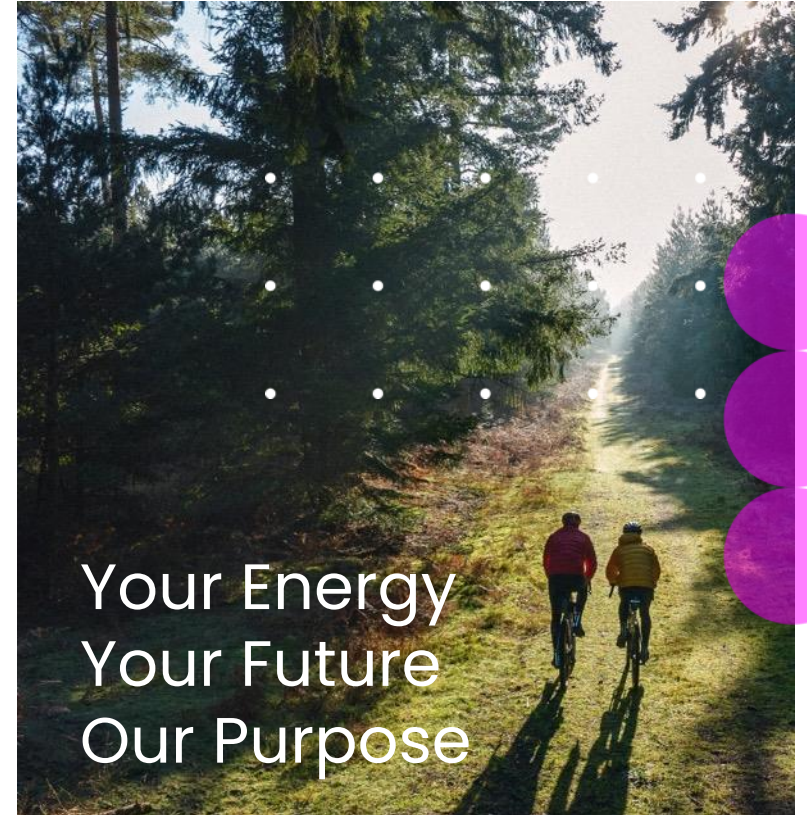
The National Energy System Operator, NESO, is an independent, public corporation at the centre of the energy system taking a whole system view to create a world where everyone has access to **reliable, clean and affordable energy**.

Our work will be the **catalyst for change** across the global community, forging the path to a **sustainable future for everyone**.

The challenge

Tackling climate change is truly the challenge of our generation; addressing energy security, sustainability and affordability for everyone is at the forefront of the global agenda and drive to meet net zero.

It is our job to transform the whole energy system to meet these challenges and transition to a low-carbon future, embracing new technologies and cleaner generation sources, always with the cost to the consumer in mind.



Our Story

We are at the heart of the energy landscape, energised by collaboration, curiosity, and innovation; creating a future where everyone has access to clean, affordable, reliable energy.

We embrace the opportunity to be the catalyst for the energy transformation, working hand-in-hand with government and industry, for the benefit of communities across the nation.

Every voice matters and everyone needs to be included. We are driven by inclusivity, diversity and a sense of belonging, building trusted relationships and empowering one another.

Our aspiration ignites innovation; our passion accelerates progress. We forge a dynamic and ambitious path and harness this momentum to drive towards a sustainable future.

Together, we are energising progress.
Together we are NESO.



Our Governance

NESO is operationally independent of government. Taking a whole system approach, we plan the electricity and gas systems and operate the electricity system to deliver the government's policy outcomes.

Being independent enables us to make fair and unbiased decisions based on evidence and data. This means we can give impartial recommendations to the government and the regulator.

Our shareholder



Department for
Energy Security
& Net Zero

The Department for Energy Security & Net Zero is responsible for national policy and providing strategic direction and targets in relation to UK energy

Our regulator

ofgem

Making a positive difference
for energy consumers

Ofgem is the energy regulator for Great Britain

Independent NESO Board

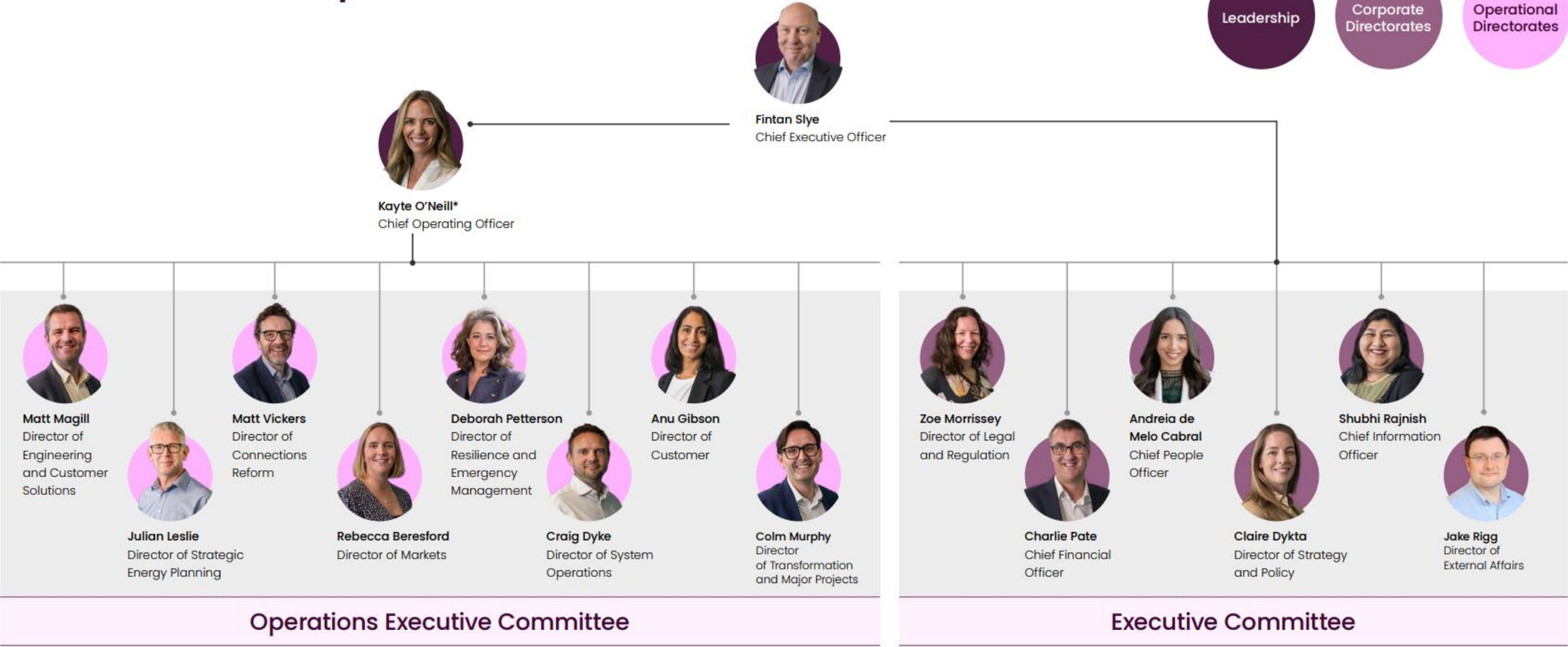
The NESO Board oversees our strategic direction, ensuring compliance with regulations and the mitigation of corporate risks. The Board ensures that we build strong relationships with customers and it evaluates performance, ultimately working to protect consumer interests and enable a reliable and secure, efficient, clean energy system.

Meet our Leadership Team



Leadership

Directorates



Led by the Chief Operating Officer, the Operations Executive Committee ensures successful delivery of commitments, business plans and operational transformation.

Led by the Chief Executive Officer, the Executive Committee sets the direction for the organisation, allocates resources and tracks performance.

Our Purpose, Vision And Values



Our purpose is to forge the path to a sustainable future for everyone.



Our vision is a future where everyone has access to reliable, clean and affordable energy; our work will be a catalyst for change across the global community.

Our values are what define us, setting the foundation for our purpose and guiding us as we move towards achieving our vision.



Accelerate Progress

We deliver better outcomes at pace when we take accountability, are courageous and progress the bigger picture.



Be Curious

We achieve more when we demonstrate a growth mindset, being curious, asking questions beyond and within our organisation to develop, learn and innovate.



Build Trust

We build trust when we listen to and understand the needs of our colleagues and customers, are transparent with our actions and deliver on our commitments.



Create Belonging

We perform at our best when we can be our true selves, embrace diversity and are truly inclusive.

The National Energy System Operator

The UK's 2023 Energy Act set the legislative framework for an independent system planner and operator to be set up to help accelerate Great Britain's energy transition, leading to the establishment of the National Energy System Operator (NESO).

Our Primary Duties

NESO will promote the following three objectives:



Net Zero
Enabling the Government to deliver on its legally binding emissions targets.



Efficiency & Economy
Promoting efficient, co-ordinated and economical systems for electricity and gas.



Security of Supply
Ensuring security of supply for current and future customers of electricity and gases.

Our Secondary Duties

NESO will also have regard to:



Facilitating Competition
Creating and maintaining competitive energy markets and networks.



Consumer Impacts
Understanding what changes mean for consumers.



Whole System Impacts
Understanding linkages across systems.



Facilitating Innovation
Creating an environment that enables others to help solve energy challenges.

