Markets Advisory Council

25th September 2024

ESO

Agenda

Agenda Item	Lead	Time (14:00 – 17:00)
Welcome	Steve Jennings	14:00 – 14:05
Whole Energy Market Strategy *Prioritised risks*	Suki Ferris (ESO)	14:05 – 14:20
Flexibility Market Strategy *Update following Call For Input*	Yingyi Wang (ESO)	14:20 – 14:40
Break		14:40 – 14:50
Clean Power 2030 *Overview & interactions with Markets & Flexibility*	Matt Magill, Paul Wakeley, Lizzie Blaxland (ESO)	14:50 – 16:20
Break		16:20 – 16:30
Update on REMA	Rob Hewitt (DESNZ)	16:30 – 16:40
Future of MAC	Rebecca Beresford (ESO)	16:40 - close

Whole Energy Market Strategy

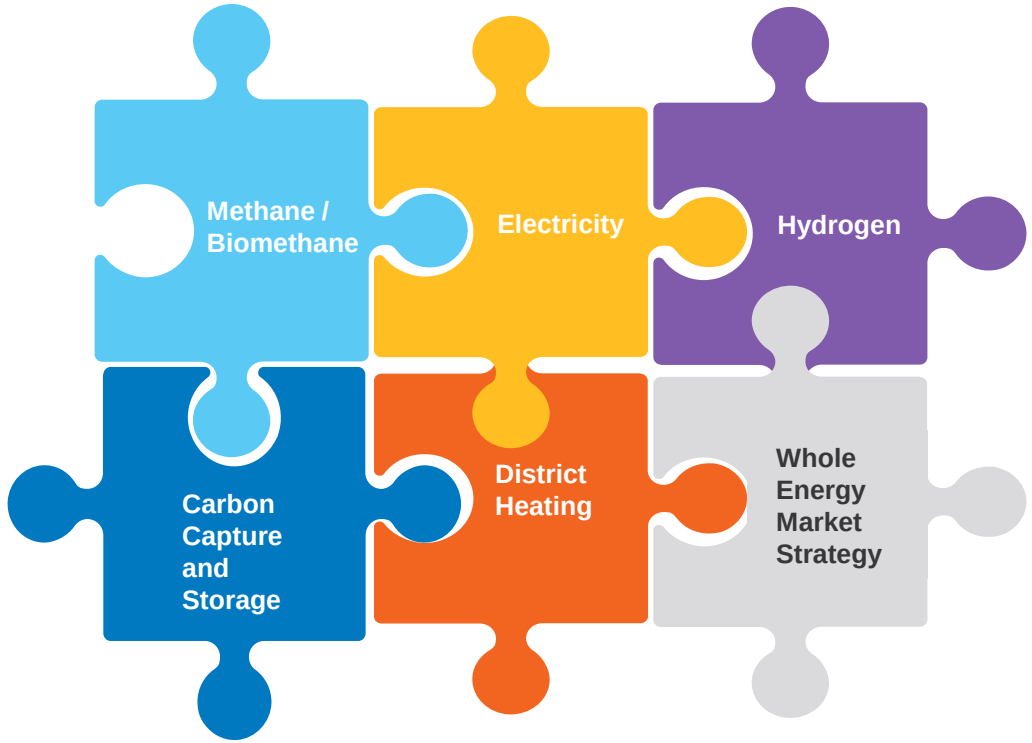
Suki Ferris (ESO)

ESO

Recap to Whole Energy Market Strategy | The new role of NESO includes whole system

Currently, energy markets are designed independently of each other, in a fragmented approach

Going forwards into a clean energy system, we need to explore the benefits from more coordination across energy markets, so they can work together to accelerate use of clean energy, drive down costs and ensure security of supply



Feedback from MAC in July:

You Said …	We did …
NESO should look at WEMS with a ‘deliverability’ perspective so to **prioritise key actions** and leave some of the less tangential issues until later.	We have re-assessed the urgency and severity of the risks posed by market design divergences into **16 prioritised risks, collated within 4 risk categories** [also taking on board previous feedback that not all divergences = risk]
ESO should build on this first phase of work and ask: “**does this divergence really matter and why it is a problem**” to be able to adequately inform future system/market design.	For each prioritised market design divergence, **we have assessed the severity and urgency of the risk posed, and illustrated the manifestation of this risk in the current UK energy landscape**

Risk categories | Based on our analysis and drawn from stakeholder insight, we have used four key categories to explore prioritised risks caused by a lack of coordination across market design

