NESO
National Energy System Operator

Electricity

Market design overview developed by NESO Whole Energy Markets Team

June 2025

Market design guidebook developed by NESO Whole Energy Markets Team

Market design overview:

We have developed market design guidebooks to outline the current market structure and existing policy across each vector. They reflect our deconstruction of holistic market design into its principal component parts, in order to comprehensively represent the status quo design for each vector. This was our first step towards a comparison of holistic market design across the five vectors in our scope to explore opportunities for greater coordination across energy markets. For the avoidance of doubt, the guidebooks' purpose is to depict existing market design and policy, rather than to recommend future changes.

We intend for these vector guidebooks to serve as a point of reference for participants across the energy industry, to share understanding of how markets are structured and outline the latest policy developments as of publication date Q2 2025.

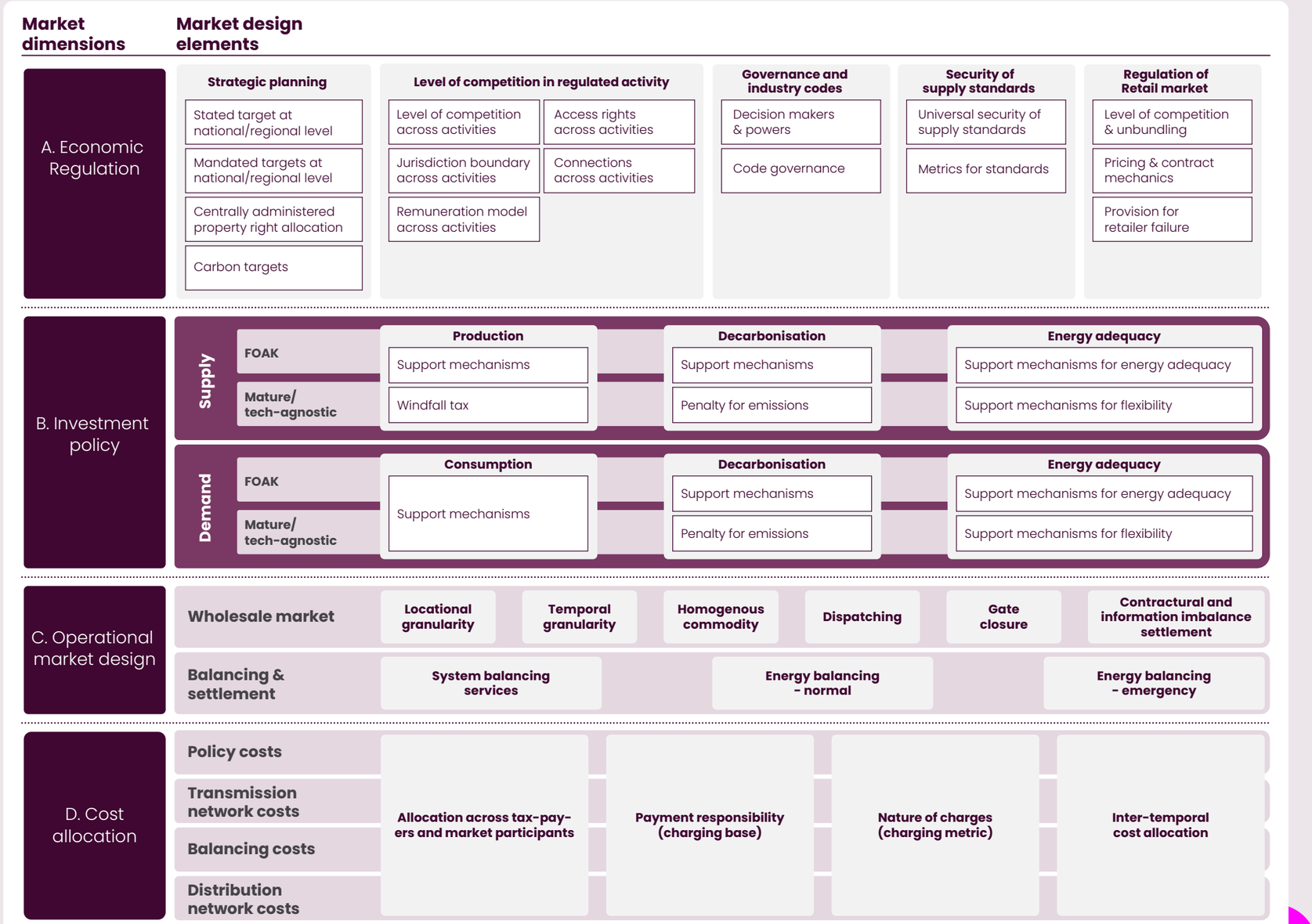
Our Market Design framework is made up of four key dimensions as set out below, and this framework forms the structure of each market design guidebook:

A. Economic Regulation: Structure of the energy market across vectors, value chains and market participants

B. Investment policy: Market interventions employed to achieve specific policy objectives

C. Operational market design: The structure of wholesale and short-term operational energy markets to match physical supply and demand

D. Cost allocation: Cost recovery for networks and investment policy.



Contents

A. Economic Regulation: Structuring of the energy market across vectors, value chains and market participants

Strategic planning:
Level of government intervention in planning of infrastructure, further specified through the existence of regional & national, capacity or production targets, carbon targets, & centrally administered property right allocation.

Brief history of Electricity in GB

Early Development and Nationalisation

- Electricity (Supply) Act of 1926: This act created the Central Electricity Board (CEB) which established Great Britain's first nationwide, synchronised, alternating current (AC) power grid. The CEB built and operated the integrated national grid, which was the first of its kind in the world. It provided 132kV transmission line interconnections between selected stations and undertakings, using a standardised frequency of 50Hz.
- Nationalisation (1947): The Electricity Act of 1947 nationalised the electricity supply industry and established the British Electricity Authority (1948). The BEA was responsible for the generation, distribution and sale of electricity to users. It was decided that the existing 132kV grid was insufficient, and plans were put in place to build a grid operating at 275kV with potential to uprate to 400kV.
- Formation of the Central Electricity Generating Board (1957) and Scottish Electricity Boards (1955): The BEA was replaced initially in 1957 by the Central Electricity Authority (CEA) for England and Wales, alongside the creation in 1955 of the South of Scotland Electricity Board (SSEB), which was an integrated electricity board responsible for generation, distribution and supply of electricity in southern and central Scotland. SSEB was one of two major electricity generation and transmission companies in Scotland, the other being North of Scotland Hydro-Electric Board. Soon afterwards, the Electricity Act 1957 replaced the CEA with the Central Electricity Generating Board (CEGB), which took over the functions of generation and main transmission.
- Between 1958 and 1990, the CEGB owned and operated publicly owned large power stations, investing heavily in growing generating capacity. By the 1970s, total generation of around 200 TWh was served by over 150 power stations with a combined capacity exceeding 50 GW. Coal-powered plant were dominant during this era, alongside substantial additional oil-fired capacity. Hydroelectric plant were the main type of renewable generation.
- Nuclear Power Development (1950s-1960s): In 1953, following the government announcement that the country would begin a civil nuclear power program, the Ministry of Supply commenced construction on the first nuclear power

reactors at Calder Hall on the Windscale site. The next year, the Atomic Energy Authority Act 1954 created the United Kingdom Atomic Energy Authority (UKAEA), which took on the responsibility for the UK's nuclear energy program.

Privatisation and Retail Market Liberalisation

- Privatisation: The Electricity Act of 1989 allowed for the privatisation of the electricity industries in the UK. The Central Electricity Generating Board was eventually split into four separate companies – National Power; PowerGen; Nuclear Electric and the National Grid Company. Regional electricity companies (RECs) were created from the old England & Wales area electricity boards. These were responsible for the distribution and supply of electricity to consumers.
- Following the Utilities Act 2000, the RECs were required to have separate licences for their supply businesses and distribution networks. The latter were renamed distribution network operators (DNOs).
- Retail Market Liberalisation (1990s): The GB electricity retail market was gradually opened up to competition in several phases between 1990 – 1999.
- The Dash for Gas (1990s): The newly privatised generating companies, National Power and PowerGen, shifted towards generation of electricity by natural gas-fired power stations. These were more efficient than coal, harnessing Combined Cycle Gas Turbine (CCGT technology), and quicker to build. CCGTs improved the diversity of fuel sources for thermal generation and took advantage of relatively low prevailing gas prices following gas production expansion in the North Sea.

Development of Market Mechanisms

- **Electricity Pool (1990):** The Electricity Pool of England & Wales ('the Pool') was a mandatory electricity market established under the Pooling and Settlement Agreement (PSA) framework. All generators and suppliers were required to buy and sell from the Pool, meaning that generators and suppliers did not trade with each other, but bought and sold from the Pool run by the System Operator (SO).
  - The Pool was centrally dispatched, with the wholesale price, known as the System Marginal Price (SMP), set by the most expensive generator for each settlement period. The GB pool was a market that cleared one day ahead of real time. All generation units would be ranked relative to the bidding price and then a combination of units would be selected, based on load forecasting information and reserve demands. Costs associated with payment to these generators were equally shared by consumers, which also included capacity payments.
- **New Electricity Trading Arrangements (NETA, 2001):** Increasing scrutiny on the Pool, including on the lack of transparency on dispatch decisions and prices consistently above marginal generation costs, led to the "New Electricity Trading Arrangement" (NETA) reforms being implemented in 2001.
  - NETA introduced a self-dispatch energy-only market (abolishing capacity payments), which replaced the Pool, aiming to encourage competition.
  - The fundamental principle for NETA was bilateral trading. All output of generators was required to be contracted.
  - NETA introduced four electricity market functions: Forward Market, Power Exchange (spot market), Balancing Mechanism, and Imbalance Settlement.
  - Under this model, much of the trading of final positions taking place as bilateral trades done on the day of delivery. Market participants that are out of balance on delivery are expected to incur an imbalance settlement cost that is higher compared to the money they would spend to balance their positions. As such this market design was intended to incentivise market participants to balance their positions more accurately.
- **British Electricity Trading and Transmission Arrangements (BETTA, 2005):** The principles of NETA are still in place today through BETTA. BETTA extended the NETA arrangements to include Scotland, creating a single electricity market in Great Britain.
  - The second principal element of BETTA was the introduction of a single set of arrangements for access to and use of the transmission system in Great Britain. In order to achieve this, a single system operator (GBSO) was appointed. The England and Wales transmission charging methodology (TNUoS) was also extended to include Scotland. A new code, the System Operator/Transmission Owner code (STC), was created to underpin the revised transmission sector structure.
- **The Energy Act 2013:** Introduced a legislative framework for delivering secure, affordable and low carbon energy. One of the aims of the Act was to ensure that, as older power plants are taken offline, the UK remains able to meet its energy demands whilst decarbonising.
  - By the early 2010s concerns were growing that the GB energy-only market design would struggle to signal the right investment signals to enable security of supply during the transition to net zero.
- **Electricity Market Reform (EMR)** legislation brought forward significant changes in the electricity market design and was a response to the simultaneous problems of securing sufficient investment in low carbon alternatives and delivering reliability within the market. The two key policies were:
  - **The Capacity Market (CM)** mechanism aimed to ensure sufficient and reliable capacity by providing payments to encourage investment in new capacity or for existing capacity to remain open.
  - **Contracts for Difference (CfD)** mechanism is a long-term (15 years), private law contract, between the generator and the Low Carbon Contracts Company (LCCC), an entity owned by the government. LCCC agrees to pay the generator the difference between the market price for electricity (the 'reference price') and an agreed 'strike price', determined via an auction process, to bring forward investment in low carbon generating technologies. If the market price is greater than the strike price, the generator pays the difference to the LCCC.
  - EMR also introduced a Carbon Price Floor and an Emissions Performance Standard, intended to rule out any future unabated new-build coal-fired power stations.