NESO Timeline

History of the System Operator:



1989
The Electricity Act was approved by parliament, which paved the way for privatisation of the electricity industry.



National Grid

1990
National Grid was established, creating one regulated company for England and Wales to provide transmission infrastructure and a marketplace; not to buy or sell energy itself.



1996
Our control room, the Electricity National Control Centre (ENCC) was established, in Wokingham.

Legal Separation of the Electricity System Operator:

nationalgridESO

April 2019
National Grid Electricity System Operator (ESO), became a legally separate business within the National Grid PLC Group.



October 2024
NESO is established.



January 2024
The ESO announced the new name for this entity as the National Energy System Operator, or NESO.



October 2023
The Energy Act 2023 was passed with cross-party support, legislating for a Future System Operator to be created.

The Formation of the National Energy System Operator:

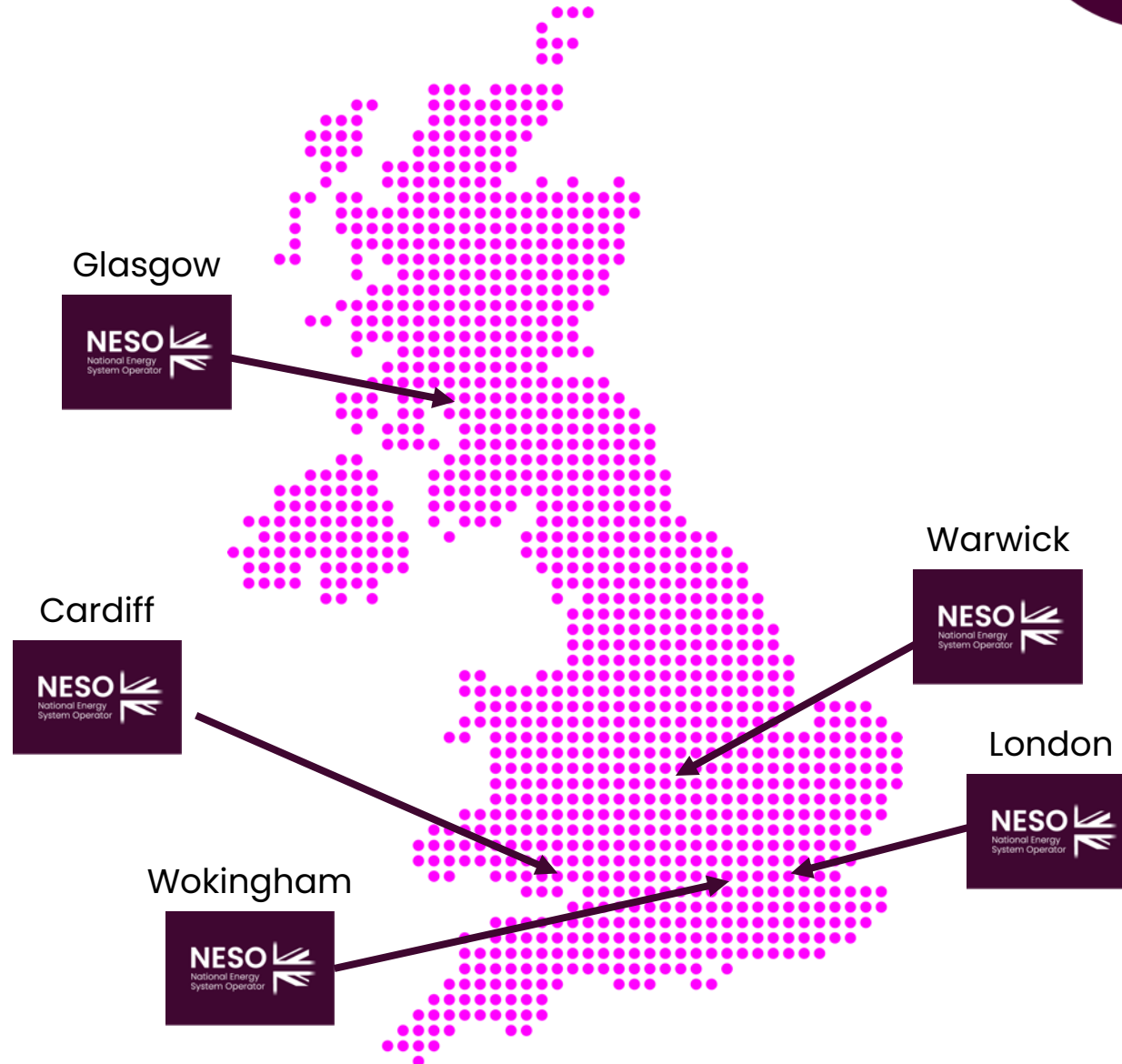


April 2022
Following industry consultation, the UK government decided that the Future System Operator would be a public corporation free from commercial interests and operationally independent.



Our Locations

We have offices in Glasgow, Warwick, Wokingham and London but our people work across Great Britain and internationally.



Our Priorities

We have identified six priorities that will guide our efforts through to 2026, the end of our current regulatory period, ensuring we fulfil our duties and achieve our purpose and vision.



Clean Power

We will enable a zero-carbon electricity system by adopting a whole system approach, encouraging innovation and collaboration.



Decarbonised Energy

We will develop integrated plans for a decarbonised, efficient and flexible energy system fit for the future.



Consumer Value

We will have unlocked around £3 billion of consumer benefits by 2026 through delivery of our commitments.



Customer Centricity

We will understand and balance the different needs of our customers to form meaningful partnerships.



Digital Mindset

We will unlock the potential of technology and teamwork through a digital-first approach, enabling a future of seamless connectivity and innovation at pace.



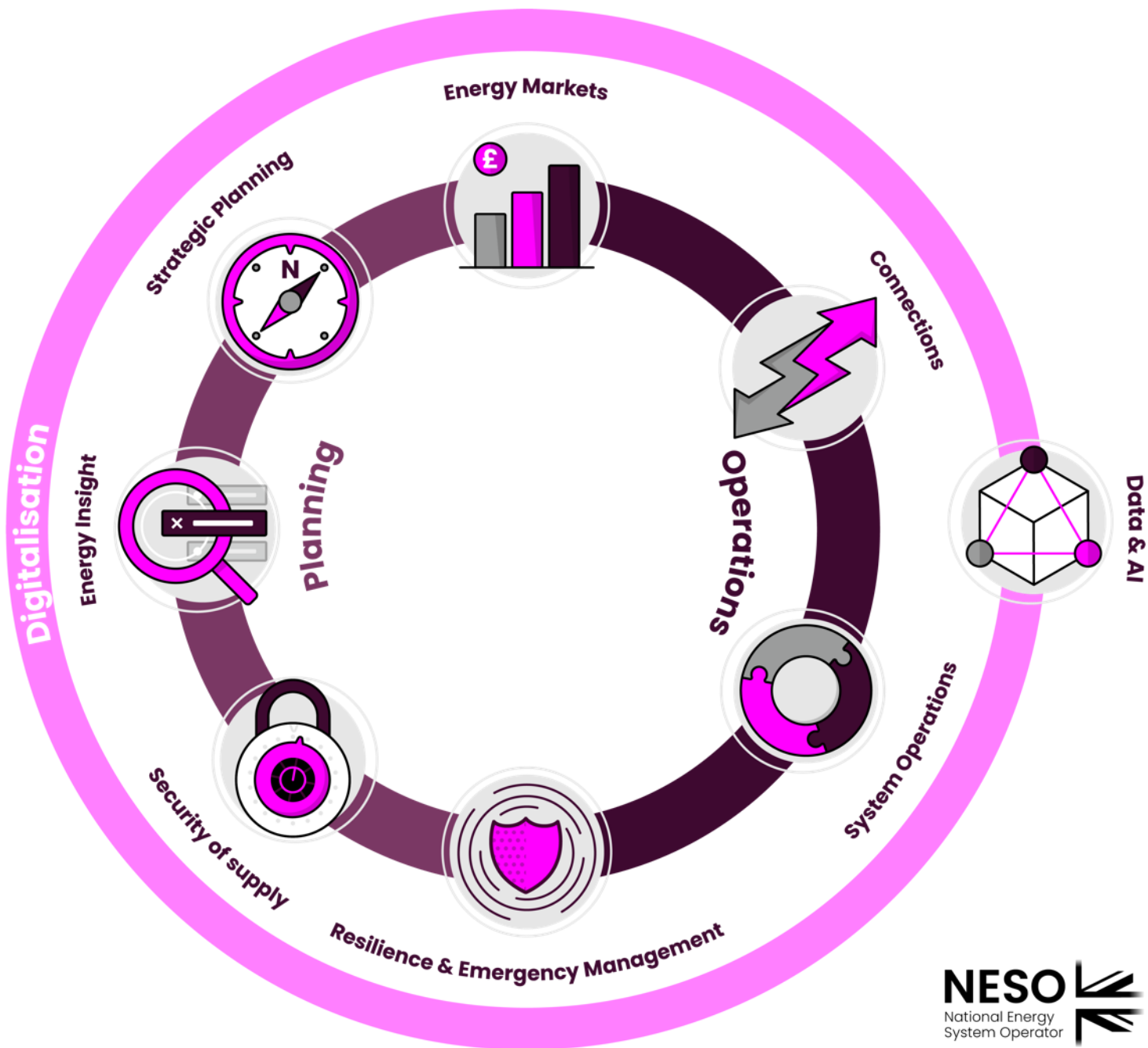
People Value

We will invest in our people, to ensure we are prepared and empowered to embrace the opportunities of the future

What we do

We bring together eight activities required to deliver the plans, markets and operations of the energy system of today and the future.