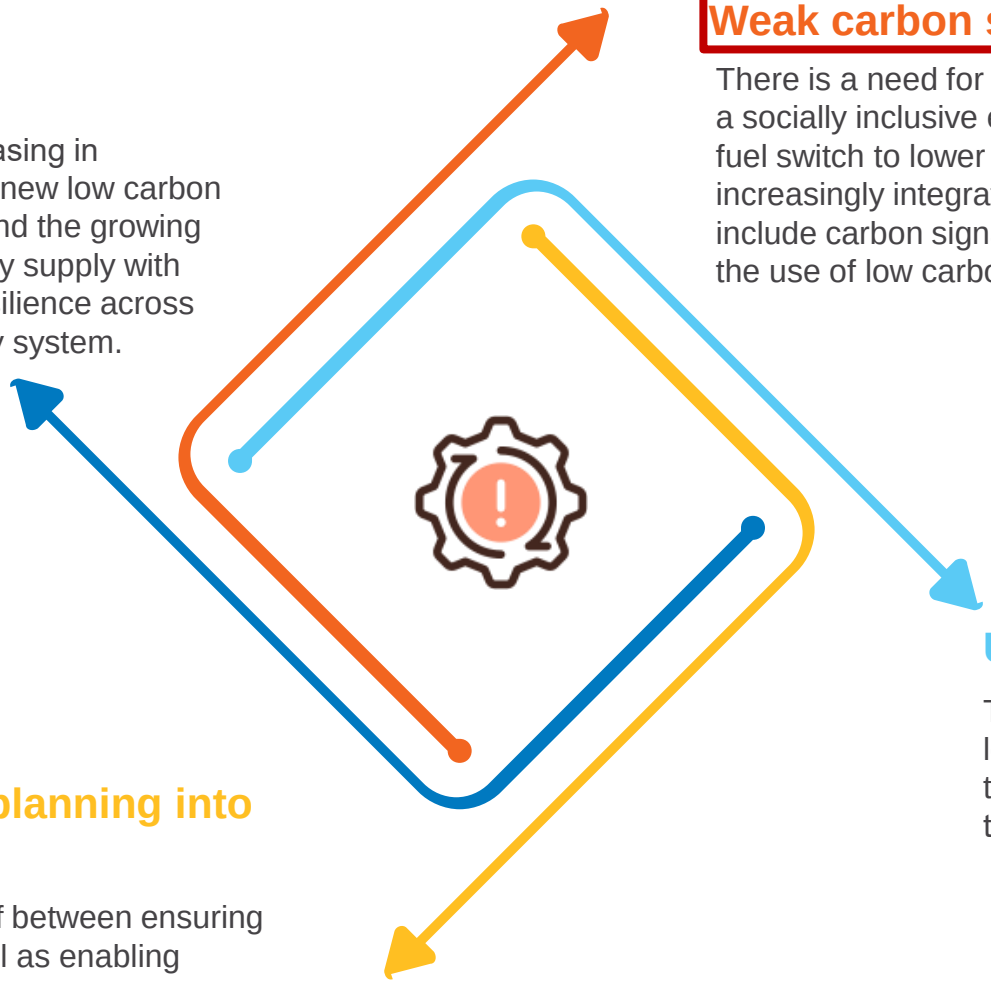
Ensuring energy security

The UK's energy landscape is increasing in complexity, with the development of new low carbon energy markets and technologies, and the growing role for consumers to balance energy supply with demand. This calls for enhanced resilience across markets to secure the overall energy system.

Weak carbon signals

Deep dive

There is a need for careful management of carbon signals for a socially inclusive energy transition, to support consumers fuel switch to lower carbon alternatives. In addition, in an increasingly integrated energy system, there is a need to include carbon signals in overall energy pricing, to maximise the use of low carbon energy sources.



Unlocking clean heat

There is an unprecedented need for pace and scale in low carbon energy market and technology development, to ensure everyone has access to clean heating to meet the UK's climate change targets.

Integrating greater central planning into holistic market design

There is a need to balance the trade-off between ensuring capital efficiency of investments, as well as enabling optionality, to steer towards a least-cost energy transition.

Risk identification & prioritization | There is more funding available for supply decarbonisation than end user decarbonisation, limiting consumer readiness for decarbonized energy

Divergence

B. Investment policy

Decarbonisation

Support mechanisms

	Supply Funding mechanism	Demand Funding mechanism
TOTAL	£36.3bn	£3bn

Description of the divergence:

Supply side subsidies far outweigh demand side subsidies

Risk from market design divergence

.

There is more funding available to support the production of low carbon energy (i.e., supply), than funding available to support end users to modify or install new appliances in order to use the new low carbon sources of energy (i.e., demand)

The imbalance in subsidy support weakens the business cases for developing low carbon energy projects, as producers of low carbon energy cannot guarantee consumers will be able to use it.

Severity

- Materiality: **High:** Presents challenges to investor support for decarbonisation projects, due to the lack of clarity in the end use of the produced decarbonized energy supply.
- Probability: This is a **live risk** and will continue until additional policy measures begin to address the current imbalance between supply and demand support mechanisms

Urgency

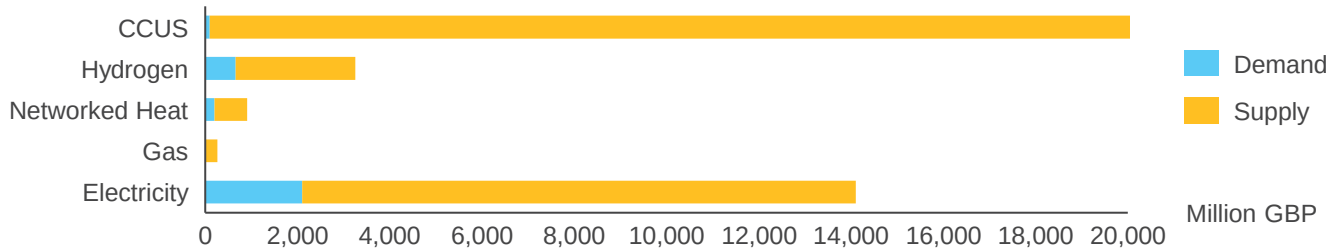
- Timescale: **Action is needed in short to medium timescale,** given long lead times to make energy projects a reality.
- Irreversibility: This is **reversible**, as subsidy funding can be granted, halted or removed

Source: NESO inputs, BCG analysis

Risk identification & prioritization | There is more funding available for supply decarbonisation than end user decarbonisation, limiting consumer readiness for decarbonized energy

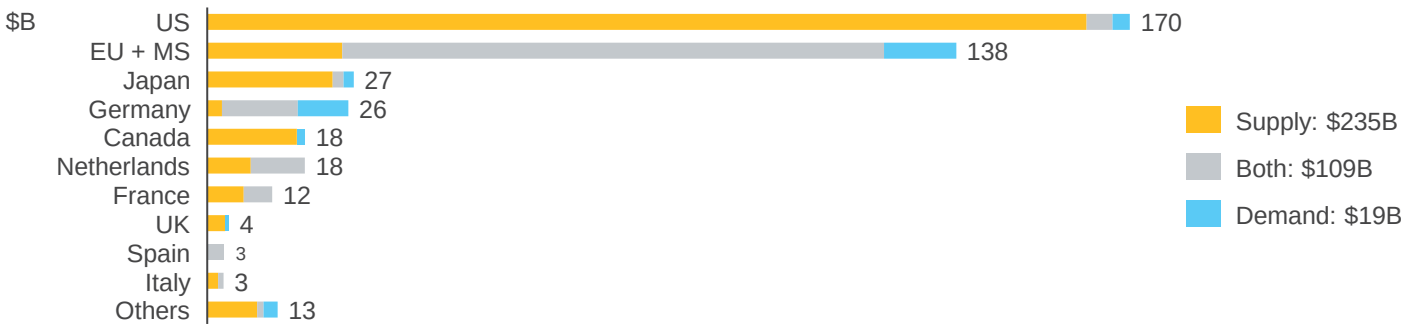
Manifestation of this risk in current energy landscape:

Total UK Govt committed subsidies for decarbonised energy supply vs demand[1]



Government support for hydrogen by market and target area

More than $360B is now available for hydrogen, but very little goes to demand



- **Clear disparity between UK supply and demand side subsidies**.
-
- The imbalance in funding between supply and demand ultimately risks slowing down the pace of decarbonisation across vectors in the UK

- This risk is not only present in the UK, but globally, as seen in the chart in the bottom left..

