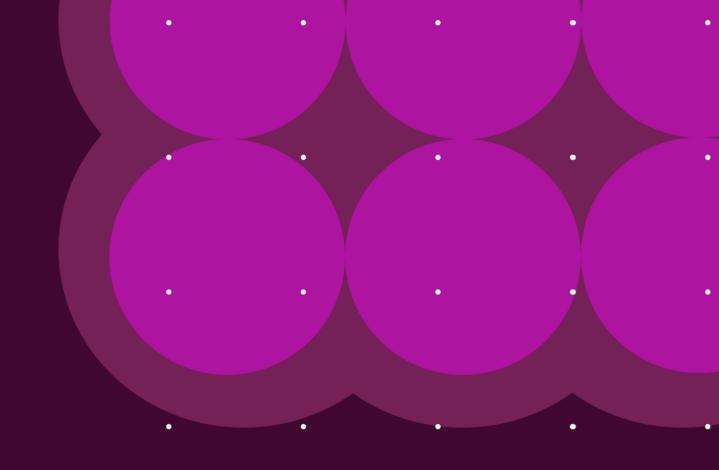
Gas Advisory Council

First meeting

30th January 2025 – London





Agenda

Time	Slot	
9.30-9.45	Opening Remarks	Rebecca Beresford
9.45-10.45	Introductions to members	Vicki Mustard
10.45-11.00	Break	
11.00-11.30	GAC Foundations (Purpose, Vision, and Terms of Reference)	Vicki Mustard
11.30-12.00	WEMS Approach	Suki Ferris
12.00-12.30	Lunch	
12.30-1.30	UK Gas Market Challenges	All
1.30-2.00	GAC Project Brief	All
2.00-2.15	Break	
2.15-4.15	Project Ideation and Prioritisation	All
4.15-4.30	Close and Next Steps	Vicki Mustard

Welcome



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.





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.



We need your expertise

We are working to deliver **competitive**, **coordinated** and **coherent** energy markets that result in the most **cost-efficient energy system** and give us the tools and services to **operate in a low-carbon energy landscape**. To do this, we:

Anticipate the whole energy system's future requirements

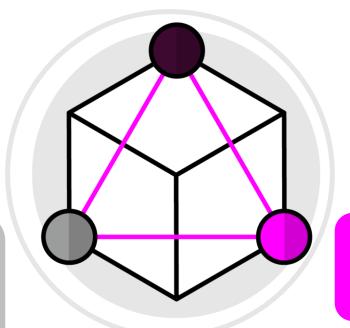
Collaborate internally & externally to implement market, services, and product changes that facilitate the transition to a secure, affordable, low-carbon energy system in line with policy

Ensure industry codes, regulations and frameworks are future-proofed and provide a pathways for customers to drive change



Markets at NESO

We aim to design market arrangements that facilitate security of supply at the lowest sustainable cost for consumers while enabling the transition to net zero.



We are working to deliver competitive, coordinated and coherent energy markets that result in the most costefficient energy system and give us the tools and services to operate in a low-carbon energy landscape.

We drive **reforms across electricity** and gas markets and collaborating across the industry to shape markets of tomorrow.



Interactions between NESO Market Engagement

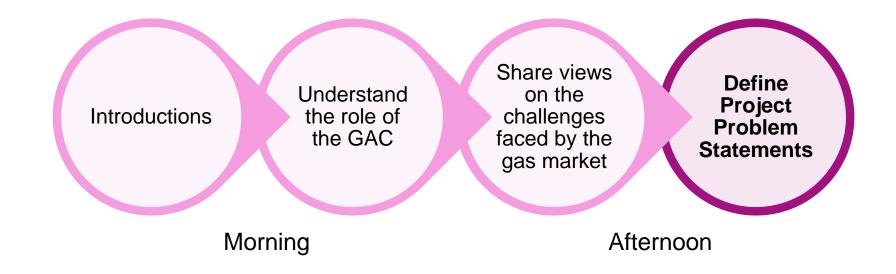
Whole Energy Markets Forum

Gas Advisory Council (GAC)

Markets Advisory Council (MAC)

Previous nomenclature	Markets Forum	Future of Gas Steering Group	Markets Advisory Council
Format	Open events to the energy industry	Invite only	Invite only
Focus area	Cross market forum reflecting the priorities of the energy industry, NESO's role, and NESO's market activities. Understanding stakeholder views on how we are designing and developing markets of today and tomorrow.	Action based advisory council exploring strategic change across different molecules to transition the gas sector.	Council providing advice to NESO on pertinent electricity market topics, such as new policy & market design and growth of flexibility.
Outputs	Information sharing and opportunity for discussions and feedback on NESO's market development and design.	Targeted recommendations in the form of research papers, recommendations for policy/legislation or code changes. Input to the Gas Future Market Plan	Group discussion including suggestions for how NESO can effectively design, prioritise and implement change across electricity markets.