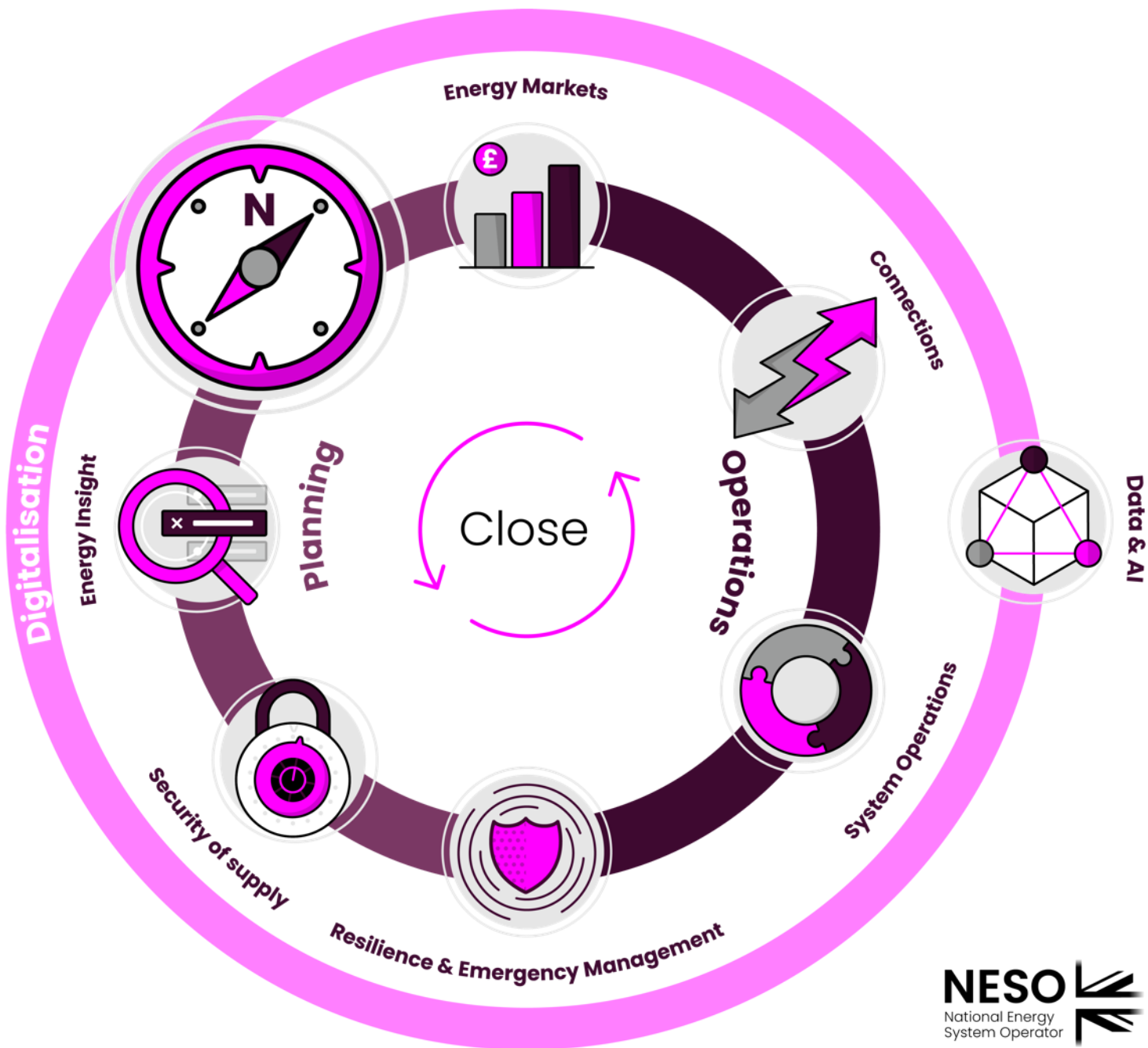
Bringing these activities together in one organisation encourages holistic thinking on the most cost-efficient and sustainable solutions to the needs of our customers.



What we do

Strategic Planning

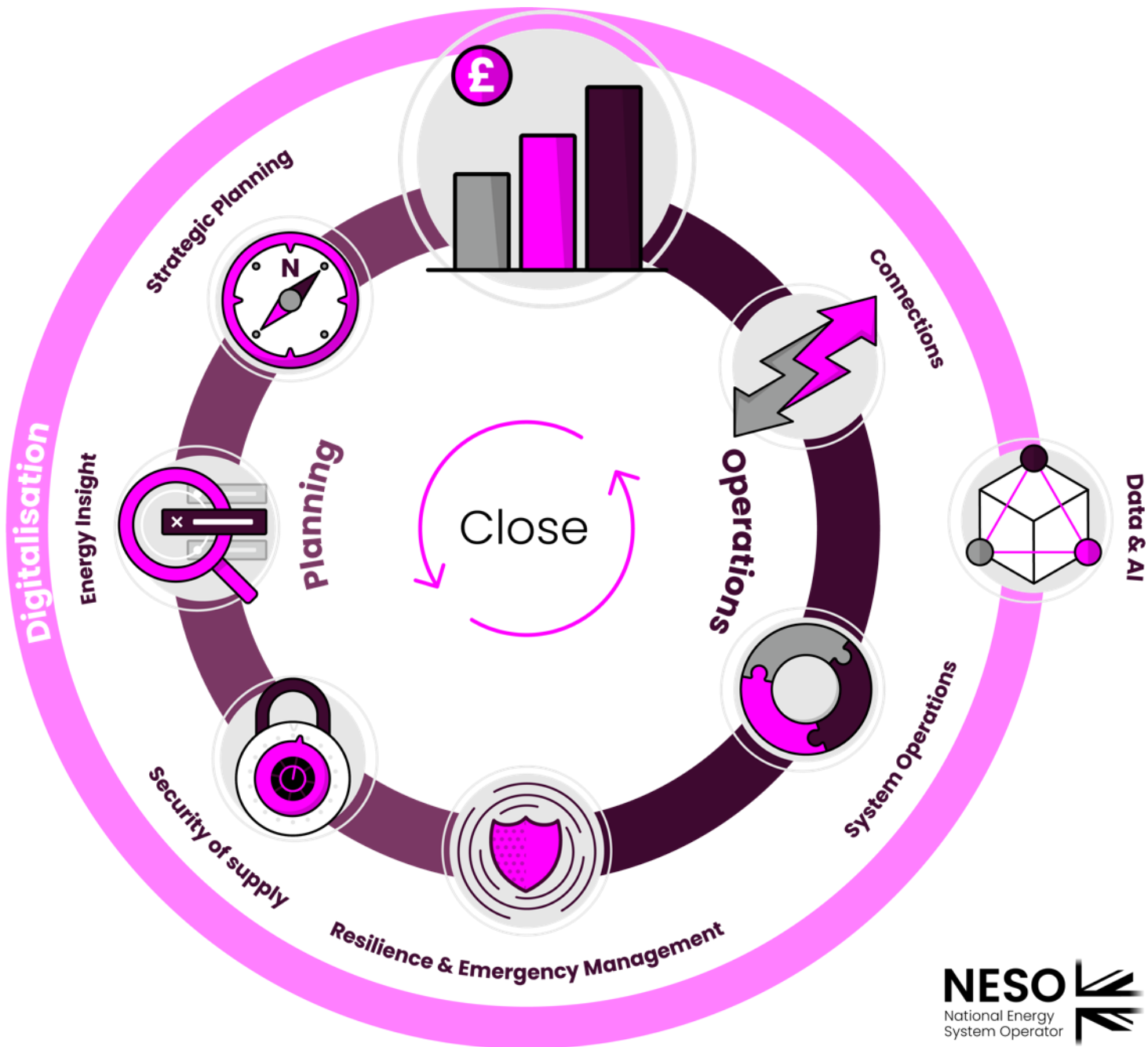
We take a long-term approach to planning, that identifies whole energy system needs and ensures that the system can be designed and built accordingly.