- A key example is in the growing hydrogen vector, where **only 11% of hydrogen projects globally have a guaranteed consumer**

What stakeholders said

There is a need for UK Govt to take international lessons learned to support demand conversion not just focusing on production

– Investor

UK tends to focus on supply support, and not consider enough for the demand side. However, demand assurance is a key factor to de-risk investment

– Investor

1. Commitment periods may vary; Note: EU + MS = European plus its member states. “Both also includes support for Hydrogen midstream (storage and transport)
Source: BNEF Hydrogen Subsidies Tracker (web | terminal), NESO inputs; BCG analysis

Discussion points for MAC:

- How do the four risk categories match your views on the key challenges associated to a lack of coordination across vectors?
- Do you believe the (example) prioritised risk is a priority?
- Have we adequately explained why the (example) prioritised risk matters and why it is a problem?

Next steps | This case-for-change report is the first step in a multi-phased project towards coordinated, whole energy market design

Whole energy market strategy phasing and key activities:

1

This phase:
Case for change

(Focus of this report)

- **Identify major challenges & risks** across vectors within as-is market design
- **Identify initial opportunities** to improve cross-vector coordination
- **Gather learnings** from other markets with analogous risks & opportunities

After summer publication

2

Next phase:
Opportunity detailing & assessment

- **Identify a broad range of opportunities** for each of the prioritized risks identified in this phase across convergence and coupling solutions
- **Assess and prioritize opportunities** based on their potential to resolve the associated risk
- **Sequence prioritized opportunities** across short-, medium- & long-term horizons based on their deliverability, and identify interdependencies across opportunities

Continued stakeholder engagement, around the case-for-change, next to the risks & opportunities

Flexibility Market Strategy

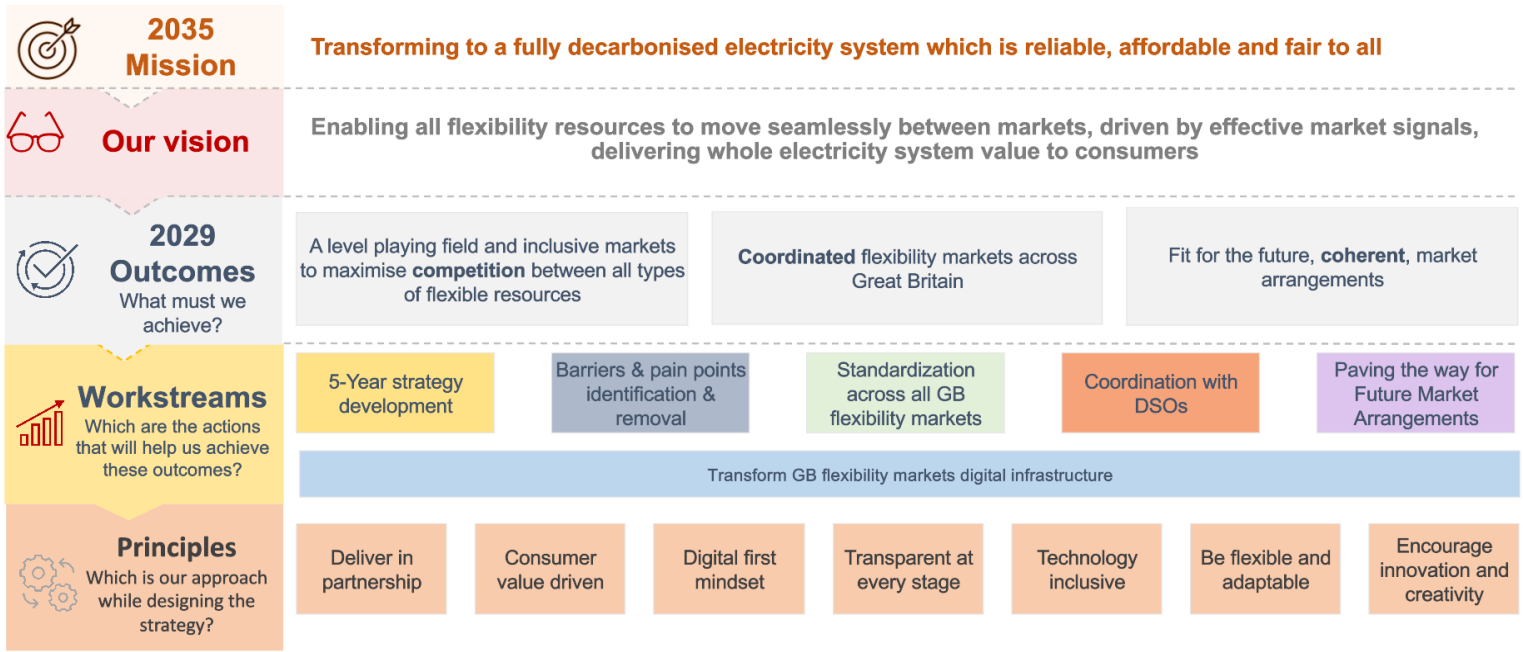
Yingyi Wang (ESO)

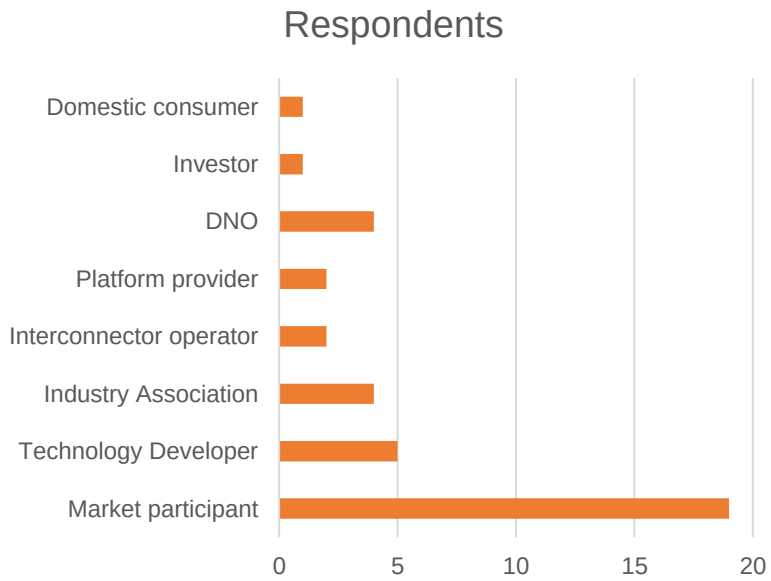
Background to the Call for Input

Flexibility Markets Strategy: to investigate the low-regret actions ESO, and our interdependent GB industry bodies, can take together to sharpen the market signals for flexibility in the medium term.