Objective of today's meeting





Introductions

Members of the GAC and the NESO Tech Sec Team



GAC Members Roundtable

Consumers

Industrial Consumers

Domestic Consumers

Generation

Transport and Storage

Storage Providers

Transmission Networks

Distribution Networks

Independent Gas Transporters

Interconnectors

Shippers and Suppliers

Large Shippers / Suppliers

Small – Medium Shippers / Suppliers

Industrial Shippers / Suppliers



Governance and Regulation

Government

Regulator

Code Administration

Billing, Settlement and Market Data

Cross Market

Skills and Jobs

Climate Change

Advisory

Academia

Evolving Markets

Hydrogen Markets

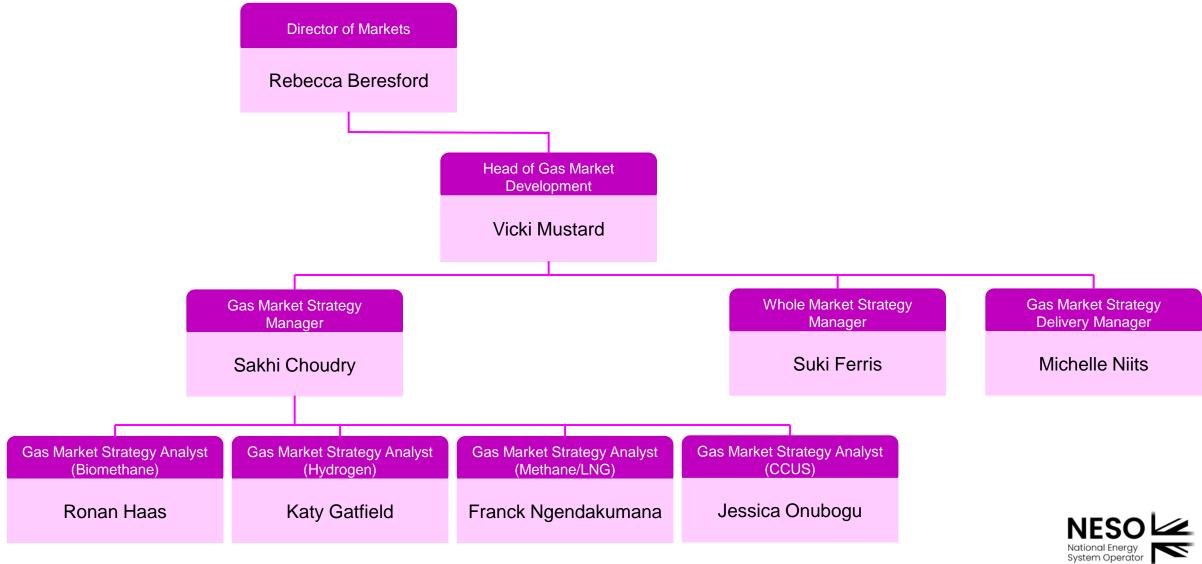
Carbon Capture Utilization and Storage

Biomethane Markets

LNG Markets

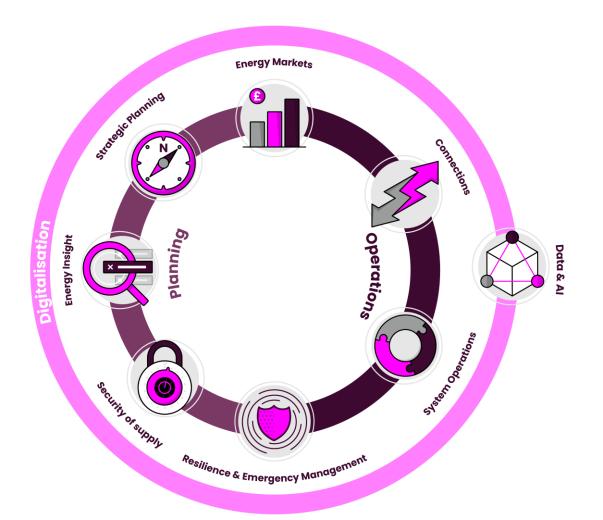


The NESO Gas Market Strategy Team



Collaborative Synergies

The Gas Market Strategy Team is working closely with other NESO Teams to benefit from their insights.



