# First Feedback Request from Forum Participants – Clean Power 2030 Programme

## Introduction to NESO

The National Energy System Operator (NESO)has just formally transitioned from the Electricity System Operator, NESO is an independent and impartial public body independent of industry and UK Government.

We are responsible for operating the electricity transmission system which spans across England, Scotland, and Wales. We do this by moving electricity around the system, procuring services to balance demand and supply second by second.

As well as operating the system, NESO is responsible for the grid connection process, planning electricity and gas networks in GB, amongst other responsibilities. The NESO also has responsibility for providing expert, impartial advice to UK Government on energy-related policy, with its first task providing advice on how Britain can achieve clean power by 2030.

## Background and context to the clean power 2030 programme

The Government has committed to achieving a net-zero carbon economy by 2050. As part of this broader goal the Government has formally asked the National Energy System Operator (NESO) to develop advice on how to achieve clean power by 2030. The formal commission letter from the Secretary of State can be found here, as well as NESO's open letter to industry on formulating this advice.

The advice NESO will develop will be a practical plan of what is required to deliver a clean, secure, operable power system by 2030. The plan will consider possible clean energy generation mixes and their associated network, market, and operability requirements, referred to as pathways. The advice will also suggest areas where the Government needs to take swift action to support industry to further accelerate GB decarbonisation of the power system in a fair way.

The programme for developing this advice will conclude within the Autumn, with an expected Government action plan being published by the end of the year.

## Approach to analysis and engagement

The NESO have stood up a cross-directorate unit to undertake this advice, building on work already underway across NESO to ensure we can operate a decarbonised power system.

Our analysis so far focuses on six key elements of the solution to clean power 2030. All of which must progress together to enable delivery. Critical considerations such as emissions and environment, consumer and community impacts, energy security, whole energy and beyond 2030 and economic impact cut across the key areas.

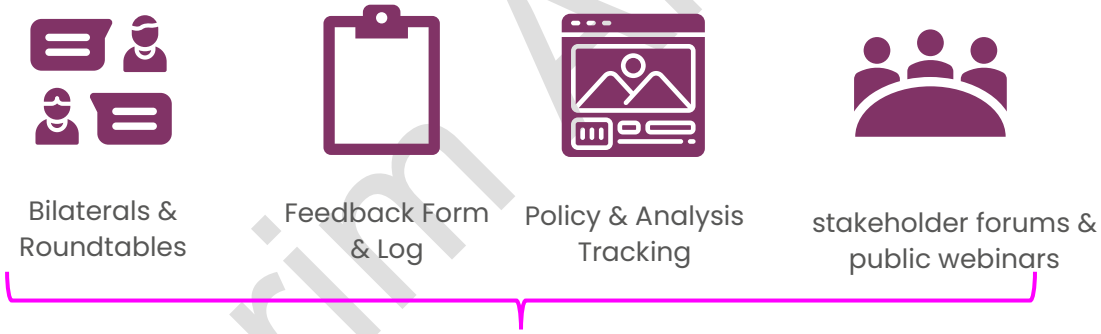
The key strands of our analysis so far include:

- Electricity Demand (decarbonisation, electrification, efficiency, demand side flexibility)
- Electricity Supply (spatial clean power generation mix)
- Networks (planned pipeline of investment against need for 2030)
- Connections
- Operability (stability, voltage, restoration, flexibility for frequency, within-day and adequacy)
- Operations and system access

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 we have so far identified which are:

- Planning, consenting and communities
- Grid connections reform
- Markets, funding and financing
- Supply chains and workforce
- Institutions and governance

NESO are engaging in through multiple channels with stakeholder to gather feedback, these are summarised below:




## Summary of second forum

**Chair and presenters**: Julian Leslie, Hannah Small, Lizzie Blaxland and Luke Nightingale from NESO.
The topics below were discussed at the Networks and Technology Forum:

- Spatial recommendations
- Demand and system level flexibility
- Enablers: Markets, financing and funding
- Enablers Institutions and Governance

The topics below were discussed at the Societal Delivery Forum:

- Spatial recommendations
- Grid connections

- Consumer flexibility and energy efficiency
- Enablers Institutions and Governance

**To note:** NESO addressed different issues at the forums, in order to ensure we were getting expert views across a range of topics.

### Summary of what we've heard in the previous session

**Deliverability –** true scale of challenge and reforms required should be outlined to ensure the plan is credible.

**Low carbon dispatchable –** mixed feedback on the credibility of accelerating greater levels of low carbon power generation than NESO's interim assumptions.

**Describing clean power –** Generally agreement with our approach to describing clean power, although clarification sought on how we are accounting for specific technologies.

**Planning & Communities -** Need to address consenting challenges across the spectrum (councils, statutory consultees, environmental permits, DCO).

**Scale of network required –** Agreement with our analysis that there is an unprecedented scale of network build needed across major and minor network projects.

**Expanding NESO engagement -** Stakeholders welcomed the engagement with trade bodies but asked NESO to ensure engagement was underway with major market participants on specific issues as well.