To ensure we're heading in the right strategic direction and work with industry collaboratively, a Call for Input (CFI) was issued in May 2024.

44 responses received in 4 weeks with a wide spread of stakeholders. On average, the strategy was rated **7 out 10** regards to clarity of our strategy and roadmap explanation.





Call for Input High-level Summary

Full version of *You Said, We did* will be included in the final strategy report

Most respondents support our mission, vision, outcomes and principles.

Topic	You said	We did
Scope	**Scope needs to be extended** as participants want to see a flexibility strategy for **interconnectors, batteries** and **cross-border coordination**.	• We have more clearly communicated the scope for this publication to be consumer flexibility. • We have agreed and communicated to extend the scope in further stages of this publication for interconnectors, long duration storage and batteries.
Coherent	Important to clarify how does flex strategy **align with other strategies**	• A section has been added to explain the alignment of this strategy with other internal and external works, such as Smart Systems and Flexibility Plan, FES, Operability Strategy, etc..
Barriers and pain points Removal	Positive feedback on transparency in Route to Market Review. The **priority and milestones** must be defined to a higher degree of details.	• We are currently going through an internal prioritisation exercise, and before the end of the year we will publish stage 2 report of the RtM Review which will set out the priority. In Q1 of 2025, following further engagement with industry, we will publish further information on our commitments and roadmaps for removing barriers.
Transform Digital Infrastructure	Enhancing Control Room **Data** and **Dispatch transparency** are the top essentials for enabling consumer flexibility	• A new section “Enabler” has been added to the strategy to call out the needs for enhancing capability including forecast and modelling, dispatch automation and dispatch transparency.
Standardization and coordination	The **roles/accountability** of **ESO** and **DSOs** are not clear in coordinating the markets	• We will be supporting the newly elected market facilitator in designing and implementing the governance process for unlocking flexibility and coordination between ESO and the DNOs.
Deliverability	Participants agree with the strategy but **do not trust ESO** can deliver this strategy as ESO has not historically delivered in a timely manner	• We will continue to work with our stakeholders and the wider industry to build transparency over the delivery of the strategy. • The prioritisation of barriers will allow us to deliver the most impactful work first, allowing us to deliver the strategy in a timely manner.

Discussion point for MAC:

Do you agree with our recommended approach for services prioritisation on the next slide?

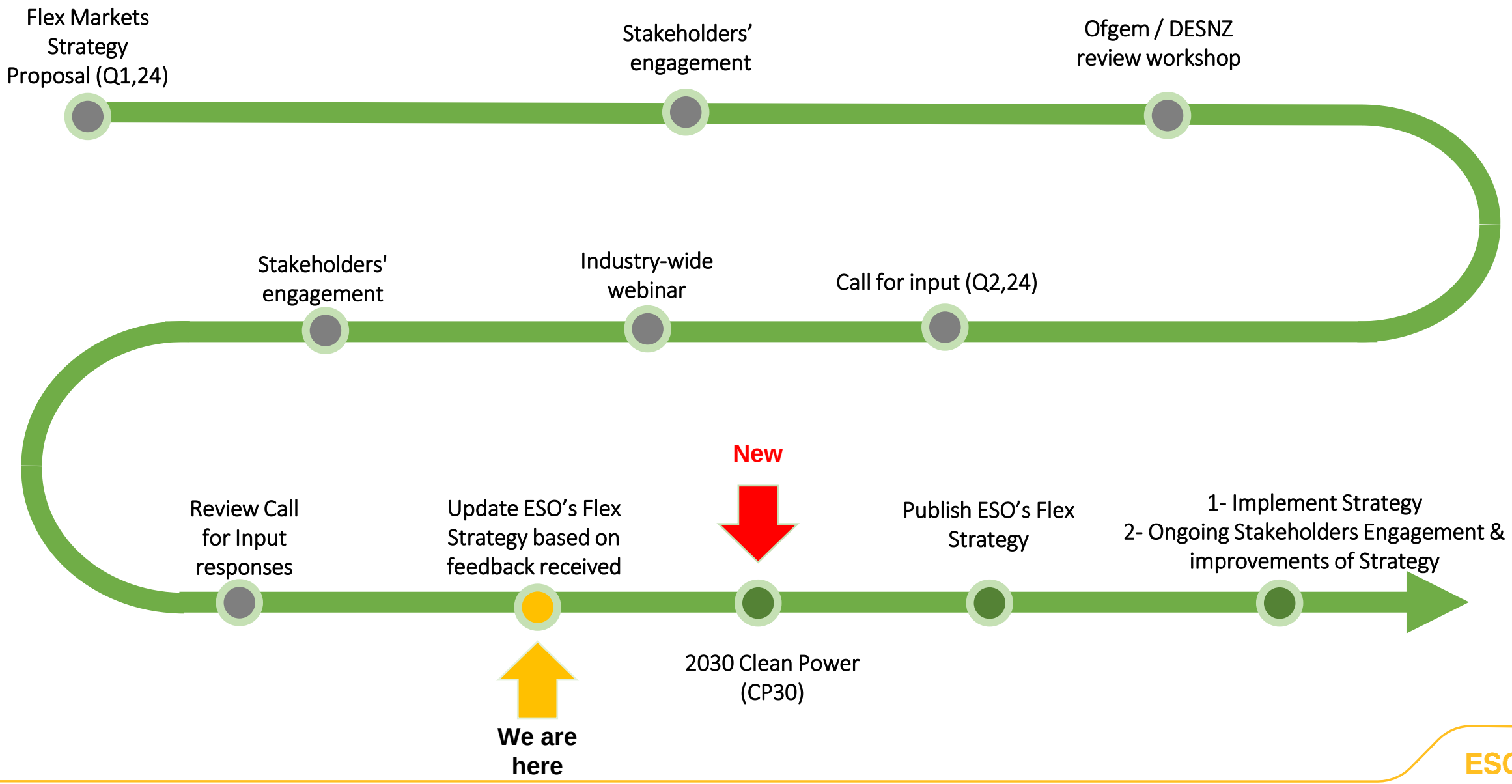
What we could be doing on HHS requirements?