Review of Electricity Market Arrangements (REMA):

- REMA: The most recent reform of the electricity market design in GB, launched in the government's British Energy Security Strategy in April 2022.
  - The purpose of the Review of Electricity Market Arrangements is to identify reforms needed to transition to a decarbonised, cost effective and secure electricity system. Despite the extent to which intervention has already taken place in the electricity market, there are issues that persist and objectives that will not be delivered without continued, or further, intervention or regulation of the market by government. NESO is working closely with DESNZ as a strategic partner on REMA.
- The first REMA consultation (July 2022) set out the case for change, and potential solutions across a wide range of reform options.
- The second public consultation (March 2024) narrowed down the number of reform options and sought further stakeholder views on specific proposals and on the short-list of remaining options.
- REMA is considering how to intervene to evolve the system to ensure that it continues to provide the most economically efficient means of producing and delivering electricity to consumers. The government aims to conclude the policy development phase of the programme by mid-2025 and move into full scale implementation from 2025 onwards.

The REMA Options Space

DESNZ, 2024

Challe 1: Passing through the value of a renewables-based system to consumers

Wholesale market features: Unified, Pay-as-clear wholesale market

Challe 2: Investing to create renewables-based system, at pace

Mass Low Carbon: Existing CfD; Deemed CfD; Capacity-based CfD; Reference price reform; Partial CfD

Challe 3: Transitioning away from an unabated gas-based system to a flexible, resilient, decarbonised electricity system

Capacity Adequacy: Bespoke support schemes for FOAK technologies; Optimised CM (Reforms to the CM to maintain security of supply and enable a transition to low carbon); Distributed low carbon flexibility review

Challe 4: Operating and optimising a renewables-based system, cost-effectively

Wholesale Market - Location: National Pricing; Zonal Pricing

Wholesale Market - Balancing: BM Reforms

Wholesale Market - Dispatch: Self Dispatch; Central Dispatch

Wholesale Market - Settlement Period: Current Period (30 mins); Shorter Period

Wholesale Market - Gate Closure: Current Period (1 hour)

Alternatives to Locational Pricing: Network Charging; Network Access; Expanding measures for contraint management; Optimising the use of cross-border interconnectors; Locational CfD*

Operability: Range of measures to be taken forward with NESO

Key
- Current arrangements continue
- REMA options - under consideration
- * Not fully discounted, but not being considered as stand-alone option
- Measures being progressed outside REMA

Government national stated production targets by technology

The government has set a Clean Power by 2030 target.

- Clean Power means that by 2030, Great Britain will generate enough clean power to meet our total annual electricity demand, backed up by unabated gas supply to be used only when essential. In a typical weather year, the 2030 power system will see clean sources produce at least as much power as Great Britain consumes in total over the whole year, and at least 95% of Great Britain's generation.

The government has accepted independent advice from NESO, provided in November 2024, on the energy infrastructure required to deliver Clean Power 2030.

- NESO's work identified two primary clean power pathways:
- New Dispatch: Growth in renewables but at a lower level compared to Further Flex and Renewables. Deployment of new low carbon dispatchable power (CCS and hydrogen) alongside highest nuclear capacity.
- Further Flex and Renewables: Highest levels of societal engagement, with higher residential and industrial demand flexibility and more storage. Fast deployment of renewables (50 GW offshore wind), but no new dispatchable power.

Installed GB-level capacity in 2030 in the NESO 'Further Flex and Renewables' and 'New Dispatch' Scenarios, and the DESNZ 'Clean Power Capacity Range', compared to installed capacity in 2024 (GW)

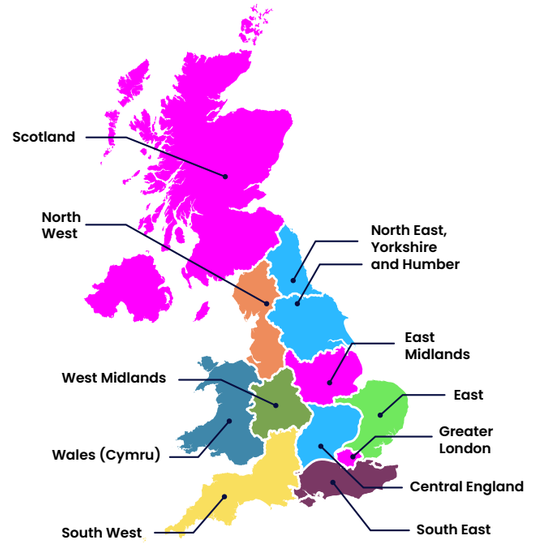
UK Government, 2024

Technology	Current Installed capacity (2024)	NESO 'Further Flex and Renewables' Scenario	NESO 'New Dispatch' Scenario	DESNZ 2030 'Clean Power Capacity Range'
Variable				
Offshore wind	14.8	51	43	43-50
Onshore wind	14.2	27	27	27-29
Solar	16.6	47	47	45-47
Firm				
Nuclear	5.9	4	4	3-4
Dispatchable				
Low Carbon Dispatchable Power	4.3	4	7	2-7
Unbataed gas	35.6	35	35	35
Fixable				
LDES	2.9	8	5	4-6
Batteries	4.55	27	23	23-27
Interconnectors	9.8	12	12	12-14
Consumer-led flexibility	2.55	12	10	10-12

Government regional stated production targets by technology

- The government's Clean Power 2030 Action Plan includes regional breakdowns for capacity which should be prioritised for solar, batteries and onshore wind. Subject to the final agreed approach to connections reform, government expects NESO will use the top-end of the government's 2030 pathway (i.e. DESNZ 'Clean Power Capacity Range'), to underpin connection offers for projects in and before 2030. This approach does not imply government commitment to further fiscal measures, levy support, or policy mechanisms to help meet the level of deployment in the 2035 ranges. Such measures will be subject to separate decisions. Please note, government will introduce legislation, when parliamentary time allows, to ensure connection reform aligns with strategic energy and network plans and supports delivery of clean power by 2030.
- In October 2024, the UK, Scottish and Welsh governments officially commissioned NESO to produce the Strategic Spatial Energy Plan (SSEP). The first SSEP will be a GB-wide plan mapping potential zonal locations, quantities and types of electricity and hydrogen generation and storage infrastructure, to help accelerate and optimise the transition to clean, affordable and secure energy across GB. It will enable specific network solutions to be developed and agreed through the Centralised Strategic Network Plan (CSNP) and provide a consistent strategic approach to spatial planning and become part of the framework of planning systems across England, Scotland and Wales.
- Following its review of local governance and institutional arrangements, Ofgem confirmed its decision to introduce Regional Energy Strategic Plans (RESPs) in 2023. In 2025, NESO became responsible for producing Regional Energy Strategic Plans (RESPs) for England, Scotland and Wales by the end of 2027. The plans will help ensure that local areas get the energy infrastructure they need to meet local net zero and growth ambitions. The RESPs will form part of NESO's wider strategic energy planning activities, ensuring a joined-up approach between national, regional and local levels. The RESP role has been set up to develop regional plans that span across all energy vectors – electricity, gas, heat networks, and hydrogen networks – as part of one integrated energy system. These different energy systems are currently planned separately. By moving to a joined-up whole-system approach, this will ensure investment is targeted where it's needed, and that progress towards net zero can be accelerated.

NESO will be producing RESPs for the nations and regions defined by Ofgem, set out in Ofgem's RESP Framework Policy decision, April 2025



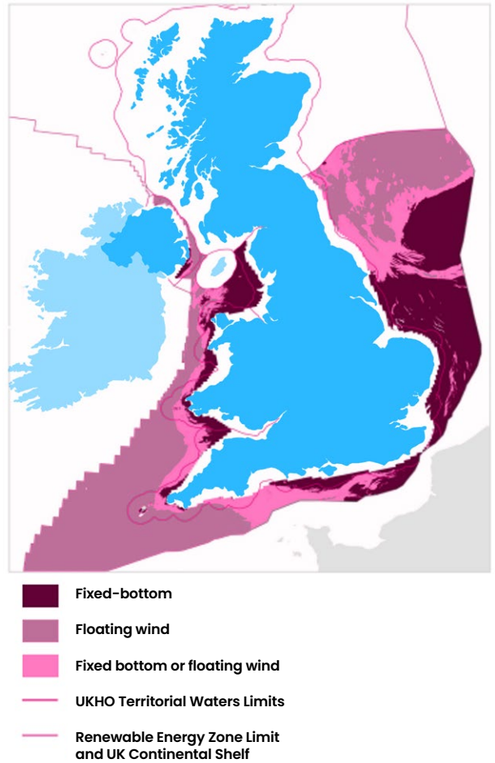
Centrally administered property right allocation

Centrally administered property rights exist through allocation by the Crown Estate and the Scottish Crown Estate for specific technologies:

- The Crown Estate manages land and assets on behalf of the Crown, including extensive seabed and coastline crucial for offshore renewable projects. Managed independently by the Crown Estate Commissioners, the estate operates under the Crown Estate Act 1961.
    - The Crown Estate role includes identifying and leasing suitable seabed sites for development, awarding rights for extensions to existing projects, facilitating test and demonstration opportunities, as well as working with partners to build evidence, share data and support innovation to enable the responsible and coordinated growth of the offshore wind sector.
- The Scottish Crown Estate, established in 2017 following the Scottish Crown Estate Act, and manages land and property in Scotland, including seabed rights crucial for offshore renewable projects.
    - The Scottish Crown Estate issue leases, licences and consents for offshore energy.