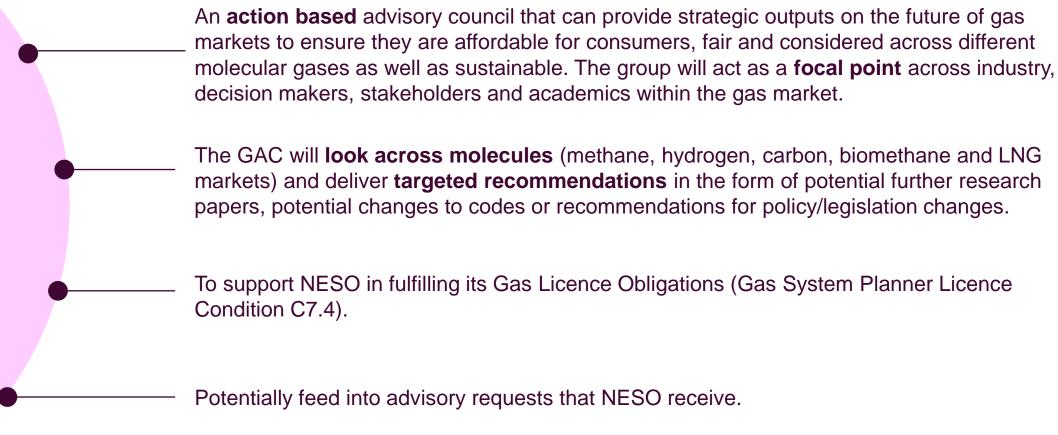


GAC Foundations

Purpose, Vision and Terms of Reference

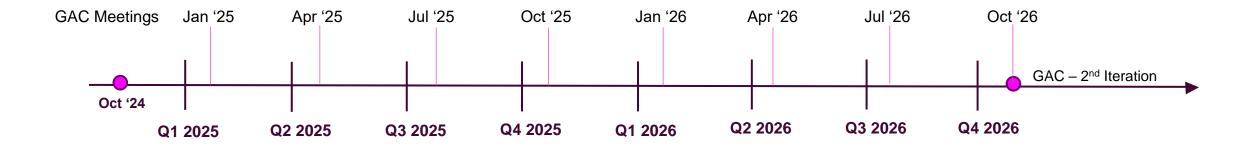


Gas Advisory Council Purpose





GAC Cadence and Look Ahead







Terms of Reference

As circulated in the pre-read material, hard copies are also available. Formal acceptance of the Terms of Reference will hold members to its contents for the 2025-2026 period. The Terms of Reference will be reviewed in October 2026.









Gas Advisory Council

Terms of Reference - January 2025

Introduction and background

The National Energy System Operator (NESO) commenced its role on 1 October 2024. This new publicly owned organisation will strive to ensure a future where everyone has access to reliable, ¿leag and affordable energy. NESO plays the unique role of driving reform across the electricity and gas markets. To optimise and design the energy system of tomorrow, we have embraced a Whole Energy Market (WEM) approach to ensure the development of competitive, efficient markets across multiple energy vector.

Meeting the UK's greenhouse gas emissions reduction targets will require adjustments to the way the gas system is planned, developing and operated. The rise of new vectors, like hydrogen and Co₂, and an increase in cross-vector interactions will help deliver the net zero transition. In the meantime, we need to reduce our dependence on fossil fuels. All in all, the energy system is becoming more complex and integrated, with an accelerated transition driven by decarbonisation needs. Understanding the role of all molecules and their respective markets is therefore crucial to achieve our climate qoals.

As part of the Gas System Planner Licence Conditions, NESO will support the progression and development of emerging energy markets. A Future Market Plan will be produced at least once every 2 Regulatory years; setting out actions, projects and plans to facilitate the transition of the gas market to a decarbonised energy system. In grder (p be assisted in this task, NESO shall engage and consult with Relevant Gas Market

Purpose

NESO is establishing a Gas Advisory Council (GAC) to structure its formal engagement with Relevant Gas Market Participants. This advisory body will act as a focal point for industry, decision makers, consumers, academics and civil society to discuss and explore the role of gas in a decarbonised, efficient and flexible energy system. This will look across molecules, consistent with NESO's WEM strategy.

At a holistic level, the GAC will:

- Embed stakeholder perspectives and national/international best practices in NESO's market design thinking.
- 2. Provide input on NESO priorities and plans for gas, to ensure alignment.
- Support NESO to prepare, develop and deliver gas-related publications with actionable outcomes, including Targeted Recommendation and the Future Market Plan.
- 4. Define GAC priorities for a period covering the next two regulatory years.
- 5. Provide members with an opportunity to collaborate and share relevant information

The group will act as an action-based advisory council. Whilst the group will not have any official decisionmaking powers, NESO considers the GAC to be an important body with a key role in supporting and challenging NESO in the way gas markets are developed.

Objectives

The GAC has two main objectives for the 2025-2026 period.

First, GAC participants will provide resources, fijne, and support to NESO in navigating through the evolving agas landscape (policy, regulation, commercial, social and technological) Working collaboratively, they will identify areas where improvements night be needed and policymaker recommendations developed. This objective should be delivered in line with NESO's primary duties:

- . Net Zero enabling the Government to deliver on its legally binding emissions targets.
- Efficiency & economy promoting efficient, <u>co-ordinated</u> and economical systems for electricity and gas
- Security of Supply ensuring security of supply for current and future customers of electricity and
 gases

Second, the GAC will assist NESO to develop a Future Market Plan by Q4 2026. Additional publications, reports or roadmaps may be identified during the GAC work, and NESO will look to the group to provide feedback challenge and inout as required.