Recommended approach for priority services

We proposed, based on Industry feedback, that we should initially prioritise services deliver the most value to system balancing and where stakeholders believe the majority of “archetypes” can already satisfy service needs and participate with relatively minor changes.

Service Requirements	Service	Consideration
Frequency • **Short response time** • **Fast ramping** • **Short duration** • **Short recovery**	Dynamic Containment	• Relatively low industry priority • Competitive market with steady ESO requirement
	Dynamic Moderation	• Relatively low industry priority • Competitive market with steady ESO requirement
	Dynamic Regulation	• Relatively low industry priority • ESO need is likely increasing in future
	Static FFR/Static Recovery	• High industry interest & good technical fit • ESO planned reform of service
	Quick Reserve	• Technically challenging to meet service requirement • Lowering technical requirements would likely lower ESO need for this service
Frequency + Energy	Slow Reserve	• Very high industry interest & good technical fit • STOR is carbon intensive currently , low carbon flex resources need to be enabled
	Balancing Reserve	• Similar requirements to BM
	Balancing Mechanism	• Very high industry interest subject to operational metering • Carbon intensive currently, low carbon flex resources need to be enabled
Energy • **Long notice period** • **Slow ramping** • **Long duration** • **Long recovery**	DTU for constraints	• High industry interest & good technical fit • Possible lower requirement post 2030 but balancing costs for thermal constraints expected to increase across the coming years
	Demand Flexibility Service	• Service designed to activate demand side flexibility, high industry interest & good technical fit • Growing within day flex volume ahead of MWHHS

Summary of Progress To Date & Next Steps



Clean Power 2030

Matt Magill, Paul Wakeley, Lizzie Blaxland
(ESO)

UK Government aims to achieve clean power by 2030

Chris Stark has been appointed to lead Mission Control in the Department for Energy Security and Net Zero.

Mission Control are overseeing the delivery of a clean power 2030, consistent with long-term net zero, security of supply and affordability objectives.

Mission Control will work with the private sector to ensure the large-scale deployment of onshore wind, solar and offshore wind. They want to invest in carbon capture and storage, hydrogen and other forms of clean generation, and ensure we have the short and long-term energy resilience that the country needs.

The Electricity System Operator has been asked to provide independent advice on the pathway towards the 2030 ambition, with expert analysis of the location and type of new investment and infrastructure needed to deliver it.

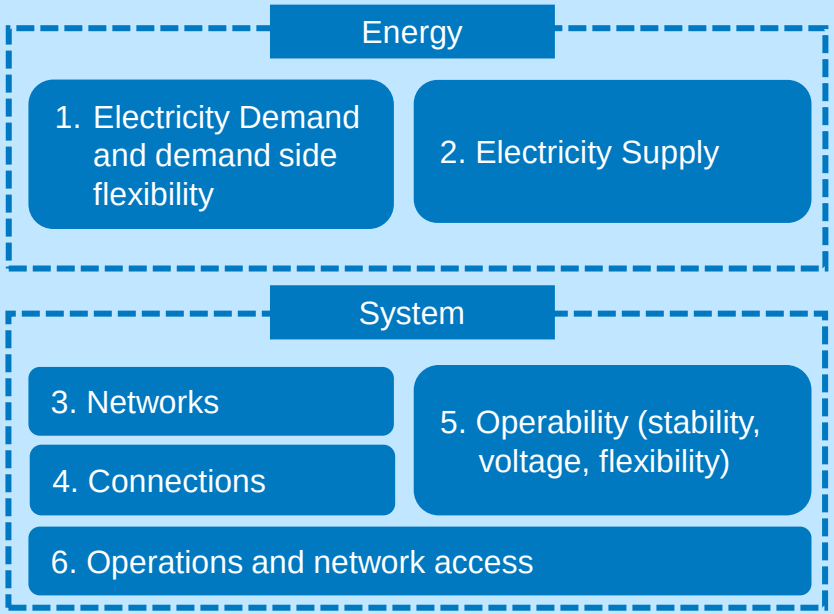
ESO approach to providing clean power advice

ESO

Our approach to the Clean Power 2030 analysis

Building on analysis carried out for our Future Energy Scenarios and Holistic Network Design, alongside additional stakeholder engagement, we have developed three pathways to Clean Power 2030. Our analysis considers where we are now, where we need to be and what needs to happen to get us there.

Our analysis focuses on six key elements of the solution to clean power 2030. All of which must progress together to enable delivery.



Our analysis will consider the actions that government, Ofgem, NESO and industry should take to deliver on the clean power mission across five critical enablers:

Critical considerations such as emissions and environment, consumer and community impacts, energy security, whole energy and beyond 2030 and economic impact cut across the six key elements.

Engagement approach

Strategic stakeholder engagement

1. Strategic bilaterals and grouped discussions

- **ESO is engaging with key market participants and experts via bilaterals and grouped discussions**, enabling market participant to share commercial sensitive information in a private setting
- **70+ strategic bilaterals** have taken place to date
- **4+** Grouped discussions are taking place on thermal, DSR flexibility, Markets (Advisory Council) and batteries throughout October

2. Established Clean Power Stakeholder Forums

- **ESO has convened two stakeholder forums**, an Industry forum and Societal Delivery forum, which are there to discuss emerging analysis, listen to external views and discuss any operational impediments
- Forum engagement has begun with **50+ organisations**
- Trade bodies are being utilised to cascade information down to their members within the industry forums and societal forum have representation from statutory planning consultees including local government, environment bodes, land use representatives and devolved governments

3. Public, open-access sessions

- **ESO will be running open-access webinars** throughout October to discuss the programme outputs. Once NESO, existing channels of communication will be utilised to share information with industry.