Key Resource Area for floating offshore wind and fixed foundation offshore wind

Crown Estate, 2023



Carbon targets

Carbon targets exist explicitly to decarbonise the electricity system specifically, and indirectly through the 2008 Climate Change Act:

- The 2008 Climate Act committed the UK to reducing its greenhouse gas emissions by 80% by 2050 compared to 1990 levels, formed the Committee on Climate Change, and established UK carbon budgets. In June 2019, this was strengthened, committing the UK to bring all greenhouse gas emissions to net zero by 2050.
- The previous UK government unveiled plans to decarbonise the GB power system by 2035. This target has been brought forward to 2030 by the current government via its Clean Power 2030 target.

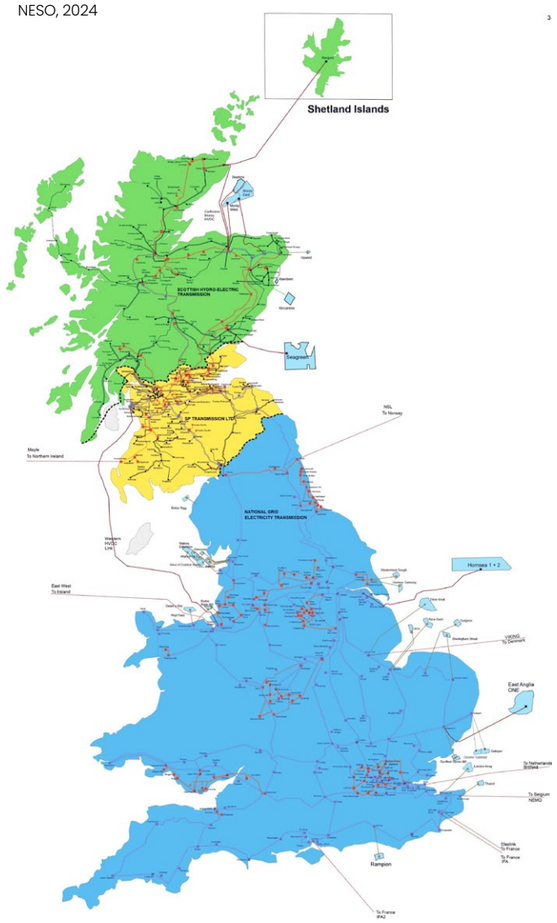
Level of competition in regulated market

Regulated level of competition & unbundling for activities such as transmission, distribution, interconnections, terminals, permanent storage (sequestration), system operations

Transmission Network Ownership and System Operation

The National Electricity Transmission System (NETS)

NESO, 2024



- Scottish and Southern Electricity Networks (SSEN)
- Scottish Power Transmission (SPT)
- National Grid Electricity Transmission (NGET)

Level of competition and jurisdiction boundary

Electricity transmission ownership is a monopoly activity, Great Britain has three onshore Transmission Owners that separately own the network:

- National Grid Electricity Transmission (NGET): Owns and operates electricity transmission network in England and Wales. Manages voltage levels of 275 kV and 400 kV.
- Scottish and Southern Electricity Networks (SSEN) Transmission: Owns and operates the high voltage electricity transmission network in Northern Scotland. Manages voltage levels of 132 kV, 275 kV, and 400 kV
- Scottish Power Transmission (SPT): Owns and operates the high voltage electricity transmission network in Central and Southern Scotland. Manages voltage levels of 132 kV, 275 kV, and 400 kV

However, some competitive elements for the development of transmission infrastructure exists through OFTO, CATO and ASTI:

- **Offshore Transmission Owner (OFTO):** Since its launch in 2009, Ofgem have been responsible for managing the competitive tender process through which offshore transmission assets are sold and licences are granted. The assets and licences are for the transmission of electricity generated by an offshore windfarm to bring it onto the onshore grid. A competitive process ensures that generators are partnered with transmission owners that are the most efficient and competitive players in the market.

- **Accelerated Strategic Transmission Investment (ASTI):** Introduced in 2023, the ASTI framework should be seen as part of a departure from traditional incremental network build towards a more co-ordinated, top down network planning approach. The ASTI framework will fund the large strategic onshore transmission projects required to deliver the Government's 2030 ambitions. The ASTI framework will initially apply to around £20bn of onshore transmission network investment with potential for further investment in the future.
- **Competitively Appointed Transmission Owners (CATO):** Published March 2025, the Grid Code GC0159 modification aims to introduce the concept of CATOs to the Grid Code to enable Onshore Network Competition for the design, build and ownership of onshore electricity transmission assets.

Remuneration model

The remuneration model for onshore transmission network owners is regulated through the Revenue = Incentives + Innovation + Outputs (RIIO) framework, which determines allowed revenue based on delivering services and a return of investment:

- Incentives: Incentives are designed to encourage network companies to exceed performance targets and deliver services efficiently. They can earn additional revenue for outperforming targets or face penalties for underperformance
- Innovation: The RIIO framework includes mechanisms such as the Network Innovation Allowance and the Strategic Innovation Fund to support and encourage innovation in the energy networks. These funds are intended to drive forward new technologies and approaches that can improve network performance and efficiency.
- Output: Measurable outputs companies must deliver.

The RIIO framework was developed by Ofgem for GB gas and electricity network companies. Electricity transmission networks are currently in the second phase of the RIIO framework (RIIO-2) which covers the 2021-2026 period.

Access rights

The vast majority of access rights to GB electricity transmission networks are commercially firm access rights.

- Access rights are set out in a bilateral contract between generators and NESO, this includes for generators that are party to either a Bilateral Connection Agreement (BCA), Bilateral Embedded Generation Agreement (BEGA) or Bilateral Embedded Licence exemptible Large power station Agreement (BELLA). Access rights consists of the following elements:
  - Transmission Entry Capacity (TEC): The maximum capacity in MW that a generator is permitted to export into the National Electricity Transmission System (NETS).
  - Connection Entry Capacity (CEC): The CEC is the maximum potential output onto the system based on the capability of the plant equipment, which can be higher than the Transmission Entry Capacity (TEC). It is often set higher than TEC to allow for changes over the years, without needing a change to the infrastructure or system, which leads to higher costs

As part of NESO's ongoing commitment to improve the connections process, in 2023 NESO launched an 'Expressions of Interest for Non-Firm access'. This aimed to offer potential non-firm connections ahead of works for energy storage projects and aimed at transmission projects and certain large embedded projects.

- The Five-Point Plan was launched in addition to connection reform activities to help address many of the key issues that are driving the long lead-times for new connectees at both transmission and distribution. One of the key deliverables as part of NESO's Five-Point Plan was to accelerate connections for energy storage projects.
- NESO is accelerating the connection of energy storage projects by removing the requirement for non-critical enabling works (i.e. transmission reinforcement works which, if not delivered, can still allow the customer to make use of the system and enable network control to operate the system in a safe manner) to be complete before they connect under a non-firm connection arrangement. These connections will be uncompensated in the event of curtailment.

Connections

The NESO Connections team is responsible for leading and facilitating the process by which customers connect to and make use of the transmission system.

Under the previous "first come, first served" approach to connections, projects looking to join the queue were receiving offer dates in the late 2030s and beyond. The connections queue contained over 750 GW of projects, over double what is needed to meet NESO's 2050 forecasts.

After extensive industry engagement, in November 2024, to ensure alignment with CP30, NESO put forward for consultation a new, agile, future-proof process for connection and access to the transmission system. The scope of the connections reform proposals includes all projects connecting at transmission level, and any generation projects connecting to the distribution networks that impact upon the transmission system.

NESO's proposals include that the reformed connections process and entry to the reformed connections queue should be based on a combination of project 'readiness' and 'strategic alignment':

- 'Readiness' relates to projects demonstrating that they have secured relevant land rights or planning;
- 'Strategic alignment' relates primarily to projects aligning with the pathways initially within Government's Clean Power by 2030 Plan (by technology, capacity and location, at transmission and distribution, but also includes a route into the new queue for projects that were not known at the time of the CP30 Plan or that are otherwise outside the scope of the CP30 Plan), and then aligning with the first Strategic Spatial Energy Plan.

Following consultation on the reform proposals, NESO submitted the accompanying methodologies (Gate 2 Criteria, Project Designation and Connections Network Design) to Ofgem for approval. In addition, NESO submitted formal code processes (the Final Modification report for CUSC CMP 434 and CMP 435, and STC CM095) seeking to introduce a new 'gated' connections process. A core feature of the gated connections process includes the opening of the connection application window twice a year.

OFGEM approved NESO's proposed connections reforms, known as the TM04+ reform package, in April 2025. NESO will indicate to projects whether they have been successful in securing a place in the reformed queue from September 2025. NESO and network companies expect to start issuing revised offers from Autumn 2025, with an initial focus on those that are connecting in 2026 and 2027. Looking beyond the current connection queue to future generation, storage and demand growth, NESO will work to open the next window for new applications, aiming for this to be before the end of 2025.

System operations at transmission level

System operation is a national monopoly activity, managed by a single GB electricity system operator, NESO:

- NESO is a publicly owned organisation with its own board and independent directors, set up to have operational independence from government, the regulator, and all industry interests. NESO will operate a not-for-profit model, licensed and regulated by the Office of Gas and Electricity Markets (Ofgem) and funded through consumer energy bills.
- NESO is also required under its licence to comply with the Grid Code, which is the technical code for connection and development of the NETS. This sets out the detailed operating procedures and principles that govern the relationship and interactions between the NESO and users of the NETS, such as generators and other users. Under these requirements, the Electricity National Control Centre (ENCC), which operates GB's electricity in real time, has two key functions – forecasting and managing the flow of energy and balancing supply and demand on a second-by-second basis.
- NESO is required, as part of its licence, to plan, develop and operate the National Electricity Transmission System (NETS) in accordance with the Security and Quality of Supply Standard (SQSS). SQSS operational criteria consider what the prevailing system conditions are, and specify a range of secured events (or faults) that could occur on the network, and stipulate the conditions that NESO should look to avoid in the event of such faults.

Distribution network

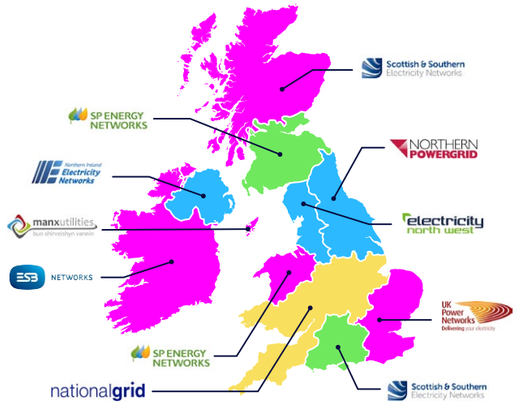
Level of competition & jurisdictional boundary

Electricity distribution networks deliver electricity from the high voltage transmission grid to industrial, commercial and domestic users. Aligned with the transmission network definition (see above), the distribution network is classified as below 275kV in England and Wales and below 132kV in Scotland. There are 14 licensed monopoly distribution network operators (DNOs) in Great Britain and each is responsible for operation, maintenance, and reliability within their regional distribution services area. Following market consolidation, six different corporate groups hold DNO licenses:

- National Grid Electricity Distribution (4 licenses: East Midlands, West Midlands, South Wales, South West England)
- UK Power Networks (3 licenses: London, South East England and East England)
- SP Energy Networks (2 licenses: South Scotland and North West England/ North Wales)
- Scottish and Southern Electricity Networks (2 licenses: North Scotland and Southern England)
- Northern Powergrid (2 licenses: North East England and Yorkshire & Northern Lincolnshire)
- Electricity North West Limited (1 license: North West England)

Distribution Network Operators

ENA, 2025



In 2004, facilitated by the Utilities Act 2000, competition was introduced to the electricity distribution activity to encourage efficiency and innovation, and facilitate tailored services, through opening the market to independent Distribution Network Operators (iDNOs). IDNO networks are mainly extensions to the DNO networks serving new housing and commercial developments, and iDNOs have the same responsibilities as DNOs for operation, maintenance, and reliability.