What we do

Energy Markets

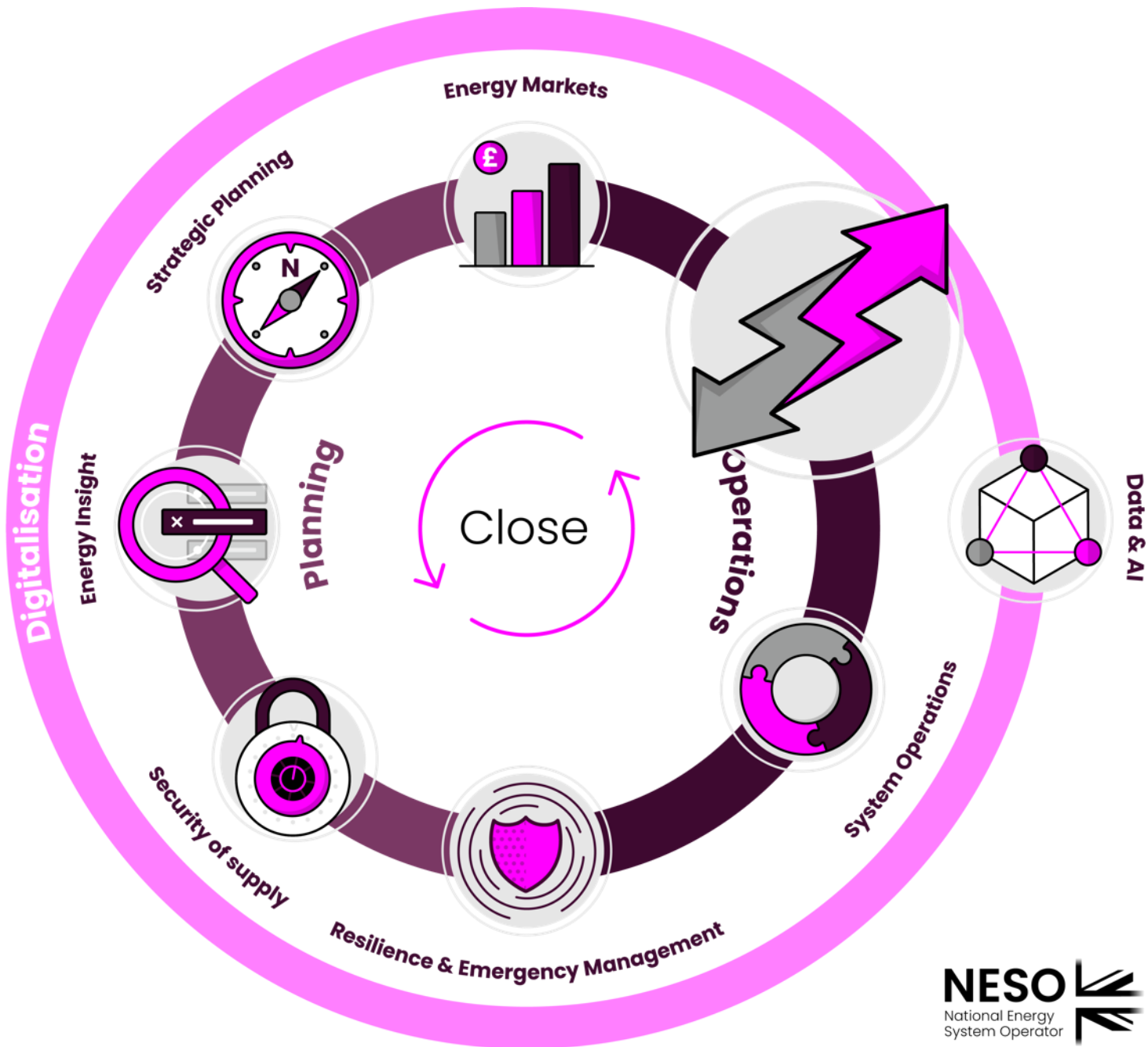
We develop competitive and coordinated energy markets that result in a cost-efficient energy system and give us the tools for low-carbon operation.



What we do

Connections

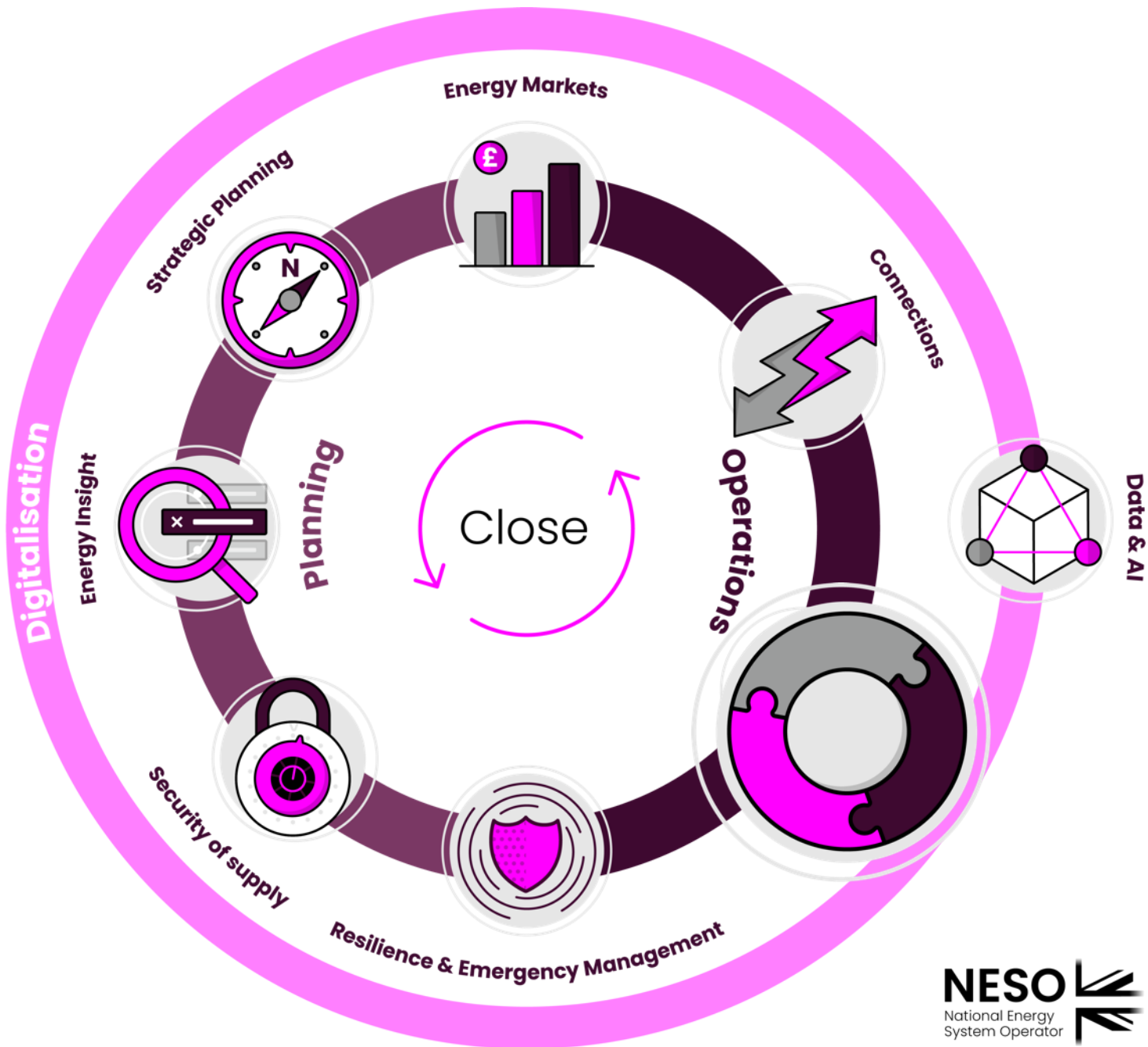
We deliver efficient system access for electricity generation and demand projects, so that those projects that are ready and aligned to Great Britain's clean power ambitions are prioritised.



What we do

System Operations

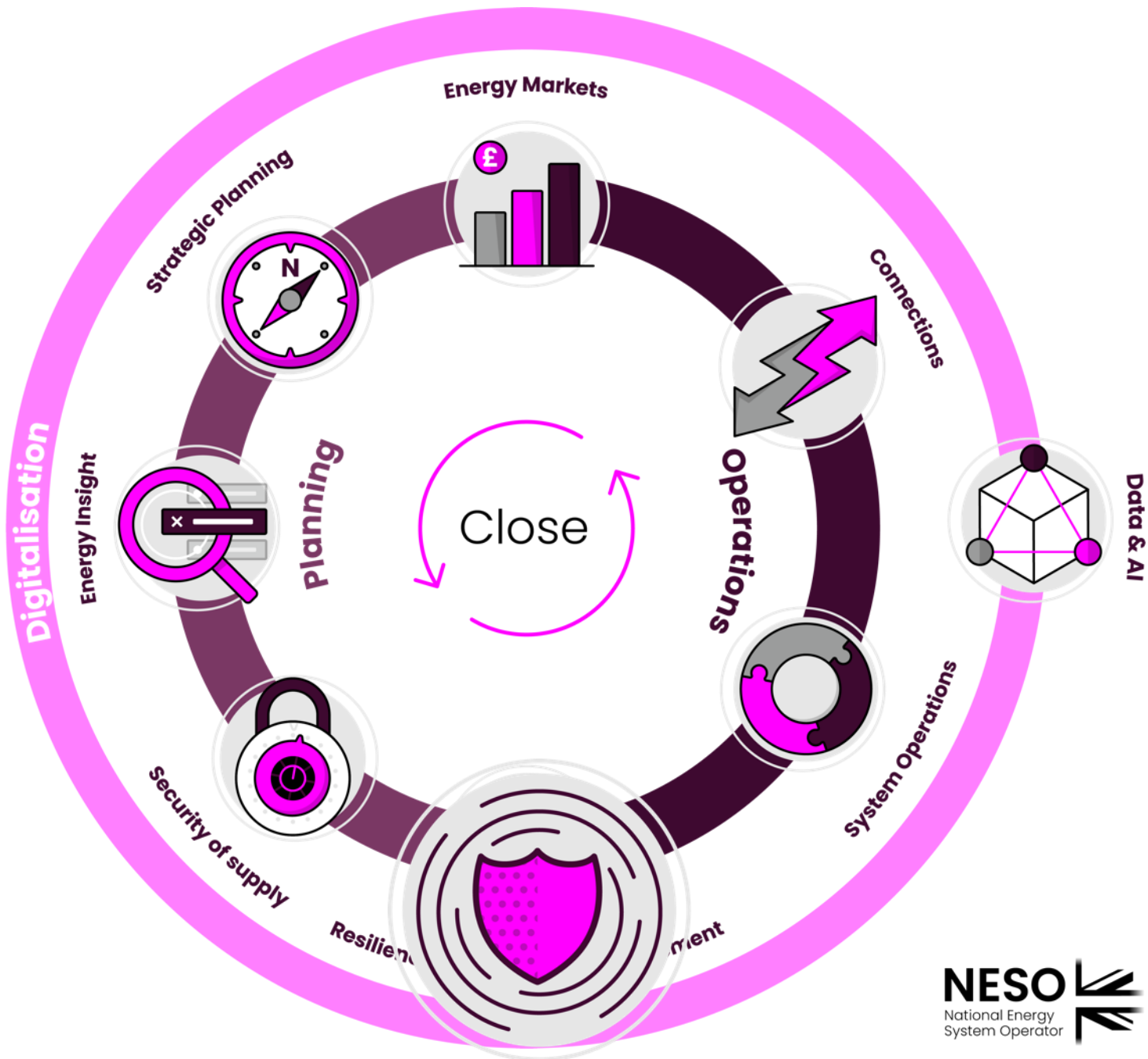
We accelerate progress towards clean power by taking a whole system approach to operations.