Please follow up with ESO from session with any additional views you wish to share at .box.Cleanpower2030@nationalgrideso.com

ESO working definition of clean power

Interim analysis, subject to review and challenge

It is important to set out a challenging yet credible definition of clean power for 2030 in the context of where we are now and what is needed to achieve future emissions reductions targets.

		Clean power as share of GB demand	Clean power as share of GB generation	System carbon intensity (gCO_2/kWh)
Today (2023)	In 2023, gas continued to play an important role providing around a third of the electricity used across Great Britain. We rely on imports of electricity from Europe.	56%	63%	<150 g
Clean Power	GB generates more clean power than aggregate GB demand (because our lower power prices mean we are a net exporter to Europe). Gas, as the only current dispatchable source at the scale required, remains on the system for security of supply, playing significantly reduced role compared to today. This is challenging yet credible ambition.	>100 %	~95%	<50g
Net Zero Power	No unabated gas remains on the system, even as back-up generation, with all power at all times delivered from low carbon sources. System carbon intensity may still be positive (e.g. 10 gCO2/kWh) given residual emissions from CCS, or may be net negative overall given removals from BECCS.	>100 %	100%	<10g

Notes:

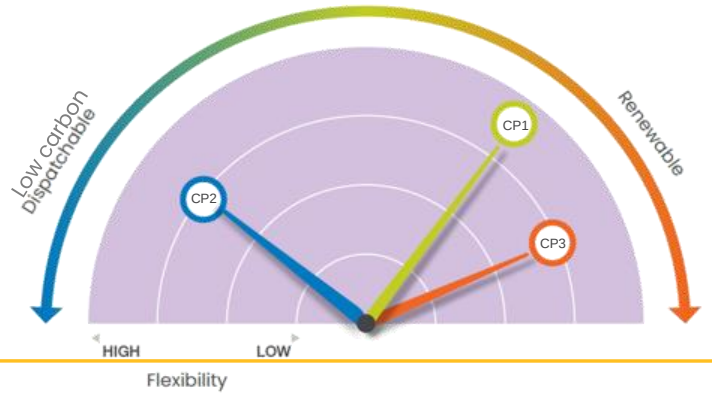
- ESO are defining clean power as power from those sources considered to be low-carbon under UK carbon accounting, including renewables, nuclear, carbon capture and storage.
- Our modelling shows we will become a net exporter of electricity in 2030.

Pathways to clean power

Interim analysis, subject to review and challenge

We have developed **three** scenarios that could provide clean power by 2030. The scenarios explore key uncertainties in supply and demand, including delivery of bulk energy by renewables, deployment of new technologies and flexibility.

Pathway	CP1 [High Flex]	CP2 [High dispatch]	CP3 [High Renewables]
Pathway description	Fast development of renewables alongside the highest level of energy storage capacity and consumer engagement in demand flexibility. Minimal new dispatchable low carbon power.	Growth in renewables but the lowest of all pathways. Highest deployment of low carbon dispatchable power alongside highest nuclear capacity.	Highest level of renewables capacity across all pathways. Growth in flexibility inline with CP2 (High Dispatch) and minimal dispatchable low carbon power inline with CP1 (High Flex).
Demand assumptions	Transport, heat and industry electrification is driven by the requirement to meet overall emission reduction targets in 2030s. Energy efficiency improvements grow. Highest engagement with residential and industrial DSR, other demand flexibility sectors aligned to other pathways.	Transport, heat and industry electrification is driven by the requirement to meet emissions targets in the 2030s. Energy efficiency improvements grow. Growing levels of smart charging and DSR.	Fastest pace of electrification of demand, with sectors decarbonising at a faster pace than in other pathways, to align with highest renewables level. Demand flexibility growth in-line with CP2 (High Dispatch).
Clean Power	96%	95%	96%



What the pathways could mean for Great Britain by 2030?

Interim analysis, subject to review and challenge

Total Volumes GB-wide – interim analysis, subject to review and challenge		
Generation and demand assumptions	2023 (GWs)	2030 (GWs)
Nuclear	6.1	Reduced output, building again in 2030s
Offshore Wind	14.7	~ 3 – 4x current levels
Onshore Wind	14.0	~ 2x current levels
Solar	15.0	~ 3x current levels
Storage (Batteries, pumped hydro, LAES and CAES) *	7.4	~ 4 – 5x current levels
Interconnection	8.4	~ 1.5x current levels
Demand side flexibility	7.4	~ 2x current levels
New low carbon dispatchable generation (gas CCS, hydrogen, BECCS)	0.0	~ 0 – 3 GW
Biomass	4.3	Reduced output, due to conversion to BECCS
Unabated gas	ESO currently investigating the amount of unabated gas required taking into consideration adequacy requirements, starting with an assumption in line with the capacity we expect to be available in the market this winter.	

*still considering the requirements for response and reserve and sensitivities around higher and lower storage capacity coming online for 2030.