Remuneration model

The RIIO-ED2 price control, regulated by Ofgem, sets the outputs that the 14 electricity Distribution Network Operators (DNOs) need to deliver for their consumers and the associated revenues they are allowed to collect for the five-year period from 2023-28. Please view the Transmission section above for an overview of the RIIO framework.

Ofgem also regulates the amounts that IDNOs can charge their customers for using their networks via a 'Relative Price Control'. This requires IDNO charges to be capped for all customers at a level broadly consistent with the equivalent DNO charge.

Access rights

Traditionally, users of distribution networks have had few options over access rights. Network access rights define the nature of users' access to the network and the capacity they can use – how much they can import or export, when and for how long, and whether their access is to be interrupted and what happens if it is. Network access requires a connection from the user's equipment to the wider network, and then allocated capacity on the wider network. For most users, their network access is defined via their connection agreement.

In recent years (c. 2019) DNOs have begun offering "flexible connections" as an alternative to paying and/or waiting for the network reinforcement required for a "standard connection". Users with "flexible connections" have no defined cap on the extent to which their network access can be interrupted.

As a result of the Access Significant Code Review conclusion in 2022, Ofgem decided to introduce the following reforms to distribution network access rights:

- **Non-firm (curtailable) access arrangements** – non-firm arrangements will be available to larger network users, where there is a network benefit associated with a curtailable connection offer, distribution network operators will be required to make this option available to the connecting customer, should they wish to opt in to this kind of connection agreement.
- **Curtailment limits for non-firm connections** – the distribution network operator will set curtailment limits and included these in the connection offer to the connecting customer, who will have to abide by those limits.
- **End dates for non-firm arrangements** – Where the customer wishes to connect initially on a non-firm basis, but ultimately be made firm, a date by which the customer should have firm access must be agreed.

Connections

The current connections process operates on a first come first served basis, where users that apply to connect to the electricity distribution system are prioritised based the date their offer is accepted.

In November 2024, NESO put forward for consultation new, agile, future-proof connections reform proposals that includes all projects connecting at transmission level, and any generation projects connecting to the distribution networks that impact upon the transmission system.

The Distribution connections in scope of connections reform include: Small and Medium generation projects, Small and Medium generation projects with a Bilateral Embedded Generation Agreement (BEGA), and Large generation projects with a Bilateral Embedded Licence exemptible Large power station Agreement (BELLA).

To provide further clarity, the projects out of scope for connections reform include:

- Demand projects seeking to connect to the distribution networks
- In addition, demand projects seeking to connect to the distribution networks that are below regional thresholds for Transmission Impact Assessment (TIA) currently have a threshold of 1 MW in England and Wales, 200 kW in mainland Scotland, and 50 kW in the Scottish Islands. Please note, the threshold for England and Wales could be amended pending the decision from charging modification proposal CMP446.

Private networks

Licence Exempt Networks (i.e. private networks) can be connected to either a transmission owner, DNO or iDNO network. They are operated by Private Network Operators (PNO) who distribute electricity to the customers connected to the private network under an exemption from holding a distribution licence.

- Private electricity networks must comply with The Electricity Safety, Quality and Continuity Regulations 2002 as amended, in the same way that licensed operators must also comply. These Regulations set out specific requirements relating to the safety of the public and general requirements relating to quality and continuity of electricity supply.

Production

Generation is a fully competitive, separately licenced activity, regulated by Ofgem. Transmission owners are prohibited from owning generation assets. The number of Major Power Producers (MPPs), defined by DESNZ as companies whose primary purpose is the generation of electricity, has increased dramatically over the last few decades, from only six at the time of privatisation, to over 50 by the early 2020s. This reflects a large number of smaller new entrants in renewable electricity generation such as wind and solar.

According to DESNZ provisional figures, renewable generation achieved a record share of 51% of total UK generation in 2024, far exceeding that of gas (30%) and nuclear (14%). 2024 marked the last generation from coal plant, with the closure Ratcliffe-on-Soar Power Station near Nottingham.

Interconnectors

Level of competition & jurisdiction boundary

An electricity interconnector licence, granted by Ofgem, allows the licensee to participate in the operation of an electricity interconnector. Until 2014, interconnector investment in GB could only be realised via the merchant approach, where developers do not receive any regulated returns on their investment, i.e. they face the full upside and downside risk related to the use of the interconnector. They would typically seek an exemption from aspects of legislation (e.g. Use of Revenues, Third Party Access). Interconnectors built under this model are: IFA (2GW) to France, Moyle (0.5MW) to Northern Ireland, BritNed (1GW) to the Netherlands, the East West Interconnector (0.5GW) to the Republic of Ireland, and ElecLink* (1GW) to France.

*Please note, ElecLink was developed on a merchant basis and holds a partial exemption from having to comply with certain aspects of EU legislation.

From 2014, Ofgem introduced a 'cap and floor' regime alternative to the merchant model, to encourage interconnector development by reducing investor risk (see below). Interconnectors built under this model are: IFA2 (1GW) to France, Nemo (1GW) to Belgium, NSL (1.4GW) to Norway and Viking (1.4GW) to Denmark.

Offshore Hybrid Assets or OHAs (previously known as multi-purpose interconnectors), combine interconnection with the transmission of power generated by offshore wind farms, providing the potential for coordination and transmission asset efficiency benefits compared to standalone point-to-point interconnectors and radial offshore power generator connections. The ambition for OHAs is to connect multiple points in different countries/regions and provide multi-node connectivity, enhanced grid stability, renewable integration, and market efficiency.

Remuneration models

- The cap & floor regime is a market-based approach that aims to incentivise developers to deliver interconnector capacity by limiting developers' exposure to electricity market price risk. The regime sets a yearly maximum (cap) and minimum (floor) level for the revenues that the interconnector can earn over a 25-year period.
- Offshore Hybrid Assets (OHAs): Pilot regulatory framework also features a cap & floor remuneration model, for which two projects (Nautilus and LionLink) were approved in November 2024, based on a multi-criteria assessment which took into account factors such as deliverability, the impact on socio-economic welfare, decarbonisation and security of supply, including modelling of operability and constraint costs. The Nautilus Interconnector will allow electricity to flow between the UK and Belgium, as well as connecting to offshore wind generation in the North Sea. LionLink will connect offshore wind between the UK and the Netherlands.

Access rights

Following Brexit, on 1 January 2021, the UK left the EU's internal energy market. Energy trading through electricity interconnectors between the EU and Great Britain is no longer managed through existing single market tools, such as EU market coupling. The UK and the EU agreed the Trade and Cooperation Agreement (TCA) on 24 December 2020.

Since the end of the transition period, the interconnectors on the borders of GB-FR, GB-BE and GB-NL run explicit auctions for their capacity.

Connections

No consuming or supplying assets are directly connected to electricity interconnectors. Instead the interconnector connects to the national transmission networks at both sides of the border, with the GB connection import and export rights subject to a Bilateral Connection Agreement, Grid Code and the CUSC.

Governance and industry codes

Decision makers involved in the energy sector & their respective powers, and code governance of the different vectors

Prime Minister and Secretary of State

The Prime Minister and Secretary of State set strategic direction and drive major initiatives such as net-zero targets. In addition, they have a strong role during crisis management, e.g. during the recent energy crisis. Finally, they formulate key energy policy, including:

- Defining the remit of government departments
- Generating roles and select delivery bodies to fulfil functions (e.g. creation of Great British Energy)
- Driving inclusion of Net Zero into law.

DESNZ

Department for Energy Security & Net Zero

The Department for Energy Security and Net Zero or DESNZ is established to ensure the UK's energy security and to support the transition to a net zero economy. It is mandated to shape energy policy, regulation, and implementation. It plays a crucial role in creating policy frameworks, strategic direction and targets by formulating primary and secondary legislation:

- Primary legislation: DESNZ has significant powers under the primary legislation related to electricity, such as the Electricity Act and Energy Act. Key acts include:
  - Electricity Act 1989: Makes new provision with respect to the supply of electricity through electric lines and the generation and transmission of electricity for such supply.
  - Energy Act 2004: Makes provision for the development, regulation and encouragement of the use of renewable energy sources and makes further provision in connection with the regulation of the electricity industry.
  - Energy Act 2008: Makes provision in relation to electricity generated from renewable sources; makes provision relating to electricity transmission and makes provision about payments to small-scale generators of low-carbon electricity.
  - Energy Act 2010: Makes provision relating to the demonstration, assessment and use of carbon capture and storage technology and makes provision about reports on decarbonisation of electricity generation and development and use of carbon capture and storage technology.
  - Energy Act 2011: Makes provision for the arrangement and financing of energy efficiency improvements to be made to properties.
  - Energy Act 2013: Makes provision for the setting of a decarbonisation target range and duties in relation to it, and in connection with reforming the electricity market for purposes of encouraging low carbon electricity generation or ensuring security of supply.
  - Energy Act 2023: Makes provision about energy production and security and the regulation of the energy market, including provision about the licensing of carbon capture, transport and storage.
- Secondary legislation: DESNZ uses secondary legislation to implement detailed rules and regulations, such as the Electricity Capacity Regulations 2014 and Contracts for Difference (CfD) regulations, which support the operationalisation of the capacity market and renewable energy incentives.
- Subsidy programmes: DESNZ administers multiple subsidy programmes to achieve specific policy objectives, including the Capacity Market, which ensures sufficient electricity capacity to meet peak demand (see below section on Investment Policy). It also sets the policy framework and decides the rules and timings for each new allocation round of the Contracts for Difference (CfD) scheme, which was designed to promote investment in secure and low-carbon electricity generation while improving affordability for consumers.

Ofgem

ofgem

Ofgem is Great Britain's independent energy regulator. They work to protect energy consumers, especially vulnerable people, by ensuring they are treated fairly and benefit from a cleaner, greener environment.