What we do

Resilience & Emergency Management

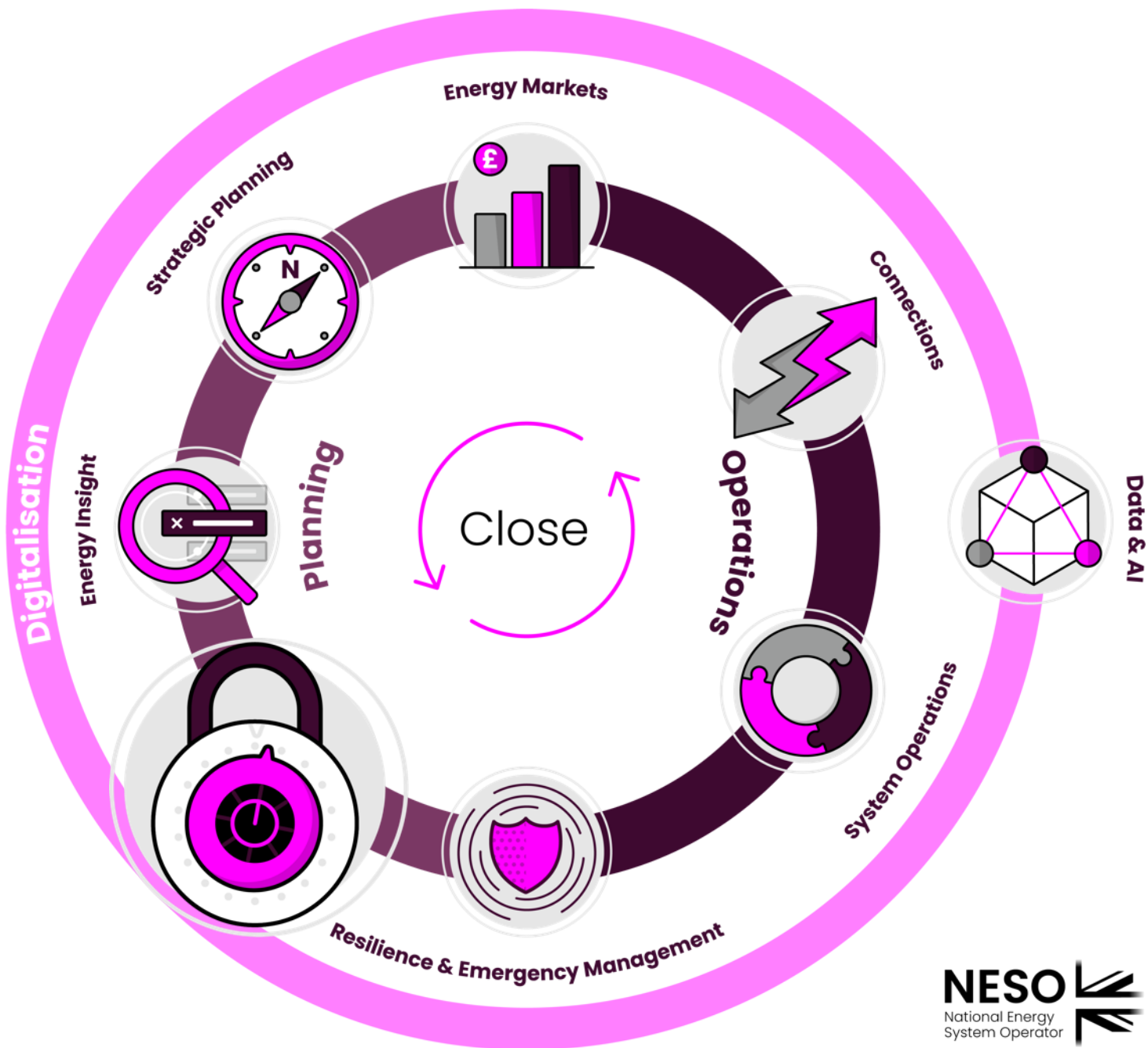
We provide whole system coordination and analysis for system resilience and preparation for emergencies across Great Britain's energy industry.



What we do

Security of Supply

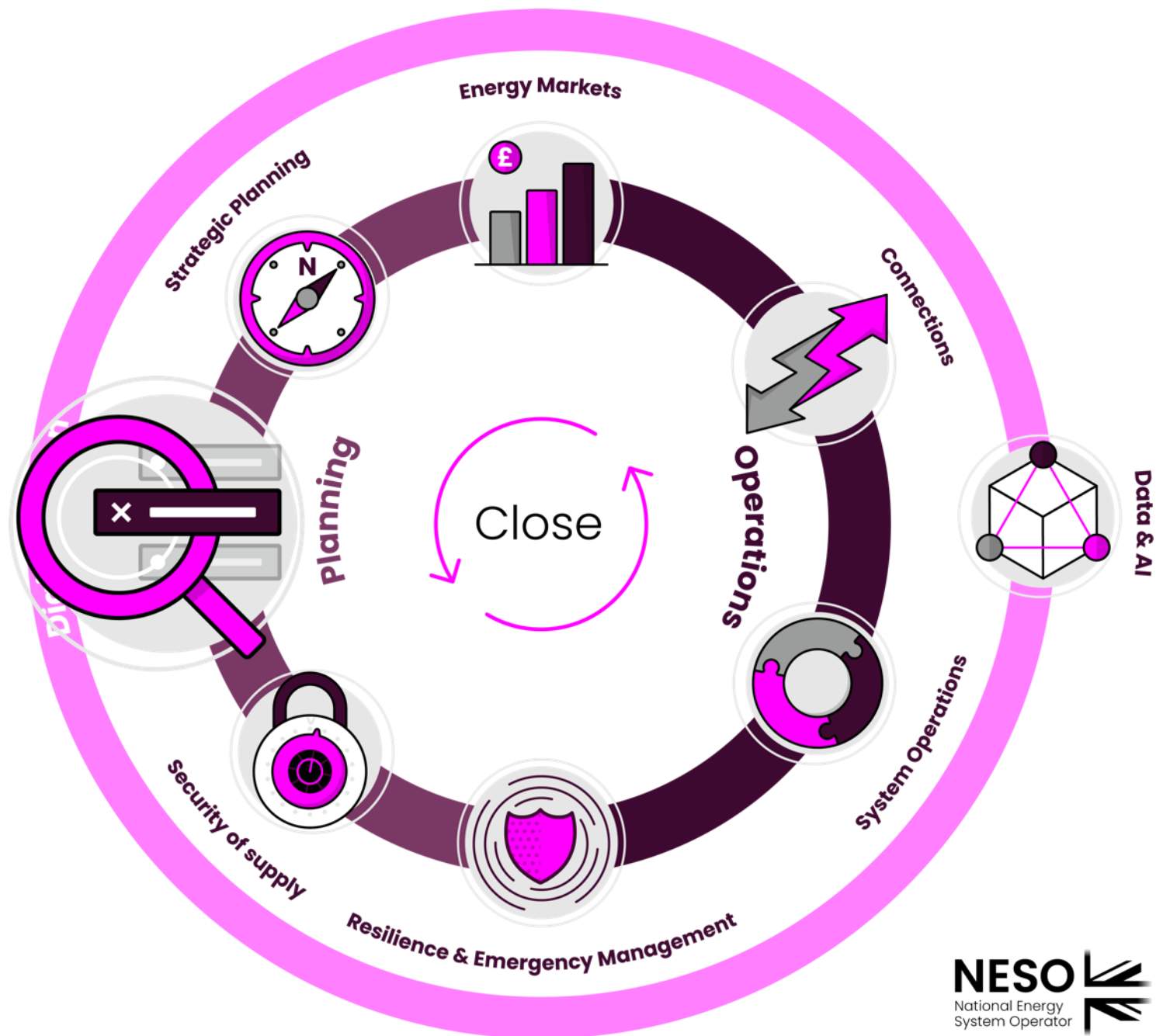
We enable a stable, reliable, and secure energy system through an integrated and coordinated approach to ensuring our energy supply needs can be securely met.