Membership (roles, responsibilities, and appointment)

The GAC will act an independent body, comprising members with a wide range of expertise who collectively represent the views and interests across the gas value chain. All participants are encouraged to participate freely in the discussions. Conflict of interest declarations, when appropriate, will be observed.

The group is proposed to have a simple structure, acting as a board of directors, with a Chair, Technical Secretariat, and Members. In addition, a Lead Sponsor (NESO's Head of Gas Market Development) and an Executive Sponsor (NESO's Director of Markets) will endorse the GAC work.

Chair

Role and responsibilities

The Chair will be impartial to both the GAC members and NESO, and able to act independently without bias or preference to ensure the Advisory Council has meaningful and fair outputs.

The Chair will provide leadership to the GAC including:

- . Ensuring all voices are heard, and that the conversation is collaborative, productive and action based,
- Ensuring that meetings are conducted in an orderly and efficient manner, in accordance with the Terms of Reference, and
- . Coordinating the agenda in collaboration with the Technical Secretariat.

ppointment

The Chair will be appointed for up to two years, in a fair and transparent manner with the recruitment process shared by NESO. Details of the Chair will be shared with the GAC members ahead of the first meeting.



¹ According to the <u>Complete Gas System Planner</u>, Relevant Gas Market Participants means *interested parties that the licensee determines should participate in the forum established under paragraph C7.4 in condition C7 (Arrangements in coordinating market strategy)*.

Whole Energy Markets



Introduction | NESO's strategic remit, following the 2023 Energy Act, includes Whole Energy Market Strategy as part of its advisory role

Remit of the National Energy System Operator (NESO)

2023 Energy Act

- NESO continues to function as the system operator for electricity
- NESO acts as a system planner providing strategic direction for electricity, gas and future systems¹
- NESO serves as an independent advisor, providing analysis and information to Government and Ofgem

NESO's Whole Energy Market Strategy (WEMS)



A whole energy market approach is needed to ensure

- A clean, secure and affordable energy future for Great Britain (GB)
- Development of competitive, efficient markets across multiple energy vectors
- Improved coordination between vectors, by addressing inefficiencies in existing market design



NESO builds upon ongoing work when developing whole energy thinking

Future Energy Scenarios (FES)



Review of Electricity Market Arrangements (REMA)



Clean Power 2030



Strategic Energy Planning



Comprises:
Strategic Spatial Energy
Plan (SSEP)
Regional Energy Strategic
Planner (RESP)
Centralised Strategic
Network Plan (CSNP)

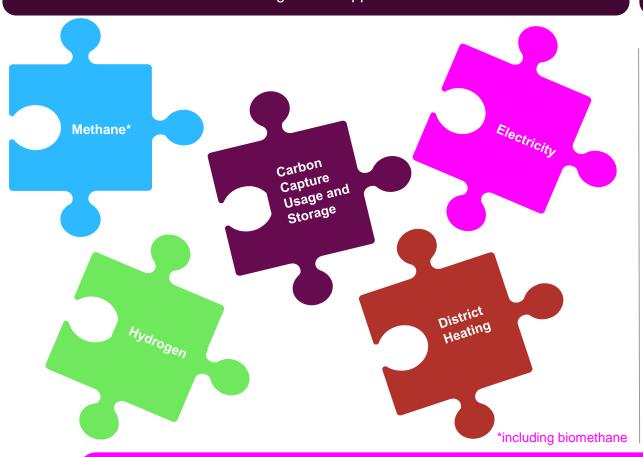


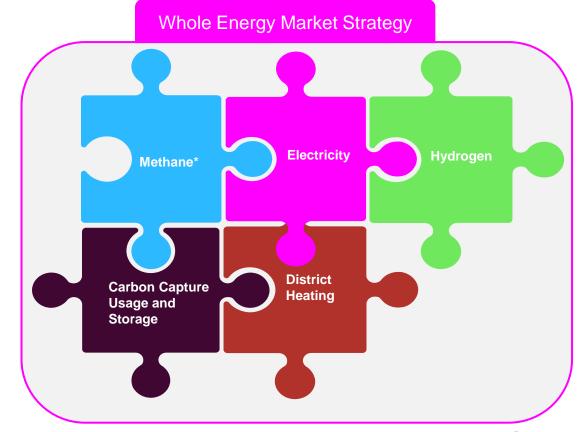
1. e.g., Hydrogen etc.