They are responsible for:

- working with government, industry and consumer groups to deliver a net-zero economy, at the lowest cost to consumers
- stamping out sharp and bad practice, ensuring fair treatment for all consumers, especially the vulnerable
- enabling competition and innovation, which drives down prices and results in new products and services for consumers.

The government is responsible for setting the policy for the energy sector and proposing any changes to this statutory framework. Ofgem have a clear role to play to support policy issues such as decarbonisation and we need to operate within this framework. Ofgem do not direct overall policy in the sector. However, where they think there are important policy gaps that affect consumers, they can call them out.

- Revenue allocation for network development: Ofgem use the RIIO framework as its approach to running its price control periods. RIIO involves setting Revenue using Incentives to deliver Innovation and Outputs designed to encourage energy network companies to:
  - Play a full role in delivery of a sustainable energy sector
  - Deliver value for money network services for existing and future consumers
- Role in electricity market licensing: Ofgem regulate the GB energy industry primarily by granting licences to companies and ensuring that those companies comply with the requirements and conditions of their licence. There is a set of standard licence conditions for each licensable activity. Licensees are obliged to comply with the licence conditions for their type of licence from the day the licence is granted. Licences which Ofgem grants in the GB Electricity market include:
  - Independent System Operator and Planner licence - National Electricity System Operator licences and conditions
  - Transmission Licenses
  - Interconnector Licenses
  - Distribution Licenses
  - Offshore Transmission Licenses
  - Generation Licenses
  - Supply Licenses

- Role in the electricity retail market: Ofgem regulates the retail electricity market to ensure fair pricing and practices. It oversees energy suppliers, enforces compliance with regulatory requirements, and protects consumers, particularly vulnerable ones.

Treasury

HM Treasury

The Treasury plays a crucial role in shaping financial policies for the energy sector, ensuring alignment with the government's economic and environmental goals. Key responsibilities include:

- Approval and risk management: Departments must obtain Treasury approval for transactions deemed novel, contentious, or repercussive.
- Fiscal oversight: The Treasury oversees public spending on energy infrastructure and initiatives.

Devolved administration

Devolved administrations do not set overarching policy and regulatory frameworks for the electricity sector. This responsibility primarily lies with the UK government. Devolved administrations do have responsibilities related to energy efficiency measures. For example, Scotland, Wales, and Northern Ireland have their own policies and programs to improve energy efficiency. Supporting low carbon innovation is part of the devolved administrations' responsibilities. They have various initiatives and programs to promote low carbon technologies and practices. The devolved administrations have their own climate change laws and policies. They contribute to the UK-wide targets but also set their own specific goals and regulations.

NESO

NESO National Energy System Operator

The remit of the National Energy System Operator, NESO, following the 2023 Energy act includes following roles:

- A system planner providing strategic direction for electricity, gas and future systems
- Independent advisor providing analysis and information to the Government and Ofgem
- The system operator for electricity

NESO will promote three objectives as its primary duties:

- Net Zero
- Efficiency and Economy
- Security of Supply

The Electricity National Control Centre (ENCC) operates GB's electricity system in real time. It works around the clock to balance supply and demand, make decisions on any required changes to who provides electricity at any given time and collaborate with network operators across the system.

NESO operates the electricity balancing mechanism and develops and procures a number of additional balancing services to balance and operate the electricity system in a safe, reliable and efficient way.

NESO leads and facilitates the process by which customers connect to the transmission system, liaising with the relevant transmission owners. It is responsible for the connections application and offer process, including leading connections reforms.

NESO plays a fundamental role in the Capacity Market and Contracts for Difference schemes through its role as the Electricity Market Reform Delivery Body. For the Capacity Market, it is responsible for running pre-qualification assessment, disputes management, auctions and ongoing agreement management. For the Contracts for Difference scheme, it has the same scope of responsibilities as in the Capacity Market, excluding ongoing contract management.

NESO also has a number of additional roles related to market rules and wider energy market design. NESO administers the Connection and Use of System Code (CUSC), the Grid Code, the SO-TO Code (STC), and the Security and Quality of Supply Standard (SQSS). It is also a party to the Balancing and Settlement Code (BSC), the Distribution Code and the Uniform Network Code (UNC). NESO is able to propose changes to these codes, provide its expertise and analysis to aid industry discussions, and influence the final recommendations that go to the Authority.

Code Governance

Industry codes underpin the electricity and gas wholesale and retail markets. Licensees are required to maintain, become party to, or comply with the industry codes in accordance with the conditions of their licence. The industry codes are 'live' documents, meaning that they can be changed. Modifications can be proposed by code parties and in some cases other interested parties including Citizens Advice and Citizens Advice Scotland. Ofgem aim to provide decisions on modifications of industry codes, however, according to the licences, relevant parties will be required to be responsible for relevant industry codes.

Code	Description	Administrator
Grid Code	Designed to permit the development, maintenance and operation of an efficient, co-ordinated and economical GB Transmission System, to facilitate competition in the generation and supply of electricity.	NESO
Distribution Code	The Distribution Connection and Use of System Agreement (DCUSA): It is designed to allow the development, maintenance and operation of an efficient, economical and coordinated electricity distribution networks in Great Britain, and for the connection of equipment to them	The Energy Networks Association
Connection and Use of System Code (CUSC)	The contractual framework for connecting to and using the National Electricity Transmission System (NETS).	NESO
Balancing and Settlement Code (BSC)	Contains the rules and governance arrangements for electricity balancing and settlement in Great Britain.	Elexon
System Operator - Transmission Owner Code (STC)	Defines the relationship between the transmission system owners and the system operator.	NESO
Process for code modification	Modifications can be proposed by code parties and in some cases other interested parties. Each code has a panel or committee that oversees the assessment of proposed changes to that code. A general rule is that changes should only be made if they better facilitate that code's ability to meet its objectives. For some proposed changes, the code's panel will also make the final decision on whether implementation is appropriate, but this is not always the case. Certain modifications require consent from the Authority, Ofgem.	OFGEM

Energy security standards

Mandatory security standard metrics for network resilience and energy adequacy, and their statistical approach

Network

Transmission licensees, both onshore and offshore, are required by their licences to comply with the National Electricity Transmission System Security and Quality of Supply Standards (NETS SQSS), which sets out criteria and methodologies for planning and operating the GB Transmission System.

The security of supply standard for distribution networks is set out in Engineering Recommendation P2/8. This sets out the level of redundancy required for different sized groups of demand. The standard is based on a series of principles which inform how network operators plan and invest.

Energy adequacy

Specific energy adequacy metrics include:

- Loss of Load Expectation (LOLE): This metric represents the number of hours per year in which supply is expected on average to be lower than demand under normal operation of the system. The LOLE metric is not a measure of the expected number of hours in which customers may be disconnected but represents periods where the system operator may be expected to employ mitigation actions available to it. The government's reliability standard for security of electricity supply is expressed as a Loss of Load Expectation (LOLE) of three hours per year.
- Value of Lost Load (VoLL): This is an assessment of the value that electricity consumers attribute to maintaining security of supply. There is no single, unique VoLL across the UK energy system. Within the BSC, VoLL is currently administratively set at £6,000/MWh. This VoLL value does not act as a cap for the ESO's balancing actions, but this value of £6,000/MWh is included in the Imbalance Price calculation to represent the cost of any disconnections and voltage reduction instructed by the SO.

Regulation of retail market

Specific retail market interventions, including elements such as price caps, mandated or incentivised usage-based and/or time-of use pricing, and mechanisms for guaranteed supply continuity under retailer failure.

Level of competition and unbundling

The UK electricity retail market is a competitive market, with numerous licensed suppliers offering a range of tariffs and services to consumers:

- The privatisation of the UK electricity retail market followed the Electricity Act in 1989. Since its privatisation, it evolved into a competitive market with over 70 suppliers at its peak. This allowed consumers to choose from various tariffs and suppliers, fostering competition and innovation
- Regulatory interventions have included the introduction of the price cap, enhanced financial resilience requirements for suppliers, and the Supplier of Last Resort mechanism to protect consumers and maintain market stability

Ability to change supplier

Consumers are free to change suppliers without any restrictions.

Powers to enable price cap and price cap in place

A price cap was introduced in Jan 2019 by Ofgem, who has the power to enable a price cap as part of its remit:

- The price cap limits the unit prices and standing charges that suppliers can charge customers on standard variable tariffs and default tariffs
- The cap is reviewed every three months by Ofgem to reflect changes in wholesale energy costs, ensuring fair prices for consumers

Minimum capital requirements for suppliers for license

Until recently, there were no minimum capital requirements to obtains a retailer license, however, this changed at the end of March 2025. The new minimum capital requirements are based around a Capital Floor (absolute minimum) and a Capital Target (preferential minimum capital), and are the same for electricity and gas suppliers.

Tariff pricing

Multiple suppliers offer time of use tariffs (ToUT), however there is no obligation to offer these and no specific regulated incentive to do so. Options include:

- Economy 7 and Economy 10
- EV-specific tariffs
- Wholesale price tracking tariffs

Mechanism for guaranteed supply under retailer failure

The Supplier of Last Resort (SoLR) mechanism ensures that customers of a failed supplier are automatically switched to a new supplier so there will be no interruption to their supply of energy. Suppliers acting as SoLR must demonstrate financial stability, customer service quality, operational capability and plans to integrate transferred customers seamlessly into their systems.

B. Investment policy: Market interventions employed to achieve specific policy objectives

Supply:
Mechanisms to incentivize supply side investments

Production

Mechanisms incentivising or disincentivising investment with production as the key policy objective, via support mechanisms or windfall taxes.

Support mechanism for production

Currently, there are no investment support mechanisms driving production of electricity with production itself as the primary objective.

Windfall tax

The Electricity Generator Levy is a temporary 45% charge on exceptional receipts generated from the production of wholesale electricity. The levy is in effect from 1 January 2023 until 31 March 2028.

It was introduced after European and UK wholesale gas prices reached record highs. This was driven by global factors, including resurgent demand for energy post COVID-19 and Russia's invasion of Ukraine and weaponisation of gas supplies.

One effect of the rise in global electricity prices has been that many UK generators of electricity have received vastly increased revenues for their power because, for structural reasons, the price of electricity is tied to the price of natural gas. Those electricity generators have realised revenues in excess of normal commercial returns. It is these exceptional revenues that the Electricity Generator Levy applies to.

The levy is payable by in-scope companies or groups that generate over 50GWh per year. Exceptional revenue is calculated as the group's revenue from wholesaling electricity that exceeds £75/MWh. The levy is calculated as 45% of the group or company's calculated exceptional revenue above an annual allowance of £10 million.

Decarbonisation

Mechanisms incentivising investment with decarbonisation as the key policy objective, either through support mechanisms or emission penalties.