### Spatial recommendations

NESO outlined how the clean power 2030 pathway could look spatially across Britain. For instance, the heatmap to the right shows the renewable deployment (these include onshore wind, offshore wind, solar, hydro and tidal) within the high flexibility pathway to clean power pathway by 2030.


The darker the colour, the more renewables capacity is expected to connect into or generate within those regions.

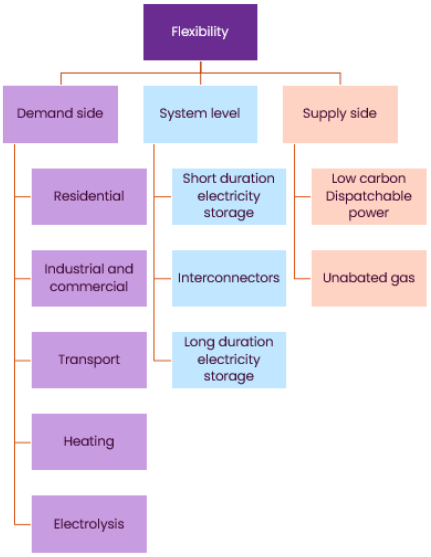
The starting presumptions for these generation assumptions is NESO's annually published Future Energy Scenarios (market intelligence exercise with 3000 participants as well as TEC queue). The generation and demand have then been flexed within our pathways to meet clean power.

Our teams have also conducted constraints interim analysis on how the clean power pathways. Early analysis shows that network constraints remain on the system by 2030 but build out of the required network helps reduce these constraints and unlock renewable and low carbon capacity.

**To note:** NESO are still undertaking analysis, and this analysis may evolve ahead of final submission to Government. This does not directly link to future connections reform, connections reform will be based on Government's clean power action plan.

### Demand and system flexibility

For the purposes of discussion NESO are describing flexibility in three main categories: demand side, system level and supply slide. However, we note that many of these technologies will play multiple roles in the system.




#### Demand-side & consumer

To achieve clean power NESO's starting position is that demand side flexibility needs to roughly double in six years.

How we have categorised demand-side flexibility includes: Storage heating ~4 GW consistently out to 2030, smart charging, Residential appliance DSR, Industrial and commercial DSR, Vehicle-to-grid (V2G), Hybrid heat pump, Thermal storage and district heating.

Taking storage heaters aside, other consumer and demand flexibility, such as smart charging, would need to roughly quadruple in six years.

This expansion happens across different categories but are mostly consumer-driven, where we expect more consumers to have access to smart charging as well as other appliances within the home that can act flexibly.

NESO sees consumer and demand side response playing a much bigger role on GB's energy system – this is not just about "building" infrastructure but engaging consumers and digitisation in different ways.

**To note:** NESO are still undertaking analysis, and this analysis may evolve ahead of final submission to Government.

#### Demand reduction – energy efficiency

Electricity demand today comes from approximately a third residential, a third industrial and third commercial, increasing throughout the morning and peaking in early evening.

Demand will grow as the economy electrifies - most of the electrification is coming after 2030 as we will see transport and heat decarbonised.

The clean power challenge becomes greater without improvements in energy efficiency measures – though before 2030, we expect that these will mostly come from improvements in home appliances efficiencies.

We heard from stakeholders that consumer engagement is will be important, and distributional impacts need to be considered as we move into the 2030s.

**System level flexibility**

**Interconnectors:** Our scenarios include ~1.5 increase in interconnection by 2030, up from 9.8GW today. Interconnectors are particularly valuable for longer-term flexibility needs, for example to cover extended periods of wind drought, to spread demand between weekend and week days, to meet seasonal variations.

**Batteries:** Our scenarios include ~4-5 increase in storage (including LDES) by 2030, up from 7.4 GW today. Batteries are particularly valuable for providing relatively short-term flexibility, cycling regularly to help match supply and demand within day. This reflects their relatively short duration (current projects are typically 2-hour batteries, i.e. when full they can provide power for at most two consecutive hours).

**Long Duration Storage:** Our scenarios include ~4-5 increase in storage (including batteries) by 2030, up from 7.4 GW today. Long duration storage is particularly valuable for longer-term flexibility needs, for example to cover extended periods of wind drought, to spread demand between weekend and week days, to meet seasonal variations.

**To note:** NESO are still undertaking analysis, and this analysis may evolve ahead of final submission to Government.

### Enablers: Markets, financing and funding

Markets, financing and funding are a critical enable to delivering clean power identified by NESO. We heard from stakeholders their thoughts on changes that may be required in the wholesale market and ancillary markets.

### Enablers Institutions and governance

Institutions and Governance are critical enables to delivering clean power identified by NESO. We heard from stakeholders their thoughts on governance, coordination and consolidation of existing policies within energy sector to deliver clean power.

### Ask of the stakeholder forum

We'd like you to provide your expert advice and experience, or that of your members (where applicable), on:

- The four agenda topics for this forum
    - The spatial generation and network recommendations that could be needed to reach clean power, including the opportunities and challenges this may mean regionally.
    - Demand and system level flexibility that could be needed to reach clean power.
    - Markets, finances and funding that could support clean power.
    - Institutions and governance that could support clean power.
- Any other evidence that you consider it important for ESO to consider.