Network investment is critical to achieve clean power in 2030

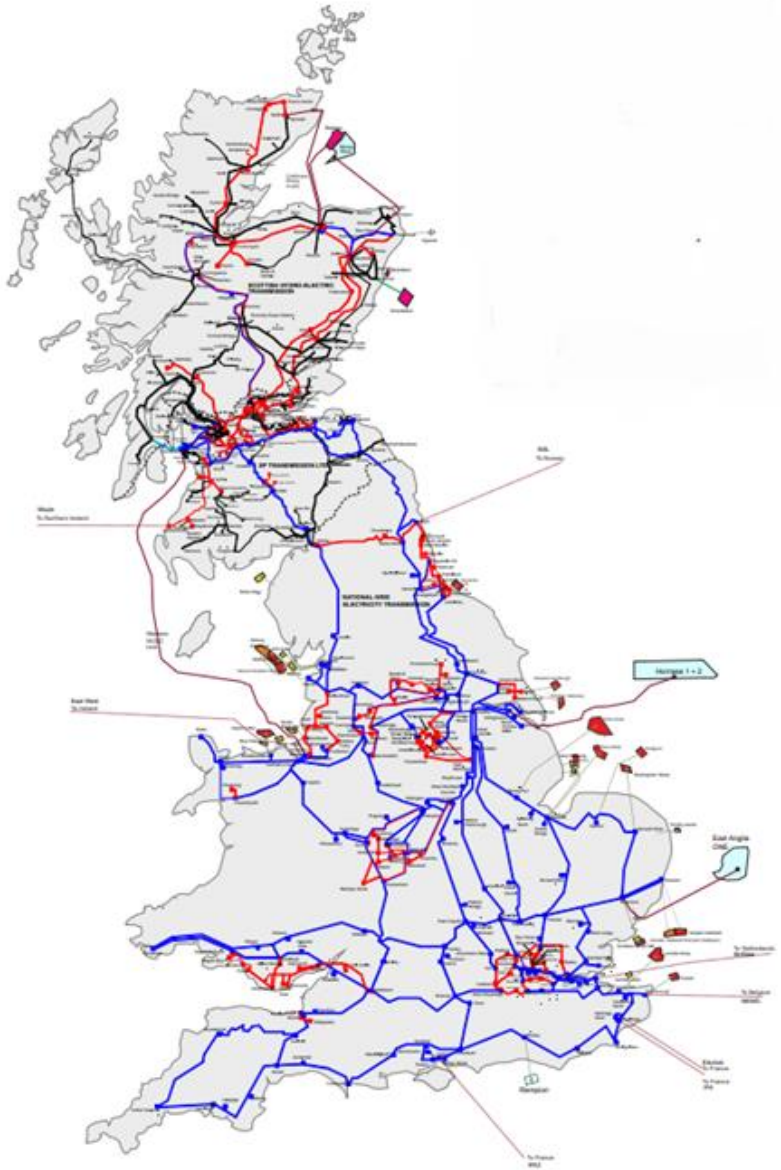
The electricity system we have today is not sufficient to support clean power supply.

Early analysis shows timely development of in-train network projects is critical to delivering Clean Power by 2030.

If built, the expected network could support clean power across all pathways.

Delays to network delivery will significantly undermine delivery of clean power by 2030.

Accelerating the delivery of transmission network due to connect in early 2030s could be better for consumers.

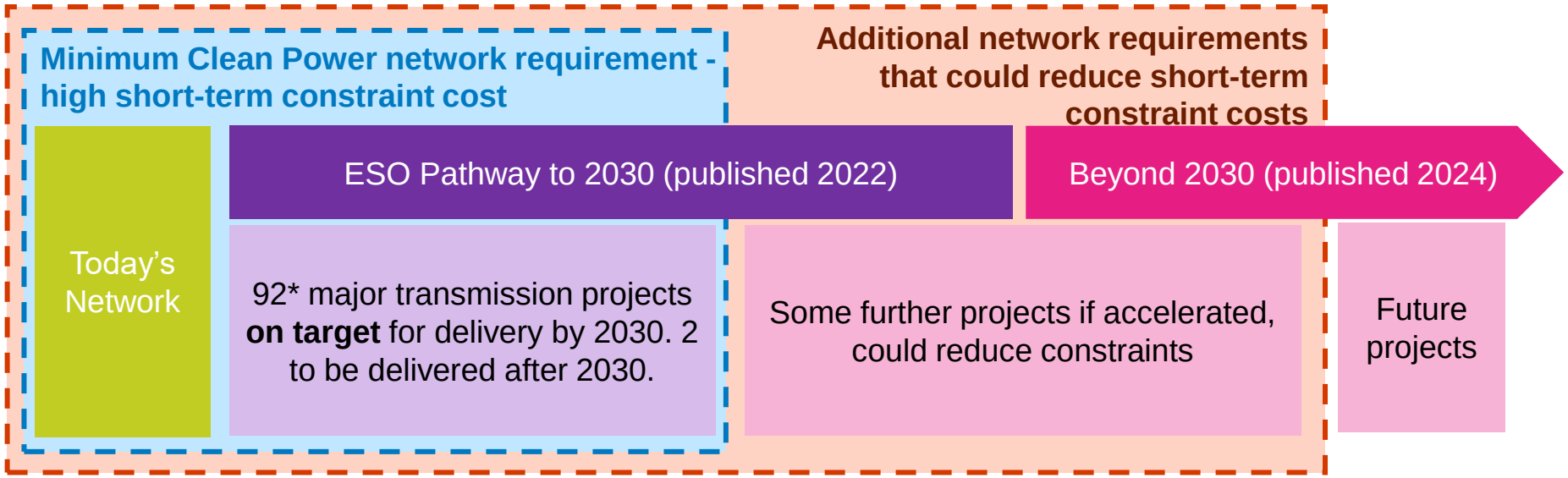


Major transmission network analysis

Interim analysis, subject to review and challenge

We have worked with the Transmission Owners to understand their delivery status for their projects for 2030, and how those in-flight projects could support the delivery of clean power.

A minimum set of major transmission network requirements have been established, accelerating other projects could reduce short-term constraint costs.



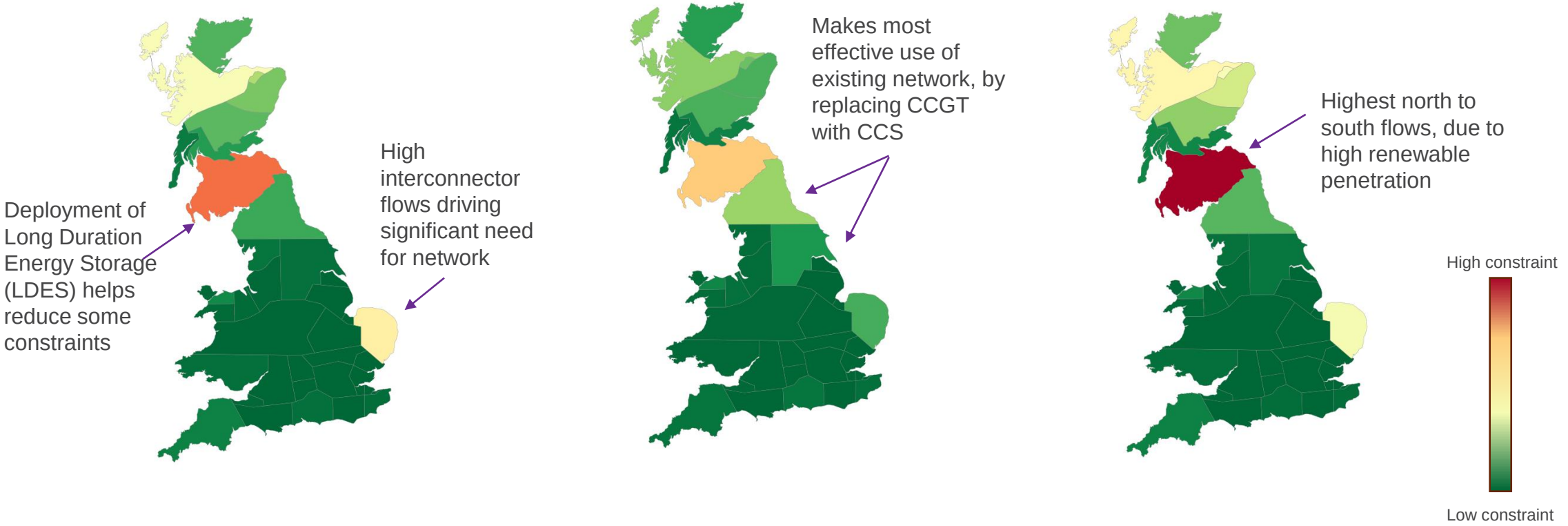
To note: Both the ESO and the network companies are still undertaking connections analysis, and there will be some 'local enabling' transmission works required to connect future generation and demand into the system. All network analysis is subject to final confirmation with Transmission Owners.