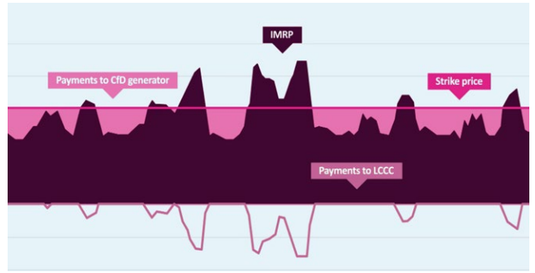
Support mechanism for decarbonisation

Multiple support mechanisms that drive the decarbonisation of electricity supply:

- **Renewable Obligation Certificates (ROC):**
  - The Renewables Obligation (RO) was designed to encourage generation of electricity from eligible renewable sources in the UK. The RO scheme came into effect in 2002 in Great Britain, followed by Northern Ireland in 2005. The scheme places an annual obligation on electricity suppliers to present to Ofgem a specified number of Renewables Obligation Certificates (ROCs) per megawatt hour (MWh) of electricity supplied to their customers during each obligation period (1 April – 31 March). The scheme will continue to support accredited generators until 2027, but closed to new generators in 2017 and was replaced by Contracts for Difference (CfDs).
- **Contracts for Difference (CfDs):**
  - The Contracts for Difference (CfD) scheme is the government's main mechanism for supporting new low carbon electricity generation projects in Great Britain. Contracts are awarded in a series of competitive, pay-as-clear auctions, with the lowest price bids being successful, which drives efficiency and cost reduction. CfDs give greater certainty and stability of revenues to electricity generators by reducing their exposure to volatile wholesale prices, while protecting consumers from paying for higher costs when electricity prices are high. CfDs require Generators to sell energy into the market as usual but, to reduce this exposure to electricity prices, CfDs provide a variable top-up from the market price to a pre-agreed 'strike price'. At times of high market prices, these payments reverse and the Generator is required to pay back the difference between the market reference price and the strike price, thus protecting consumers from overpayment.
  - Since 2014 there have been 6 CfD auctions, or allocation rounds, with a pot structure defining which technologies compete against each other.
  - The Low Carbon Contracts Company (LCCC) is the counterparty to the contracts awarded in CfD allocation rounds, its primary role is to issue contracts, manage them during the construction and delivery phase and make CfD payments.
- Capacity awarded in each Allocation Round
  - AR1 (2015) - 2.1 GW
  - AR2 (2017) - 3.3 GW
  - AR3 (2019) - 5.8 GW
  - AR4 (2021) - 10.8 GW
  - AR5 (2023) - 3.7 GW.
  - AR6 (2024) Revised: 9.6 GW

The CfD Funding Mechanism

LCCC



The Intermittent Market Reference Prices (IMRP), the GB Day Ahead Hourly Price, is calculated as the weighted average across the day ahead indicies. IMPR are used to calculate CfD Generator payments for intermittent generators.

- **Nuclear Regulated Asset Base (RAB):**
  - The Nuclear Energy (Financing) Act 2022 introduced the option of a Regulated Asset Base (RAB) model to help fund future nuclear energy projects. A RAB model is a tried and tested method, to finance large scale infrastructure assets such as water, gas and electricity networks. Under this model a company receives a licence from an economic regulator to charge a regulated price to consumers in exchange for providing the infrastructure in question. The model enables investors to share some of the project's construction and operating risks with consumers, significantly lowering the cost of capital which is the main driver of a nuclear project's cost to consumers.
- **Power Bioenergy with Carbon Capture and Storage (Power BECCS) Business Model:**
  - The previous government sought views on the government's minded-to position for a business model to incentivise deployment of power bioenergy with carbon capture (BECCS) within the UK. Please note, the policy positions remain subject to further development by the government and do not represent final positions.
  - The government response to this consultation on the proposed business model for power BECCS confirmed the positions of Dual CfD as the preferred model, as it offers a clear distribution of costs and risk allocation. The Dual CfD mechanism would consist of a Contract for Difference for electricity (CfDe) and a Contract for Difference for carbon (CfDc):
    - CfDe: A CfD for electricity generation (in £/MWh) where the generator is paid the difference between a contractually agreed strike price and a market reference price for electricity.
    - CfDc: A CfD for carbon (in £/tCO_2) under which a subsidy is paid above the prevailing carbon price for negative emissions (such as the UK ETS, a voluntary carbon market or bilateral negative emissions sale) up to an agreed strike price.
- **Power CCUS Dispatchable Power Agreement (DPA):**
  - The Dispatchable Power Agreement (DPA) is a private law contract, based on the renewables contract for difference (CfD), of between 10 and 15 years between a power plant developer and a DPA contract counterparty. The DPA business model has been designed to support Power CCUS by incentivising natural gas fired power facilities to install and operate equipment to capture the carbon dioxide (CO_2) produced when generating electricity, for transport to a permanent storage site. The DPA will incentivise power projects to produce low-carbon, mid-merit electricity, meaning plants are only incentivised to turn on when zero carbon sources of generation, such as renewables and nuclear power, are not meeting the needs of the country. Power CCUS can provide non-weather dependent, dispatchable low carbon generation.
  - The first DPA contract was signed for the East Coast Cluster in Teesside in November 2024. Net Zero Teesside Power aims to be the first gas-fired power station with carbon capture and storage.
- **Hydrogen to Power Business model:** Government consulted on the need for and potential design of market intervention to support deployment of a hydrogen to power (H2P). Following its minded-to position, government will be introducing a DPA-style mechanism for H2P (the H2P BM). This business model is based on elements of the power CCUS dispatchable power agreement (DPA), but adapted to suit the needs of H2P.

Penalty for emissions

The UK Emissions Trading Scheme (ETS) applies to emissions from power generation. It applies to combustion of fuels on a site where combustion units with a total rated thermal input exceeding 20MW are operated.

Energy adequacy & flexibility

Mechanisms incentivising investment with energy adequacy and/or flexibility as the key policy objective, through support mechanisms.

Support mechanism for adequacy

The key support mechanism specifically to drive energy adequacy is the Capacity Market, although other mechanisms mentioned in the decarbonisation section also indirectly contribute.

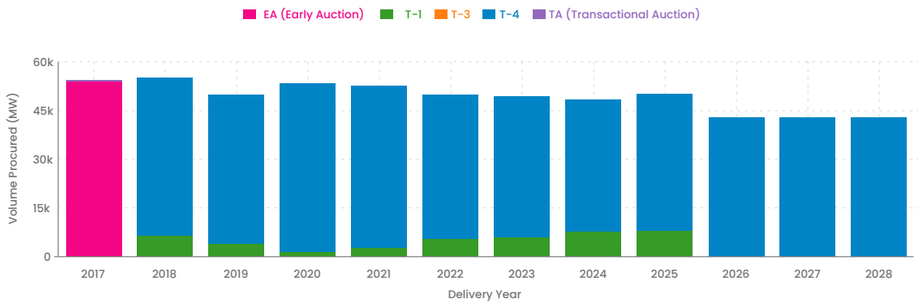
- **Capacity market (CM):**
  - Established in 2014 as part of the Electricity Market Reform (EMR) programme. The primary objective of the CM is to ensure the security of Great Britain's (GB) electricity supply by providing incentives for capacity to be on the electricity system and deliver that capacity when needed during system stress events.

Support mechanism for flexibility

A number of support mechanisms for decarbonisation will also indirectly support flexibility, including the Power BECCS business model, Dispatchable Power Agreement, and the Hydrogen to Power business model. There is, however, one specific support mechanism designed to support flexibility as its principal policy objective.

- **Long Duration Energy Storage mechanisms (LDES):**
  - Long duration energy storage (LDES) is a key enabler to a secure, cost-effective and low carbon energy system. LDES can help to decarbonise the system by storing excess renewable generation over longer periods of time (days, weeks, and months), replacing flexibility from fossil fuelled generation and helping to alleviate constraints on the grid.
  - The government has decided that an LDES cap and floor should be introduced as the optimal policy approach to best facilitate rapid and efficient LDES investment.
  - Ofgem has agreed to act as the regulator for LDES, which encompasses the role as the investment framework delivery body, as well as setting out some high-level decisions on the scale and scope of the scheme. The government will continue to work with Ofgem, NESO and industry to further develop the scheme, with the intention of Ofgem opening a scheme to applications in 2025.

Capacity Market: Volume by Auction Type (MW)



Demand:
Mechanisms to incentivise demand side investments

Consumption

Mechanisms incentivising investment with consumption as the key policy objective, through support mechanisms for consumption.

Support mechanism for consumption

There are no support mechanisms for consumption of electricity with consumption itself as the key policy objective.

Decarbonisation

Mechanisms incentivising investment with decarbonisation as the key policy objective, either through support mechanisms or emission penalties

Support mechanism for decarbonisation

- Energy Company Obligation (ECO):
  - First introduced in 2013, the ECO is a government energy efficiency scheme in Great Britain designed to tackle fuel poverty and help reduce carbon emissions.
  - The ECO scheme works by placing a Home Heating Cost Reduction Obligation (HHCRO) on medium and large energy suppliers.
  - Obligated suppliers must promote measures that improve the ability of low-income, fuel-poor and vulnerable households to heat their homes. This includes actions that result in reduced energy usage, such as installing insulation or upgrading a heating system.
- Great British Insulation Scheme (GBIS):
  - GBIS is a new government energy efficiency scheme administered by Ofgem. Similar to its predecessor ECO+, it is designed to deliver improvements to the least energy-efficient homes in Great Britain to tackle fuel poverty and help reduce energy bills. The scheme also works by placing an obligation on medium and large energy companies to deliver measures that result in reduced energy usage. It began in April 2023 and is scheduled to end in April 2026.
- Boiler Upgrade Scheme:
  - The Boiler Upgrade Scheme (BUS), first opened in 2022, supports the decarbonisation of homes and small and medium non-domestic buildings in England and Wales.
  - The scheme provides upfront capital grants of up to £7,500 to encourage property owners to replace existing fossil fuel heating with more efficient, low carbon heating systems including heat pumps
  - The BUS budget for financial year 2024/25 is £205 million, with the ability to over-allocate vouchers up to £280 million. On 21 November 2024, the government announced that the budget for 2025/2026 for the Boiler Upgrade Scheme will be £295 million. Budgets for subsequent years will be confirmed as part of the second phase of a multi-year Spending Review which will conclude in spring 2025.

Energy adequacy & Flexibility

Mechanisms incentivising investment with energy adequacy and/or flexibility as the key policy objective, through support mechanisms.

Within the Capacity Market, consumer-led flexibility is delivered via 'Demand Side Response' mechanisms. These allow consumers to be rewarded through Capacity Payments made via 'Demand Side Response Service Providers' (DSRSPs) who act on the consumer's behalf to reduce electricity demands on the grid at peak times. The financial benefits of flexibility on offer to consumers reflect the benefits to the wider electricity system, which in turn benefits all consumers.