What we do

Energy Insights

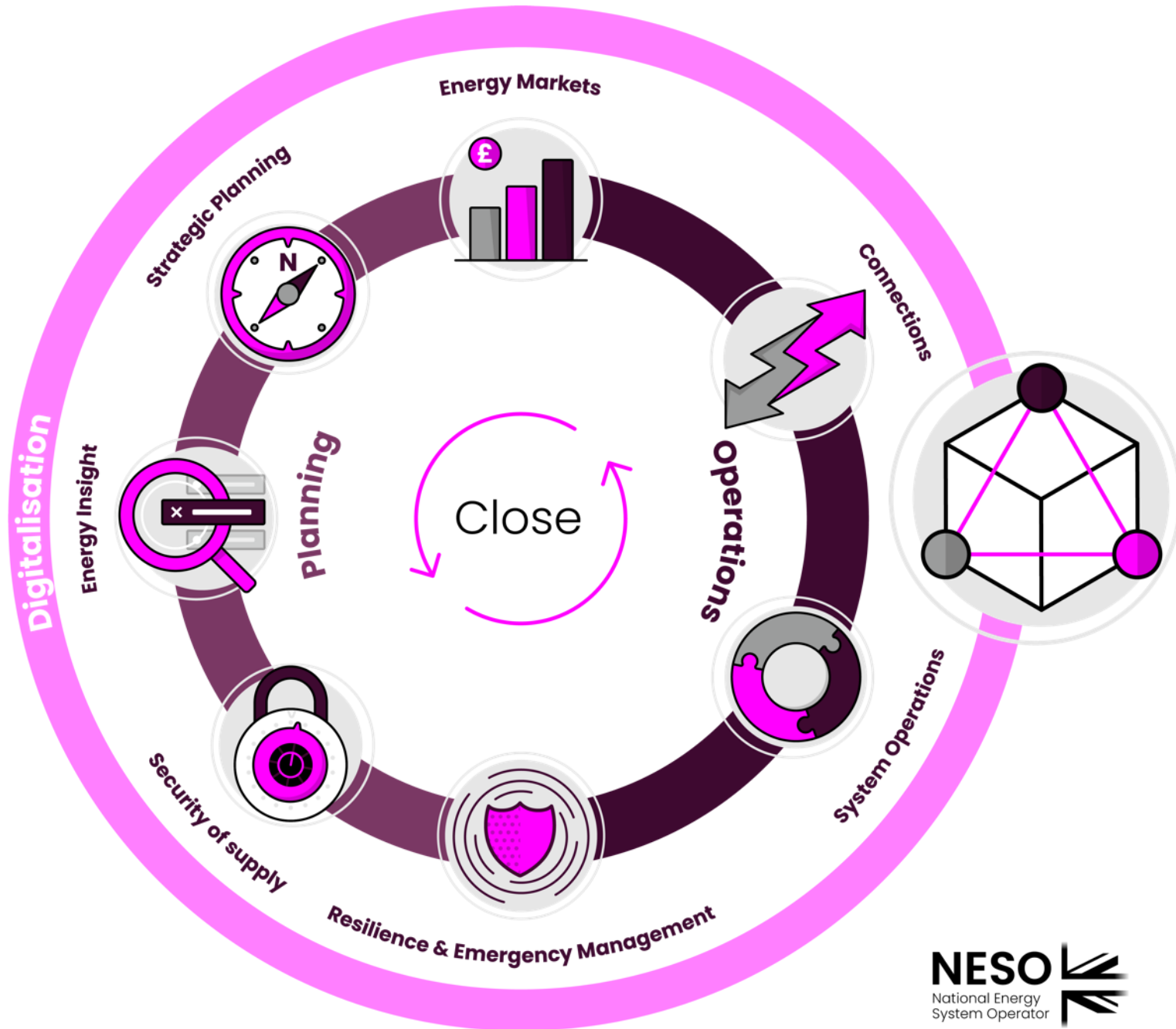
We use our whole system expertise to deliver independent insights to government, Ofgem and industry, backed by transparent evidence.



What we do

Data & Artificial Intelligence

We digitally advance Great Britain's whole energy system by collaborating with industry, enabling the exchange of data and driving value through artificial intelligence.



Clean Power 2030

Clean Power 2030 Headlines

Clean Power by 2030 is achievable

- Outer edge of feasibility
- Herculean effort

Clean Power will require doing things differently

Major scale-up in delivery
Multiple major reforms required

Clean Power can bring benefits for GB

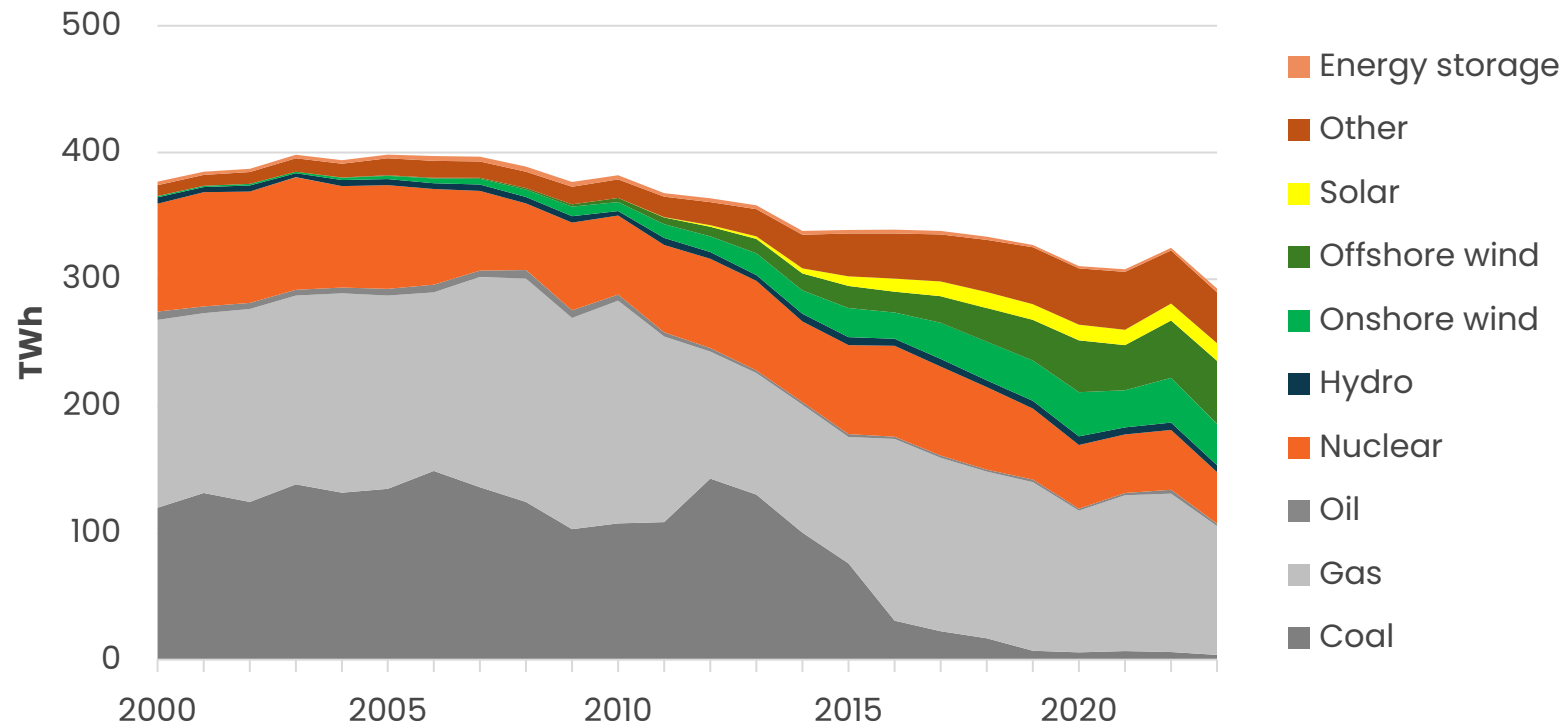
Carbon targets
Investment, jobs
Cut link to gas prices

Clean Power in numbers			
	GB clean power as share of GB consumption ¹	Share of unabated fossil generation ²	Carbon Intensity ³
Currently	~60%	33%	~150 gCO ₂ e
Clean Power 2030	≥100%	<5%	< 20 gCO ₂ e

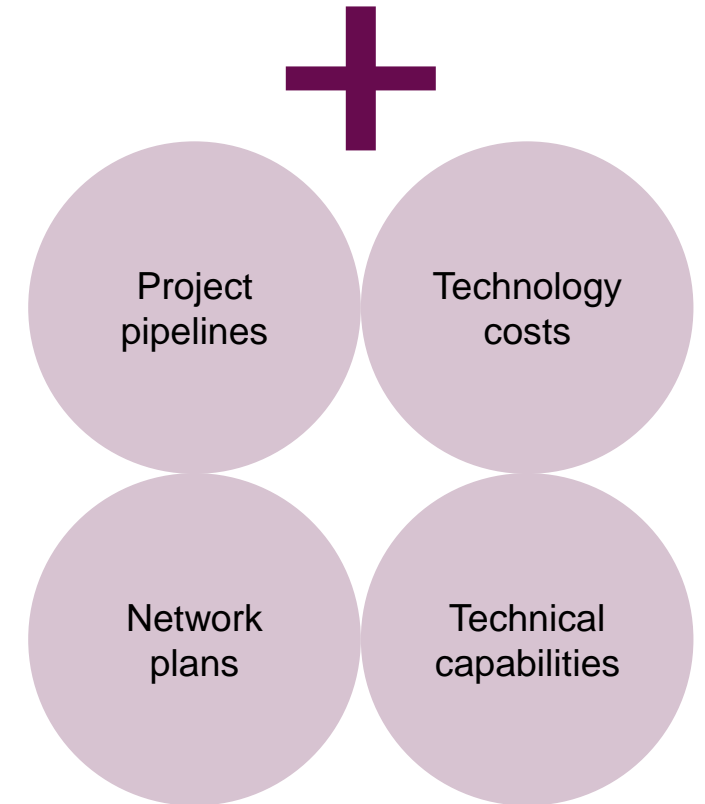
Source: ¹ Annual TWh domestic clean power production over total electricity consumed by GB homes and businesses ² Unabated fossil generation as a proportion of total electricity generation excluding exports ³ Carbon emitted from GB electricity production (gross, excluding combined heat and power, and energy from waste).