Purpose | The new role of NESO includes exploring how energy markets can work better together

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

Transitioning to a clean energy system requires an exploration of how markets can work better together to support decarbonisation in an affordable and secure way





For the purpose of this project, our scope includes 5 'vectors', which we define as distinct energy / waste carrying networks including: Electricity, Natural Gas (methane / biomethane), Networked Heat (i.e., district heating), Hydrogen, Networked Carbon (i.e., Carbon Capture Usage and Storage)



We developed an analytical framework to identify & prioritise focus areas that could benefit from greater whole energy market coordination

Market Design Categories: We developed an overview of the components of as-is market design across the 5 vectors in our scope using the below categories:

Economic Regulation

Structure of the energy market across vectors, value chains and market participants

E.g. Licensed activities, Codes, Standards

Investment policy

Market interventions employed to achieve specific policy objectives

E.g. Decarbonisation support mechanisms

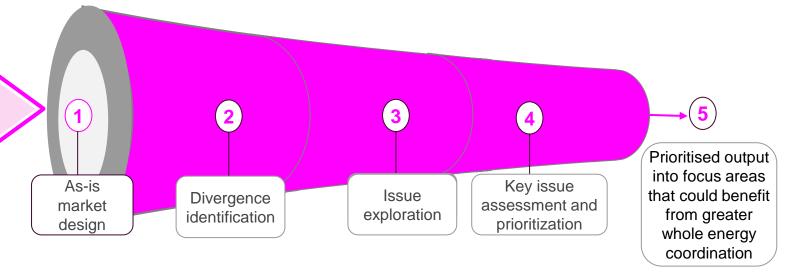
Operational market design

The structure of wholesale and short-term operational energy markets to match physical supply and demand

E.g. Energy balancing mechanism design, ancillary services

Cost allocation

Cost recovery for networks and investment policy E.g. Investment policy cost allocation, network cost allocation



- Market design categories were used to develop comprehensive as-is market representations (across a total of 122 sub-category market design elements for each of the five vectors).
- Comparing the as-is market representations we identified where there are differences (divergences).
- 3 We then explored potential issues as a result of these market design divergences.
- We then considered the urgency and severity of the issues, assessing the urgency through their timescale & irreversibility, and severity through risk materiality & probability.



Focus areas | Based on our analysis and stakeholder insight, four pillars encapsulate the potential for improved coordination across energy markets

Improving carbon signals to support decarbonisation

There is a need for coordination of carbon signals for a fair energy transition, to support consumers in the transition to lower carbon energy alternatives.

Integrating greater strategic planning into holistic market design

There is a need to coordinate greater strategic planning with market signals and investment policy to support the UK's netzero transition.

Unlocking clean heating by minimising cost exposure for consumers

How we heat our homes is one of the biggest challenges we face on the path to net zero. The pace and scale of new heating technology required to decarbonise heat requires co-ordinated market signals to achieve the UK's climate change targets.

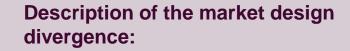
Ensuring energy security in a more complex energy system

GB's energy landscape is increasing in complexity, with emerging new low carbon energy markets and technologies, and a growing role for energy consumers to balance energy supply with demand. This calls for enhanced coordination across markets to secure the overall energy system.



Market design divergence

Investment policy					
Supply adequacy					
Support mechanisms					
Flectricity	YesCapacity Market*				
Natural Gas	No mechanisms exist				
Hydrogen	To be determined				
Networked Heat	No mechanisms exist				
Networked Carbon	 Not applicable, carbon is a waste product 				



Electricity is the only vector that has an investment policy mechanism to provide a long-term incentive to support investment in energy supply assets to contribute to security of supply.

*The Capacity Market was introduced by the UK government and launched in 2014 to manage security of electricity supply by ensuring adequate investment into reliable electricity capacity. The scheme operates by providing Capacity Providers with steady, monthly payment to ensure there is enough capacity to meet demand. The agreement length available is dependent on the type of unit – new build can secure 15-year agreements.



Issues driven by market design divergence:

- Will scarcity pricing be sufficient to ensure SoS across vectors?
- Reduced investor confidence into new assets to contribute to SoS across vectors
- Increased cost exposure to consumers to ensure overall energy security.

Whole energy coordination opportunity:

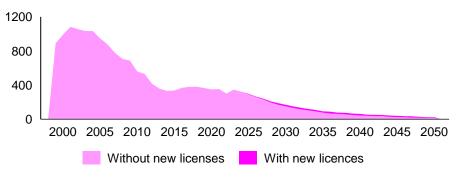
Introduction of incentive mechanisms across vectors to support overall energy system security.



Illustration of case study in current energy landscape:

Natural gas will continue to play a critical role in our energy system for decades to come. To date, the market has and continues to deliver effectively, wholesale prices have provided adequate signals to support SoS. However, the decline of UKCS production could generate the need to consider further measures to ensure security of supply, especially when considering the integrated nature of natural gas into overall energy security.