Under the previous government, the recent T-1 (24/25) and T-4 (27/28) CM auctions awarded 10% of total auction capacity in the T-1 for delivery years 2024/25 and 3% in the T-4 for delivery years 2027/28 to DSR units.

The government is considering reforms to the CM with respect to Demand Side Response mechanisms, to enable consumer-led flexibility.

C. Operational market design: Market design elements that match supply and demand and enable stable and reliable day-to-day operations

Wholesale market

Operational market design related to facilitating the matching of supply and demand

Wholesale Market

The GB electricity system has a national wholesale market.

Wholesale trading is the sale and purchase of electricity between suppliers (to meet the demands of their customers) and generators of electricity.

Locational granularity

Currently, the locational granularity of the GB wholesale electricity price is national. Under national pricing arrangements, the wholesale electricity price is set by the national marginal plant (i.e. the most expensive plant needed to meet demand).

The Review of Electricity Market Arrangements (REMA) aims to identify reforms needed to transition to a decarbonised, cost effective and secure electricity system. One of the options under consideration is zonal pricing. Under zonal pricing, each zone has different electricity prices based on their respective levels of supply, demand and available grid.

Temporal granularity

Electricity is traded in half hour 'chunks'. These half hour chunks are referred to as settlement periods.

Dispatch

The existing dispatch mechanism in Great Britain is a self-dispatch wholesale electricity market. Under a self-dispatch system, buyers and sellers of electricity contract ahead of time for their anticipated demand at prices that are bilaterally negotiated or determined through demand and supply matching on public exchanges. Generators and suppliers prepare operating plans for their anticipated physical behaviour or that of their customers. The parties communicate their anticipated physical behaviour and their contractual position to the System Operator (NESO).

NESO has a licence provided by Ofgem and a requirement to operate a safe, reliable and efficient network. As such, NESO has a set of standards that the Electricity National Control Centre (ENCC) must meet. NESO's regulation includes the focus on continuation of service, using the cheapest power available on the system at any given time.

NESO manages the balancing supply and demand close to real time, at a point known as 'gate closure'. It is an intrinsic feature of modern electricity systems that at some point the matching of physical supply and demand requires central control over operating decisions.

Gate closure

Gate Closure is a point one hour prior to the start of a Settlement Period. This is the point by which Balancing and Settlement Code Parties must submit information to NESO regarding their planned production or consumption in a Settlement Period.

Final Physical Notifications (FPNs) have to be submitted to the System Operator by Gate Closure for each Settlement Period. Final Physical Notification for a Balancing Mechanism (BM) Unit is the level of Import or Export that the Party expects to Import or Export in a Settlement Period.

At gate closure, wholesale market trading ceases for that half our period.

Contractual and information imbalance settlement

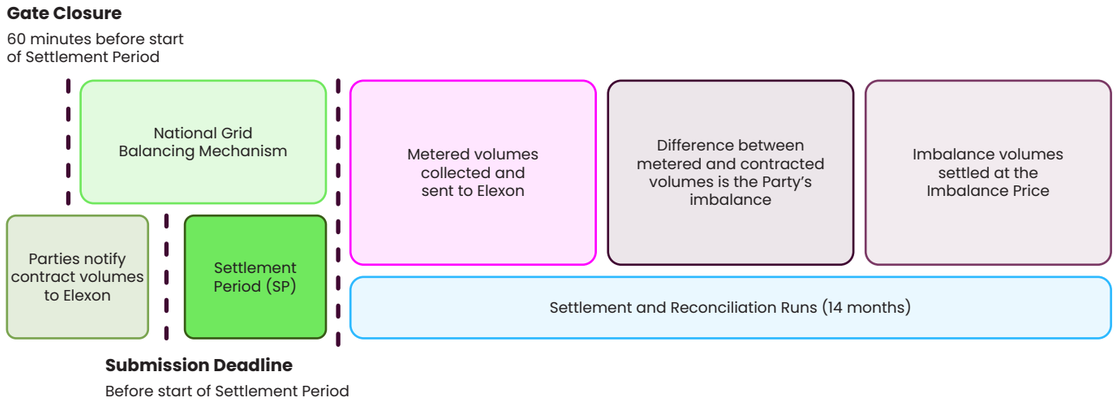
Following Gate Closure, NESO uses the Balancing Mechanism to balance the system. Contract notifications, bids and offers, and other data, is sent to BSC Central Services for Imbalance Settlement.

The Balancing and Settlement Code contains the rules and governance arrangements for electricity balancing and settlement in Great Britain. The BSC is administered by Elexon. The code covers the metering of the physical production and demand for electricity from generators, suppliers and interconnectors in relation to their contracted positions. The code also covers the calculating and settling of any imbalances when delivery or offtake doesn't match those positions.

The Imbalance Price is used to settle energy imbalance volumes. The Imbalance Price is a financial incentive for market participants to accurately forecast generation and demand and match it with energy contracts ahead of the Settlement Period.

Settlement and Gate Closure

Elexon



- If market participants used more electricity than contracted for, market participants must buy additional electricity from the system at System Buy Price.
- If market participants generated more electricity than contracted for, market participants have to sell the additional electricity to the system at System Sell Price.

The System Sell Price (SSP) and System Buy Price (SBP) are the 'cash-out' or 'Energy Imbalance' prices. Please note, although imbalance settlement originally used a "dual cashout" process, in practice there is now a single cashout system with a single price calculation, such that SBP equals SSP in each settlement period.

The SSP is paid to BSC Trading Parties who have a net surplus of imbalance energy, and SBP is paid by BSC Trading Parties who have a net deficit of imbalance energy. These prices are designed to incentivise Parties to balance their position.

Balancing and settlement

Processes and mechanisms to manage and reconcile discrepancies between supply and demand and ensure operability of the system.

Energy balancing

Routine processes and mechanisms to ensure balance of supply and demand under typical operating conditions, further specified through the primary balancer, residual balancer, dispatch mechanism, and gate closure where applicable.

- NESO's Electricity System Operator licence sets out its obligation to operate the electricity system in a safe, reliable and efficient way. NESO is also required under its licence to comply with the Grid Code, which is the technical code for connection and development of the National Electricity Transmission System (NETS).
- Under these requirements, the ENCC has two key functions – forecasting and managing the flow of energy and balancing supply and demand on a second-by-second basis by issuing instructions in the BM and balancing services.

System balancing services

Mechanisms and contractual arrangements employed by system operator to facilitate real-time system operation, including sub-settlement period energy balancing (to resolve short-term discrepancies between supply and demand), and ancillary services to maintain system stability and security

It is key to note that the NESO's balancing actions instructed via the balancing mechanism (BM) are of two types:

- Energy imbalance actions: due to total amount of electricity contracted for by generators and suppliers ahead of a settlement period varying from actual demand over that period.
- System imbalance actions: due to grid constraints, or minute-to-minute variances between demand and generation within a settlement period needing balancing actions, even if demand would have matched generation for the period as a whole without those actions.

In addition to BM actions, NESO procures services to balance demand and supply, and ensure the security and quality of the electricity supply across Great Britain's transmission system.

Two key ancillary services support sub-settlement period energy balancing:

- Frequency response:
  - As part of NESO's licensing obligations, the system frequency is controlled at 50Hz plus or minus 1%. NESO currently actively procures the following response services:
    - Static Firm Frequency Response (static FFR)
    - Mandatory Frequency Response (MFR)
    - Dynamic Services (Dynamic Containment, Dynamic Moderation and Dynamic Regulation)
    - Commercial Frequency Response
- Reserve Services:
  - At certain times of the day, there is a need to access sources of extra power in the form of either increased generation or demand reduction. These additional power sources available to NESO are called 'reserve services.'
  - Different types of reserve services exist across different timescales, and include Balancing Reserve, BM start up, Fast reserve, Short term operating reserve, Super SEL, Slow reserve, and Quick reserve..

Ancillary services

Other ancillary services include:

- Reactive power services: help NESO ensure voltage levels on the system stay within a specific range. NESO instructs generators or other asset owners to either absorb or generate reactive power.
- Demand Flexibility Service: Innovative new service offers incentives for flexing the times when consumers use electricity, helping NESO manage the electricity system.
- Local Constraint Market: NESO is trailling a new Local Constraint Market to access new sources of flexibility to help manage one of our most constrained boundaries , the B6 boundary, which roughly aligns with the border between Scotland and England.

Energy balancing – emergency

Procedures and mechanisms implemented to address severe imbalances between supply and demand that threaten the stability and reliability of energy system, further specified through the central balancing function, wholesale market closure, balancing notice and load shedding merit order.

In certain circumstances it will be necessary, in order to preserve the integrity of the GB Transmission System and any synchronously connected external system, for NESO to issue Emergency Instructions. In such circumstances it may be necessary to depart from normal Balancing Mechanism (BM) operation in accordance with BC2.9 of the Grid Code.

These circumstances may include system events and situations involving the requirement for demand control, Negative Reserve Active Power Margin, System Restoration, frequency response and communication failure. For example:

- In extremely rare and unusual circumstances where forecast demand for electricity is greater than the levels of supply available, issued margin notices from NESO (i.e. Electricity Margin Notice or Capacity Market Notices, which are routine ways for NESO to communicate to the market), might be followed by a High Risk of Demand Control (HRDR) or Demand Control Imminent (DCI) notification. In the unlikely event of NESO instructing Distribution Network Operators (DNOs) to begin demand control, they might reduce voltage to manage demand without affecting supply, or – in more severe situations – they might temporarily disconnect some consumers through a controlled process to reduce electricity demand on the system [please see the section below].
- At times of low demand, or in periods where less controllable generation connected directly to distribution networks makes up more of the supply, NESO might identify the need for additional flexibility on the system. NESO may issue a Negative Reserve Active Power Margin (NRAPM) notice. It is a way to tell power stations that NESO might need them to turn down output to retain its safety margin, and NESO would expect them to respond. NRAPM notices are rare – a small number of local NRAPMs have been issued, and none at a national level.

Load shedding merit order

If a sudden or short-duration electricity shortfall affected a specific region, or the whole country, NESO would implement the Demand Control process as set out in the Grid Code, Operating Code 6 (OC6): Demand Control. This process allows NESO to instruct DNOs to reduce up to 20% of demand at short-notice (5 minutes) with an additional 20% made available at 1 days' notice.

If a prolonged electricity shortfall affected a specific region, or the whole country, NESO and the DNOs would implement rota disconnections using the process defined in the Electricity Supply Emergency Code (ESEC) . This process ensures fair distribution nationally while still protecting those who require special treatment. Sites are protected if they need to have their electricity supply maintained because of a national or regional critical need; public health and safety issues; the potential for catastrophic damage to high value plant. Once invoked, this process allows the government to direct NESO to implement rota disconnections for up to 90% of demand at 1 days' notice.