The fundamentals are in place...

Annual historic power generation in Great Britain

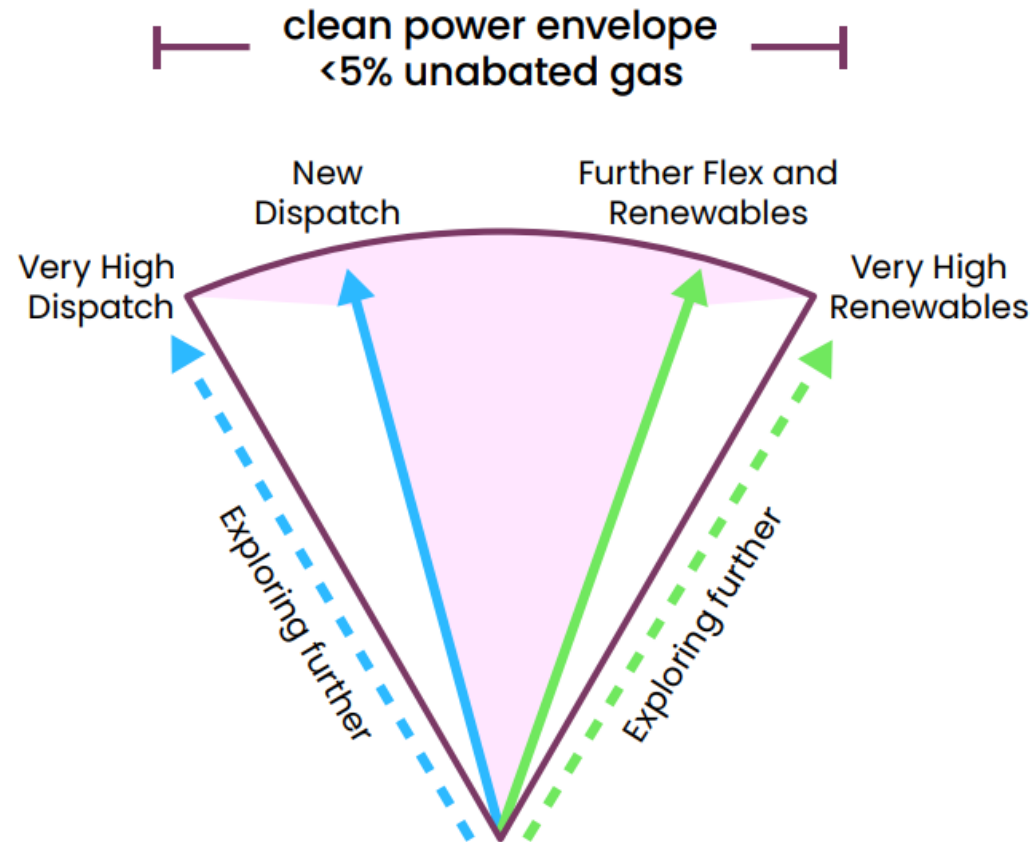


Source: DUKES, NESO. Note: Historical data includes Northern Ireland. Excludes CHP and waste



Flexibility is the backbone of a clean power system

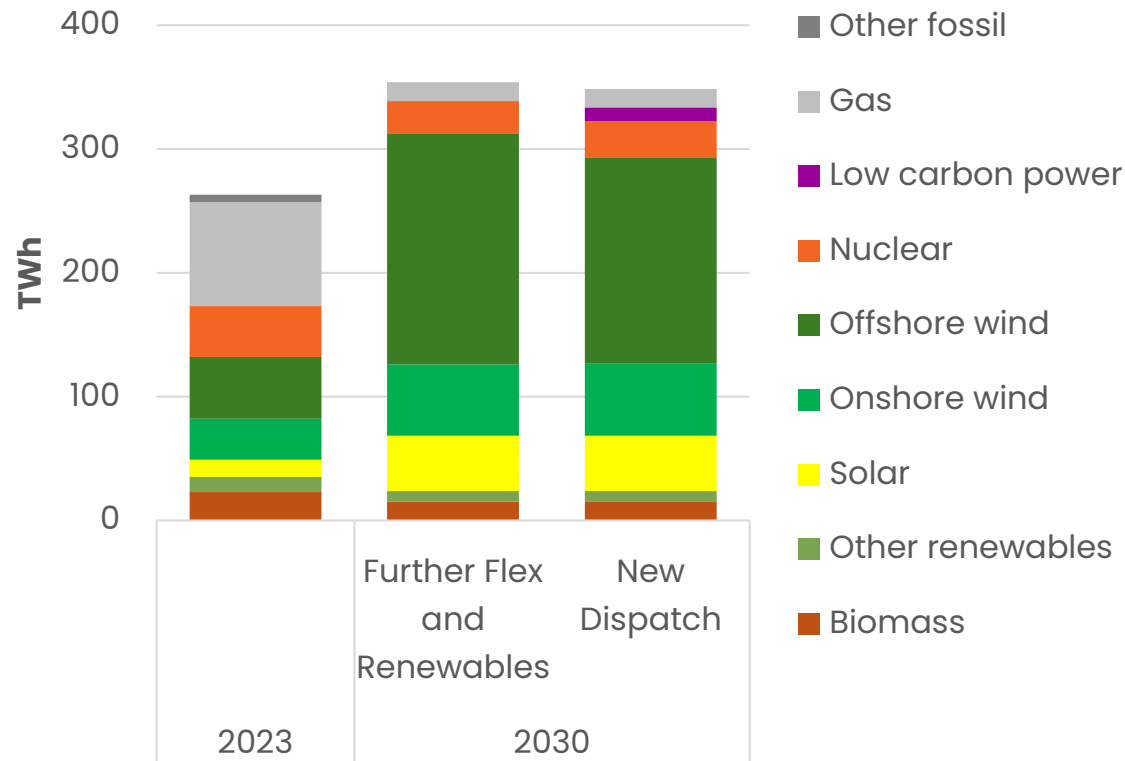
Primary pathways that meet clean power description