To note: this interim analysis is transmission only and does not include any associated infrastructure build required at distribution level. .

How the network performs across the different clean power 2030 pathways

Interim analysis, subject to review and challenge

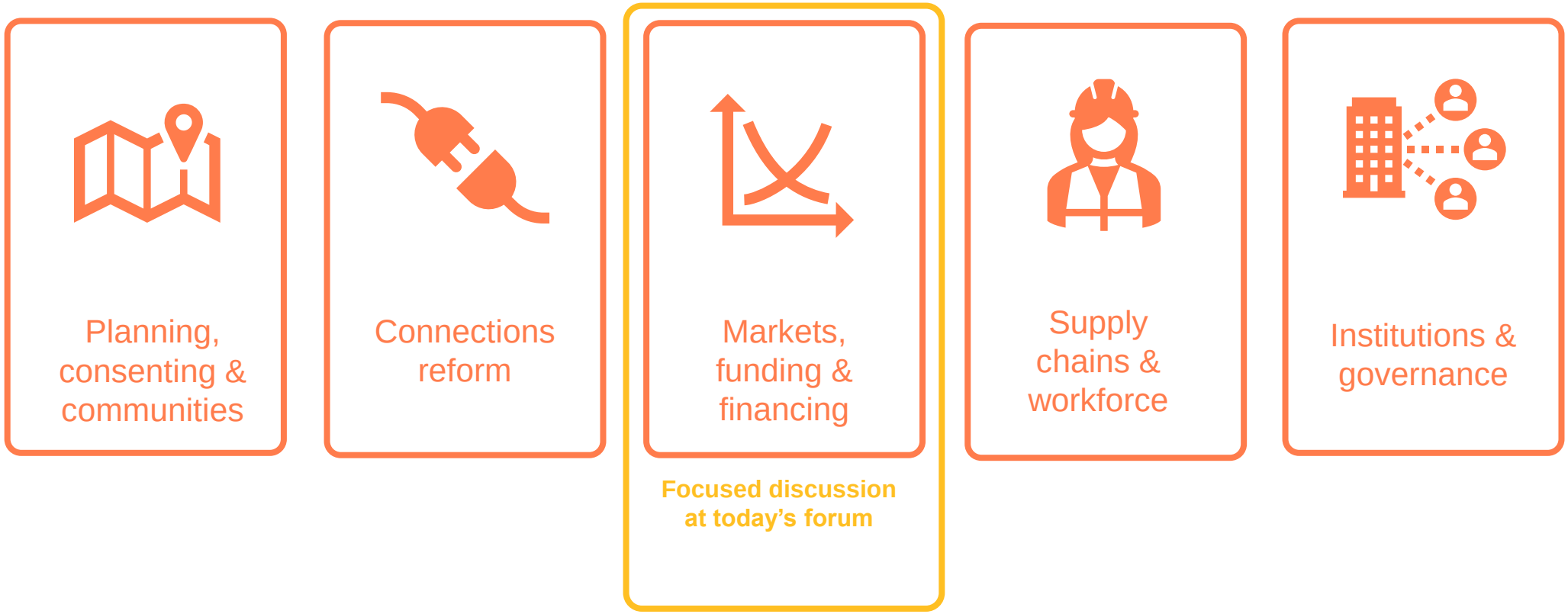
The heat map below shows the constraint performance of the 94 network requirements needed by 2030 in each of the 3 scenarios.



CP1 - High Flexibility	CP2 – High Dispatchable	CP3 – High Renewables

How do we enable the delivery of Clean Power by 2030?

- The Secretary of State and Head of Mission Control asked ESO to consider the actions that government, Ofgem, NESO and industry should take to deliver on the clean power mission.
- The scenarios that ESO/NESO are presenting are technically feasible but will require bold, concerted, rapid and sustained action from government, Ofgem, ESO/NESO and industry to deliver.
- We have identified five cross-cutting enablers where action will be needed:



Markets Advisory Council discussion: Clean Power 2030

We will provide a summary of ESO's overall approach to CP2030 and have included a series of questions below to structure discussion around some themes, including those specific to markets and flexibility. We would like to reiterate this is an evolving piece of work, hence this is a non-exhaustive list of questions and CP30 will also cover broader topics.

ESO's proposed overall approach:

- We would welcome feedback on the four main topics discussed today:
  - ESO's working definition of clean power.
  - The demand and supply mixes that can achieve clean power.
  - Transmission network reinforcements, including trade-offs between the needs of the consumer, the environment and communities, and the clean power system.
  - Policy and enablers.

Markets, Funding & Financing:

- How do we ensure locational and operational signals are sufficient to support the Clean Power mission?
- Do you agree with NESO's approach to designing new operability markets?
- Do you have any views on how investment policies should help drive the delivery of CP30?
- Do you have any views on how we support gas plants to remain viable in a reduced role on a clean power system to support security of supply?
- Do you have any views on how government, NESO and Ofgem can help realise the level of demand side reduction and flexibility required for CP30?
- Are there any other market issues you would like to see NESO cover in our advice to government?

Future of MAC

Rebecca Beresford (ESO)

AOB