D. Cost allocation: Allocation mechanisms of various costs

Policy costs
Costs incurred from providing policy support to achieve specific government objectives, generally for investments

Allocation on taxpayer and market participants

Policy costs are allocated 100% to market participants and passed on to final consumers through their energy bills. In exceptional circumstances, costs can be imposed on taxpayers, e.g. the government Energy Price Guarantee from October 2022 – March 2024.

Charges (levies), charging base and basis

Several levies are charged to suppliers and passed through to consumers, generally on a £ per kWh basis, such as:

- **Renewable Obligation Certificates (ROC):**
  - The cost of the RO to suppliers is passed onto consumers via their electricity bills.
- **Feed-in Tariff (FiT)**:
  - The FiT scheme was established to promote the development of small-scale renewable and low carbon electricity generation projects with a capacity of less than 5MW. The FiT scheme was introduced in 2010, and closed to new applicants from 2019. FIT generators registered with their choice of FIT licensee, from whom they receive payments at least quarterly for the electricity their accredited installations generate and export. FIT generators receive support for between 10 and 25 years depending on technology type, capacity, when their installation was commissioned, and whether it was previously accredited under the Renewables Obligation scheme.
  - The costs of the scheme are then spread across all licensed electricity suppliers in Great Britain through the 'levelisation' process based on their share of the electricity supply market, and passed onto consumers via their electricity bills.

Electricity

- **Contracts for Difference (CfD):**
  - The net cost of the CfD scheme is passed onto consumers' electricity bills via suppliers as a per unit charge on consumption.
- **Capacity Market (CM):**
  - All suppliers are obligated to finance the Capacity Market (CM) arrangements through the Settlement Costs Levy (SCL) and the Capacity Market Supplier Charge, which are subsequently passed onto consumer bills. For all CM Calculations, a Supplier's market share is based on Chargeable Demand between 4pm and 7pm on Working Days from the start of November to the end of February.
- **Energy Company Obligation (ECO):**
  - Energy suppliers are obligated to deliver the scheme and they recover the costs of delivering the scheme through customers' energy bills.
- **Warm Homes Discount (WHD):**
  - The Warm Homes Discount is a one-off £150 discount off eligible consumer electricity (or gas) bill. The Warm Home Discount was first introduced by the Government in April 2011 to help eligible customers in England, Scotland and Wales with their energy bills during the winter.
  - Energy suppliers (with over 1,000 domestic customers) are obligated to participate in the scheme, and they recover the costs of delivering the scheme through customers' energy bills.
- **British Industry Supercharger (BIS):**

The BIS is a set of three measures implemented by the government to make Energy Intensive Industries (EIIs) more competitive across Europe and tackle the challenge of indirect carbon leakage.

The 3 measures are as follows:

- An increase in the subsidy under the existing EII Renewable Levy Exemption scheme from 85% to 100% aid intensity (relief for the costs associated with the CfD, ROCs, and FiT schemes)
- A new full exemption from the indirect costs associated with the GB Capacity Market
- A proposed compensation scheme for the charges paid for using the GB electricity grid through the EII Network Charging Compensation (NCC) Scheme

Transmission network costs

Costs incurred to remunerate network transmission companies to account for investment, operational & maintenance costs for transportation over long distances

Allocation to taxpayer and market participants

Transmission network costs are allocated 100% to market participants.

Charging base and charging basis

Transmission Network Use of System (TNUoS) charges recover the cost of installing and maintaining the transmission system in England, Wales, Scotland, and offshore. These charges apply to Generators, Suppliers and Directly connected transmission demand.

Overall TNUoS cost recovery is split between supply and demand to comply with EU Regulation 838/2010, which states that the average annual transmission charge should be between €0-2.50/MWh, which in turn affects how much TNUoS is recovered through demand charges and generation charges. In 2024/2025, this was a 25% : 75% split between supply and demand.

Tariffs are broken down as below:

1. The **Locational** charge (wider TNUoS) – calculated by the Transport model - this reflects the incremental cost of power being added to the system at different geographical points.
2. The **Residual** charge (wider TNUoS) – what is not recovered under the Locational charge is recovered in this charge so that the Transmission Owners recover their total allowed revenue.
3. **Adjustment** charge (ensure that the generation tariffs are compliant with EU legislation (€2.50 gen cap))

Generators who are connected to the transmission network and embedded generators with >=100MW Transmission Entry Capacity (TEC) pay wider TNUoS charges based on TEC. There are also local substation and circuit tariffs for onshore and offshore generators.

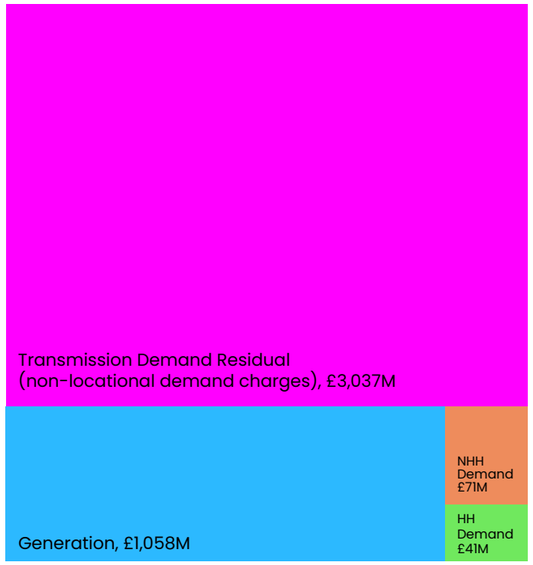
All licenced suppliers are liable for TNUoS for their gross demand from the transmission network. There are four categories of demand charges:

- **Half Hourly (HH)** customers are charged according to the demand they take over the three Triad periods each year; the charge is levied through a £/kW tariff. Triads are defined as the three half-hours with the highest net system demand, between November and February (inclusive), separated by at least ten clear days.
- **Non-Half Hourly (NHH)** customers are charged based on their annual consumption between 4 and 7pm daily, through a pence/kWh tariff.
- **Embedded Export Tariff (EET)**, a credit for embedded generation over the Triad periods. All directly connected demand sites pay HH demand charges and embedded generators (<100MW) which contracts directly with National Grid ESO can gain Embedded Export payments.
- **Transmission demand residual** charges are levied on all final demand and are calculated on a £/Site/Day basis, with sites allocated into a band.

Who pays TNUoS

NESO, 2024/ 25

Values in £M



The Network Charging Compensation (NCC) Scheme is part of the BIS package of government measures to help Britain's Energy Intensive Industries (EIIs) remain competitive in the global market.

- This scheme offers EIIs 60% compensation on network charging costs for using the GB electricity grid from April 2024.
- This is funded by a levy on electricity Suppliers known as the EII Support Levy.
- The compensation payments for eligible EII will begin after April 2025.

The compensation applies to all electricity network charges, including TNUoS, DUoS and BSUoS.

Inter-temporal cost allocation

Electricity transmission network costs are spread over the lifetime of transmission assets, currently set by Ofgem at 45 years for economic asset life.

Balancing costs

Costs incurred by the system operator to ensure real-time balance between supply and demand, including the procurement and deployment of balancing services

Allocation to taxpayer and market participants

Balancing costs are allocated 100% to market participants.

Charging base and charging basis

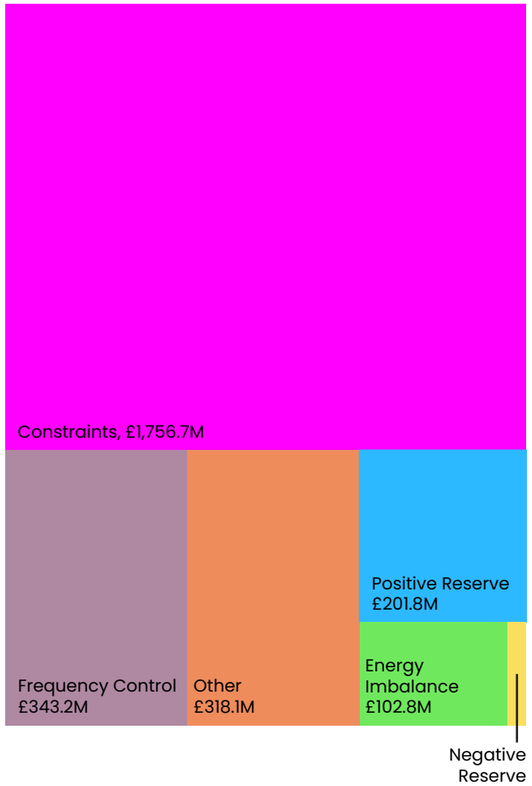
Balancing Services Use of System (BSUoS) charges recover the cost of day-to-day operation, including the cost of balancing, the electricity transmission system.

- BSUoS charges are passed on to suppliers, who pass these costs onto consumers
- BSUoS charges are also applied to Directly connected transmission demand
- Since April 2023, BSUoS has been charged as a ex-ante fixed volumetric £/MWh charge.

Forecast Balancing Cost Components (2025/26)

NESO, 2024

Values in £M



Distribution network costs

Costs incurred to remunerate network distribution companies to account for investment, operational & maintenance costs for final stage transportation to end users.

Allocation on taxpayer and market participants

Distribution network costs are allocated 100% to market participants.

Charging base and charging basis

Distribution Use of System charge (DUoS) Costs are paid to Distribution Network Operators (DNOs) for the cost of building and maintaining the local distribution network.

DUoS charges can be divided into two elements:

- 'forward-looking' charges that are designed to ensure network users receive signals that are reflective of the costs of how and when they use the network
- 'residual' charges that are designed to recover the rest of the relevant DNO's allowed revenue once the forward-looking charges have been levied. The methodology used to calculate DUoS charges for low and high-voltage connected users is called the CDCM, and is set out in the Distribution Connections and Use of System Agreement (DCUSA).
- Customers are charged based on different components (please note not all customers will be charged all of these), including:
  - Consumption based unit charges (p/kWh)
  - Fixed charges (p/MPAN/day)
  - Capacity charges (p/kVA/day)
  - Reactive power charges (p/kVArh/day).

The 60% compensation on network charging costs via the NCC scheme described above also applies to DUoS charges.

Areas with High Electricity Distribution Costs (AAHEDC)

AAHEDC was implemented as part of the Energy Act 2004, and is designed to reduce the cost of electricity distribution in "specified areas", currently defined as North Scotland only. It is applied as a single unit based charge to each supplier based on their settled consumption.

Inter-temporal cost allocation

Electricity distribution network costs are spread over the lifetime of transmission assets, currently set by Ofgem at 45 years for economic asset life.

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NESO
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