UK North Sea natural gas production over time



Source: North Sea Transition Authority



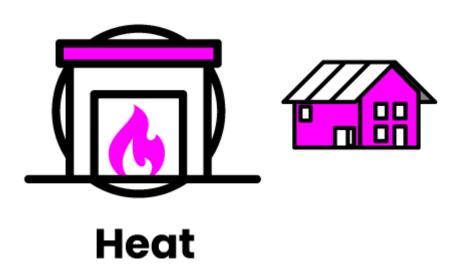
Whole energy illustrative opportunities

- Gas storage diversity
- Evolution of gas fired power plants business case



Illustration of case study in current energy landscape:

District heat provides just over 2% of our heating requirements today, Government targets set to increase this to 20% by 2050. Ofgem has been appointed as the regulator for heat networks, and DESNZ is currently establishing heat network zones across the UK.





Whole energy illustrative opportunities

- Thermal storage (large + small scale) for networked heat / domestic heat for energy security purposes
 - Opportunity to provide flexibility services too.



Case study | Coordination of connections policy across vectors could lead to more efficient outcomes in how low carbon energy is produced and transported

Market design divergence

Market fundamentals				
Level of competition in regulated activity				
Connection process				
Electricity	 Prioritisation based on alignment of projects readiness (project milestones incl. secured consents, land rights and agreed construction plan) as well as alignment with strategic plan (initially CP2030). 			
Natural Gas	First come first served			
Hydrogen	To be confirmed			
Networked Heat	 N/A (as networked heat does not operate at transmission level) 			
Networked Carbon	First come first served			



Issues driven by market design divergence:

Discrepancies in connection processes across vectors could result in inefficient incentives to produce, transport or consume energy in one or more vector(s), where it may have been more efficient to connect to another vector's infrastructure.



Case study | Coordination of connections policy across vectors could lead to more efficient outcomes in how low carbon energy is produced and transported

Illustration of case study in current energy landscape:

The GB electricity connections queue is over 750 Gigawatts (GW), an amount of electricity generation that is over four times more than what is predicted to achieve net zero by 2050 (NESO modelling).

GB Distributed Power Generation connected to Gas Distribution Networks by size of MW output SCOTLAND Connected Accepted Connected Accepted

- Long delays in electricity transmission connections cause parties to seek alternatives.
- Data centre developers may use 'islanded' gas plants to bypass connection delays.
 - Microsoft is to build its own power station as part of a new €900m data centre in Dublin, it has been reported.
 - The gas-fired generator plan is because of worries about future constraints on the national energy grid.
- Offshore wind developers might export energy as hydrogen if connections are delayed.



Whole energy illustrative opportunities

Converged connection process across vectors, could create a level playing field across different connections solutions available

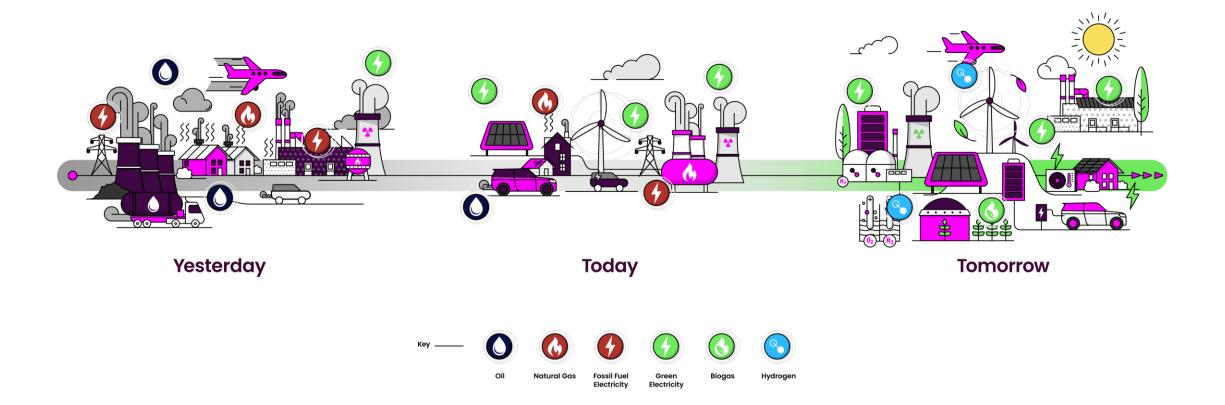




UK Gas Market Challenges



UK Energy Landscape: Navigating the Shift





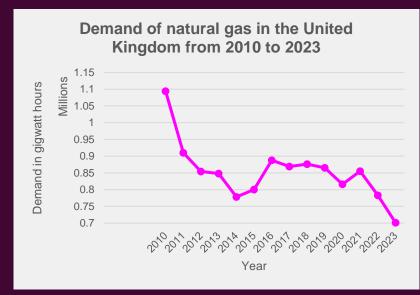
Identification process

We have developed an understanding of the challenges faced by the UK gas market based on:





CH4 Methane



Source: DESNZ

4 Key Challenges identified

1 Ensuring security of supply

Declining production and increasing reliance on imports via interconnectors and LNG, challenges arise in securing diverse and reliable sources of natural gas. This includes mitigating geopolitical risks, market volatility, and ensuring flexibility to balance supply-demand dynamics, especially during peak usage or global energy crises.