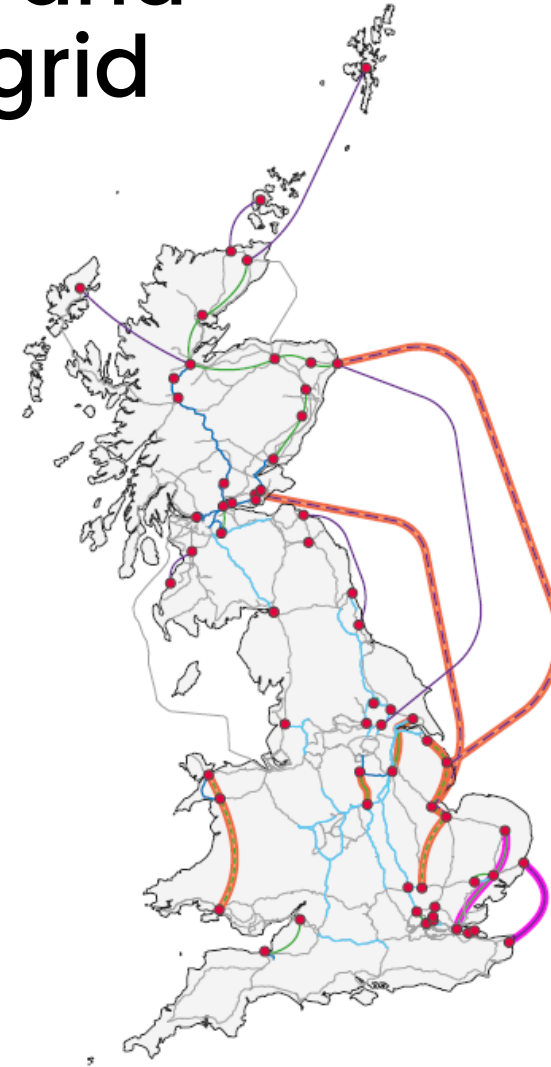
Source: NESO Clean Power 2030 Report

We need a huge scale-up in wind and solar, and rapid expansion of the grid

Generation mix for a clean British power system in 2030



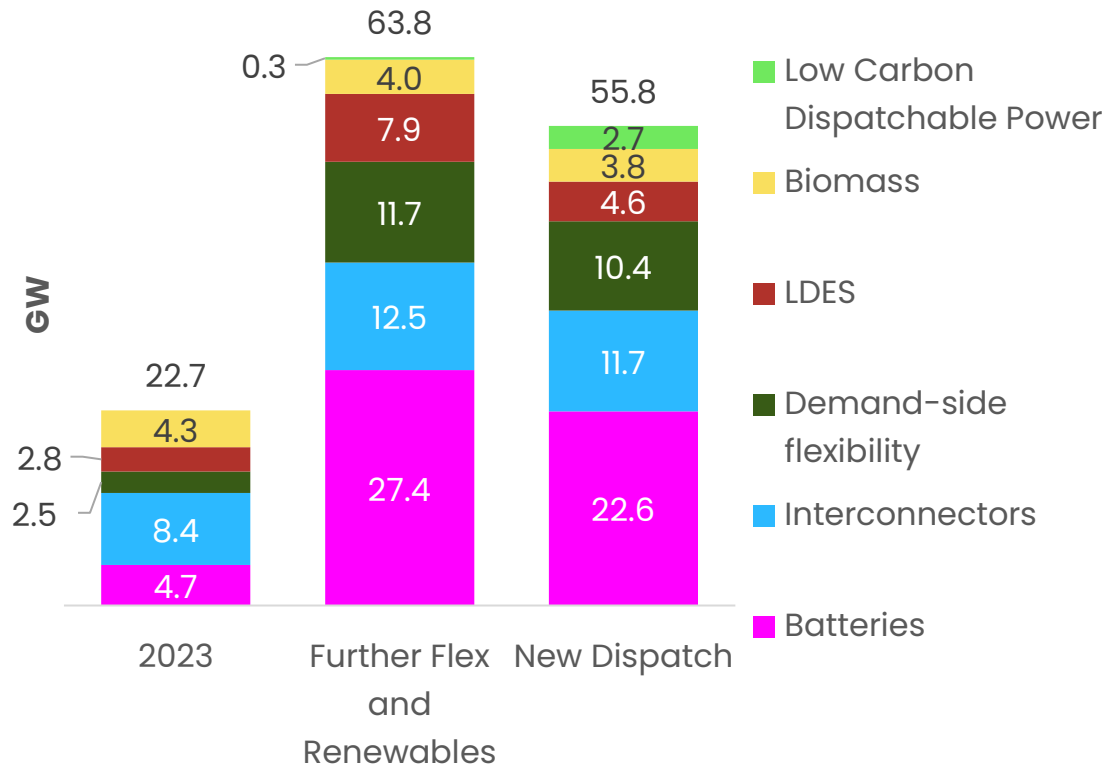
Source: NESO.



Note: Map of 2030 transmission network reinforcements for a clean power system. **Pink** = need accelerated delivery. **Orange** = accelerated delivery lowers constraints. All routes and options shown on this map are for illustrative purposes only.

New sources of flexibility are vital for clean power

Low Carbon Flexibility Capacity by Technology



Source: NESO CP30 Report. Note: LDES = Long duration electricity storage.



Long Duration Energy Storage (LDES) up from 3 GW to 5-8 GW*



Interconnector capacity increases from 8.4 to 12.5 GW*



4x more demand flexibility, largely from vehicles and smart appliances



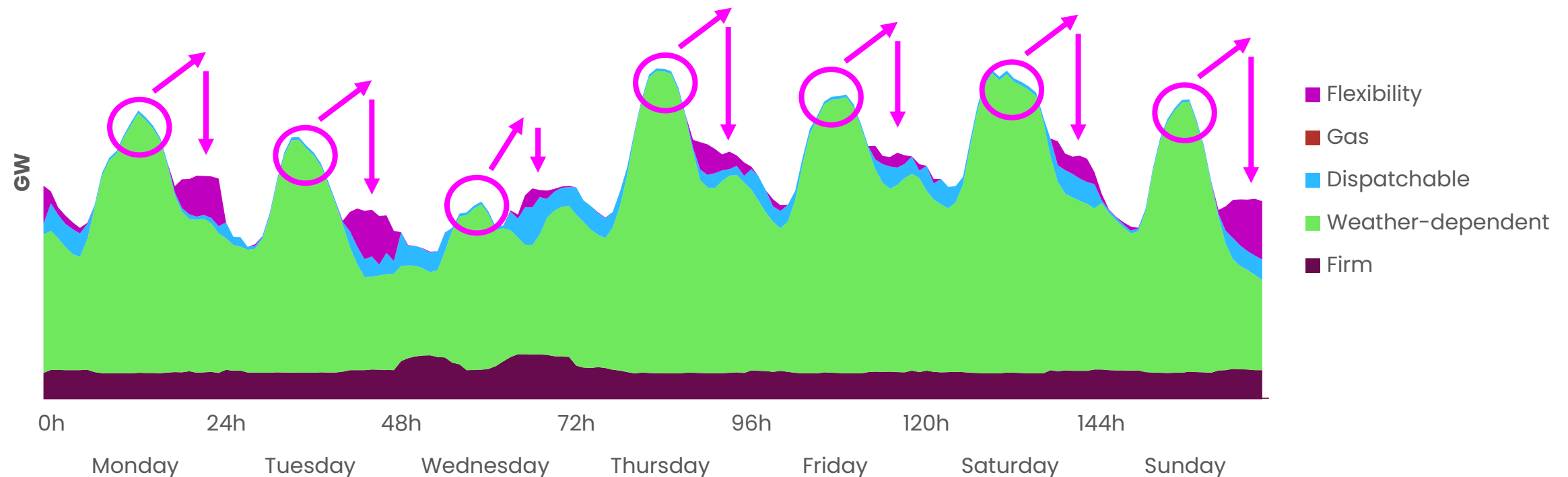
Clean dispatchable generation has an outsized value

Note: LDES included at 4-6 GW and interconnectors at 12-14 GW in 2030 in the Government's Clean Power 2030 Action Plan.

An evolving flexibility challenge

Illustrative weekly generation profiles

Further Flex and Renewables, Summer 2030

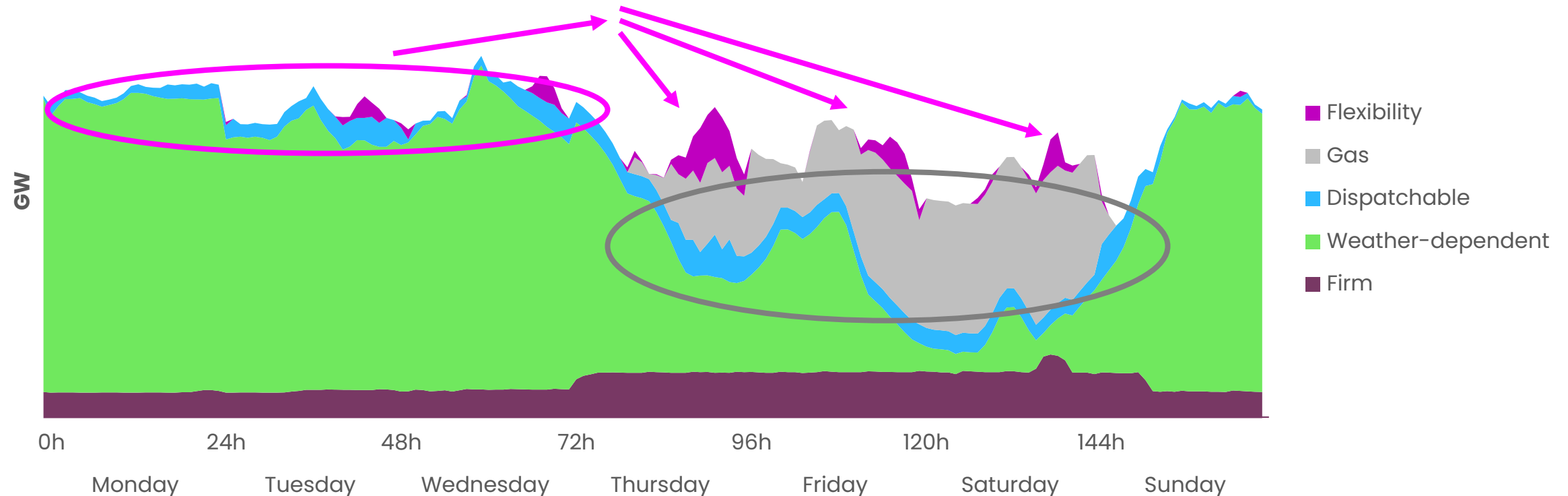


Source: NESO. Note: Firm includes nuclear, hydro, CHP and waste. Weather-dependent includes onshore wind, offshore wind and solar. Dispatchable includes biomass, pumped hydro, gas with CCS and hydrogen to power. Flexibility includes batteries and residential flexibility. Chart only shows when flexibility is discharging, not charging.

An evolving flexibility challenge

Illustrative weekly generation profiles

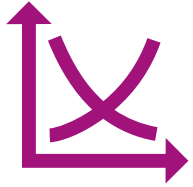
Further Flex and Renewables, Winter 2030



Source: NESO. Note: Firm includes nuclear, hydro, CHP and waste. Weather-dependent includes onshore wind, offshore wind and solar. Dispatchable includes biomass, pumped hydro, gas with CCS and hydrogen to power. Flexibility includes batteries and residential flexibility. Chart only shows when flexibility is discharging, not charging.

Urgency and coordination are essential to deliver Clean Power 2030

Government



Mission Control & the Clean Power Action Plan



Planning reforms



Supply chains & workforce



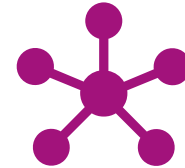
Key decisions, including

- REMA (Market Arrangements)
- Renewable Auction Round 7
- Bilateral negotiations
- Low Carbon Flexibility Roadmap
- LDES Cap and Floor

NESO



Connections reform



Strategic Spatial Energy Plan



NESO as a delivery partner

- Digitalisation and Innovation
- Markets Roadmap, Operability Strategy & Balancing Programme
- Grid forming batteries
- Skip rates

Thank You