2 Decommissioning or repurposing infrastructure

Much of the gas infrastructure is ageing and may become redundant as the country transitions to low-carbon energy. Deciding whether to decommission or repurpose assets (e.g. pipelines for hydrogen) while managing costs, safety and operation challenges is paramount.

3 Decarbonising while ensuring reliability

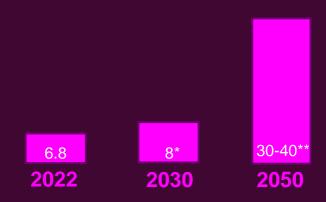
Transitioning the gas network to low-carbon alternatives, such as hydrogen or using carbon capture technologies, without compromising the stability and flexibility of the grid. This is especially critical during high-demand periods when natural gas still plays a dominant role in balancing the electricity system.

4 Developing regulatory frameworks

Existing regulations could be enhanced to increase the incentive of mitigation of methane leakage across the gas supply chain. Enhanced frameworks are required to support robust monitoring, reporting, and verifying methane emissions alongside implementing carbon offset mechanisms.

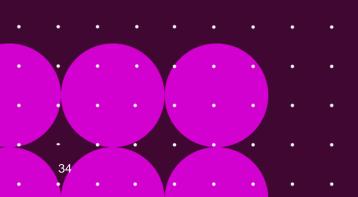


Bio Biomethane



UK Biomethane injected into the grid (TWh)

* DESNZ modelling ** UK TIMES modelling



4 Key Challenges identified

1 Move towards a self-sustaining market

So far, support schemes have been tariff-based in order to support the high operational costs of anaerobic digestion. The current scheme (GGSS) ending in 2028, HMG is consulting on the development of a new market-based mechanism to help the industry becoming self-sustaining.

2 Develop cross-sectoral sustainability criteria

Biomethane production can deliver wider system benefits and deliver genuine GHG savings. The 2023 Biomass Strategy has called for a common GHG emissions calculation methodology for the biomass supply chain, including biomethane (feedstock and digestate management as well as methane emissions)

3 Unlock barriers to grid injection

The volume of biomethane injected to the NTS remains very limited, with planning & consenting issues faced by biomethane plants developers. At distribution level, biomethane often need to be enriched with propane in order to meet the Flow Weighted Average CV required by the Gas Calculation of Thermal Energy Regulations

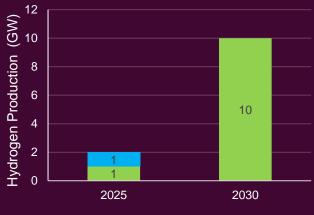
4 Address the ETS pricing

The UK ETS isn't currently used to incentivise biomethane production because if mixed with fossil fuels, its emissions are not differentiated from fossil fuel emissions



H₂ Hydrogen

UK Hydrogen Targets



■Blue Hydrogen Target (GW)

5 Key Challenges identified

1 Cost of Hydrogen

The upfront investment associated with hydrogen projects, as well as the factors affecting the levelized cost of hydrogen, and whether hydrogen can become competitive with natural gas considering the macroeconomic and geopolitical shifts.

Need for Transport and Storage Infrastructure

Developing dedicated transport and storage network to enable the hydrogen value chain to progress to a hydrogen market.

3 Demand Stimulation and Supply Chain Certainty

Complex and uncertain landscape for hydrogen off-takers during the early phases of the market and imbalance between production and demand incentives leading to a volatile supply chain. Some vertical integration of supply chains potentially leading to further stagnation.

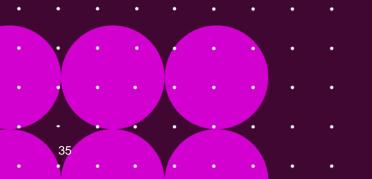
4 Nascent Market Frameworks

Hydrogen markets are in their nascency and require direction on market arrangements, system operation, connections, capacity, balancing and renumeration as the market develops beyond a point-point arrangement.

5 Regulatory and Policy Uncertainty

Decisions needed within the hydrogen policy and regulatory landscape that have broader market impact, including hydrogen for heat, and hydrogen blending.





[■]Low Carbon Hydrogen Target (GW)



Carbon Capture, Utilisation & Storage

4 Clusters by 2030 through Track 1 & 2 Clusters* Storing 20 to 30 Mt of CO₂ per year by 2030*

Storing 50 to 60 Mt of CO₂ per year by 2035* Track 1
Clusters
reached FID
Dec 2024

* UK government CCUS targets

5 Key Challenges identified

1 Lack of incentive to invest

The UK ETS isn't currently high enough to incentivise CCUS investment, currently its somewhat cheaper to continue to emit than to not. Whilst the ETS is estimated to increase over time, delayed investment decisions in carbon capture tech by businesses could lead to delays/missed CO₂ targets in the future.

Lack of demand for low carbon (CCUS) products

Currently, it's challenging for companies to create a business case for investment in CCUS technology. One of the reasons for this is due to the offtake uncertainty. Higher costs often lead to higher priced products, and without guarantees on offtake at these higher prices, especially whilst other lower priced alternatives are available in the market, companies are reluctant to be the first to take the step.

Track system only for selected projects much more needed to reach goals

Only 8 projects (Track-1) have currently been selected and reached FID, quick decisions on projects in Track-2, Track 1 Expansion and beyond will be required to meet government CCS targets.

4 Limited CO₂ transportation options outside clusters

If an emitter is not located within a cluster there are currently no transport and storage options for their emitted CO₂, hence investing in carbon capture technology to capture CO₂ is redundant, as they currently have nowhere to send capture CO₂ to, thus emitters are currently reluctant to invest in carbon capture technology.

5 No Utilisation policy

Industries that currently use fossilized carbon in their processes could benefit from the utilization of captured CO₂, however, there is little policy or market mechanisms to facilitate this or enable a CO₂ market.



GAC Project Ideation

Objective: identify gaps as potential project opportunities for the GAC

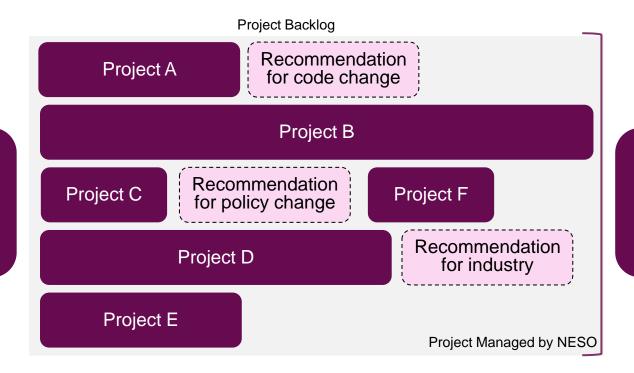


Gas Future Market Plan Projects

Challenges identified in developing the gas markets of tomorrow

Projects identified and scope defined

- ✓ Defined output
- ✓ Manageable scope
- ✓ No duplication or replication with industry groups
- ✓ Aligned with priorities
- ✓ GAC agreement on Project Execution Plan developed by NESO



Future Market Plan



Worked Project Example

Problem Statement

There is a lack of whole energy system coordination to the issuing of warning notices and pre-emergency market incentive tools. Industry behaviour may therefore be unsupportive of the maintenance of whole energy system health.

This workstream seeks to review current gas and electricity market incentives to determine whether any alterations or additions, when enacted, would achieve a better outcomes for a stressed gas network.

Stakeholders/ Dependencies (not exhaustive)

- NESO
- National Gas (GSO/ NEC)
- Gas Task Group (GTG)
- Electricity Task Group (ETG)
- DESNZ/ Ofgem
- Health & Safety Executive (HSE)
- Network Operators

Outcomes/Outputs

Gas and electricity market stress response that is coordinated between system operators and produces market incentives that work together to bring the whole system back to balance.

Discussion:

Possible solutions/deliverables may include:

- Creation of new industry incentives
- Introduction of whole energy system pre-emergency warning notice
- Educational series for industry during a gas supply shortage event



Project Ideation and Prioritization

Objective: identify gaps as potential project opportunities for the GAC, understanding some of the area's in discussion in industry



Working session on GAC Projects







Discussion in smaller groups

Facilitated by NESO









Share back to the group

30 mins



GAC prioritisation exercise

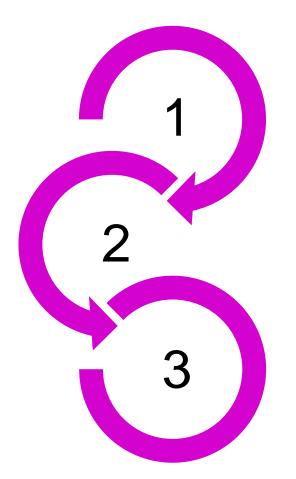
30 mins



Wrap up and close



Next Steps



Confirming and circulating GAC dates for April, July and October 2025.

Feedback and follow ups

Defining project charters and project execution plans





